

SUSITNA HYDROELECTRIC PROJECT

EBASCO ESTIMATING PACKAGE

REVISION 3

JANUARY 29, 1982

Prepared by:



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT
EBASCO Estimating Package

January 29, 1982

PAGE

1 - GENERAL

1.1 - Revision Three Discussion

1

2 - WATANA

2.1 - Quantity Notes and Assumptions

3

2.2 - List of Drawings

5

2.3 - Revised Computer Listing

Enclosed

3 - DEVIL CANYON

3.1 - Quantity Notes and Assumptions

6

3.2 - List of Drawings

7

3.3 - Revised Computer Listing

Enclosed

SUSITNA HYDROELECTRIC PROJECT
EBASCO Estimating Package
Revision Three Discussion

January 29, 1982

1.1

1. The computer listing has been updated to include quantities developed from the engineering drawings. The following general items should be noted:

- o The Mechanical and Electrical work items have been revised to reflect the design drawings and assumptions. A draft copy of the "Devil Canyon Turbines and Powerplant Mechanical Equipment Data" is included for reference.
 - o Notes have been included on the listing to indicate under which heading various items are to be listed.
 - o The camp quantity listings (Account 63) have been revised.
 - o Quantities for the pioneer access roads have been developed and included on the listings.
 - o The construction road item has been deleted from the individual structure listings. This item will instead be carried as part of Account 336.
2. The following schedules are being used in the preparation of the estimate and are included for reference:

<u>Schedule</u>	<u>Description</u>
1	Underground Rock Bolting - Watana and Devil Canyon
2	Underground Steel Support - Watana and Devil Canyon
3	Shotcrete - Watana and Devil Canyon
4	Reinforcing Steel Ratios - Watana and Devil Canyon
5	Grouting for Penstock Tunnels and Upstream of Powerhouse - Watana and Devil Canyon
6	Power Facility Drainage - Watana and Devil Canyon
7	Grouting for Diversion Tunnels - Watana and Devil Canyon

SUSITNA HYDROELECTRIC PROJECT
EBASCO Estimating Package
Revision Three Discussion

January 29, 1982

1.1 Continued

3. The following items are also included for reference:

- o Acres Memos, January 11 and 13, 1982
Re: Electric Power and Water
- o Acres Memo, January 16, 1982
Re: Main Dam Assumptions
- o Acres Note, January 19, 1982
Re: Road Gradients
- o Transmission Line Specifications Package,
January 26, 1982

4. The following assumptions are also being made:

- o The roof or crown of all underground work will be fully covered by 2" chain-link mesh for safety purposes. This mesh will be left in place and will, therefore, be encased in concrete in all lined tunnels.
- o Additional mesh is being listed for 20 percent of the shotcreted ceilings in all tunnels ten feet or less in diameter and for 20 percent of the shotcreted wall areas in all underground work.
- o Generally 25 percent of all exposed inclined rock faces will be rockbolted with one inch, 15 foot long bolts in a 10 foot by 10 foot pattern. In addition, a row of bolts (3.0' O.C.) are being included around all portal openings.
- o Surface preparation is being included for all horizontal and inclined concrete contact areas. Separate line items are being developed for aboveground work, and a single line item is being developed for belowground work.
- o No item is being listed for rock overbreak, and all rock excavation is being taken to the neat drawing lines. An allowance is being made for concrete overbreak as listed with each overbreak line item. As an example, 12"H/6"V indicates 12 inch overbreak concrete has been allowed for horizontal (slab) concrete contact areas and 6 inches for vertical (wall) concrete contact areas. In general, a 6 inch allowance has been included for all lined tunnels.

SUSITNA HYDROELECTRIC PROJECT
EBASCO Estimating Package
Watana Quantity Notes and Assumptions

January 29, 1982

2.1

1. Quantities were revised throughout to reflect updated design.
2. The following assumptions and notes apply to specific account items:

o ACCOUNT NO. 331.12 - ACCESS TUNNELS & PORTALS

- The listing for access tunnels has been expanded to include the variously sized tunnels. The "connector tunnel" connects the powerhouse to the access shaft. The "access shaft tunnel" connects the transformer gallery and surge chamber to the access shaft.

o ACCOUNT NO. 332.2 - DIVERSION TUNNELS/COFFERDAMS

- The diversion tunnel listing includes quantities for the portions of the tailrace tunnel and the portal which are also used during diversion.
- The listings have been divided to identify the upper and lower tunnel quantities as appropriate. Portal excavation quantities have been assigned to the upper, lower, or to both portals as appropriate.
- An item has been added to allow for removal of liner concrete to allow the keying in of the permanent (lower tunnel) plug and gate or valve (upper tunnel) control.
- Items for the access tunnel from the emergency release chambers to a portal near the main access tunnel portal have been added. Design assumptions for this tunnel are the same as for the main access tunnel.

o ACCOUNT NO. 332.3 - MAIN DAM

- Quantities for the main dam have been revised to reflect the change in the dam core slopes as shown on Drawing SK-5700-C6-516.

o ACCOUNT NO. 332.4 - RELICT CHANNEL

- Quantities and items have been revised to include placement of shore protection and a downstream filter blanket for the north bank relict channel.

o ACCOUNT NO. 332.51 - TUNNEL SPILLWAY

- The tunnel spillway listing has been revised to reflect the dual functions of the inlet and outlet facilities. The intake and approach civil work items have been included with the power intake quantities. The outlet civil works have been included with the main spillway valve block.

SUSITNA HYDROELECTRIC PROJECT
Watana Quantity Notes and Assumptions

January 29, 1982

2.1 Continued

2. Continued

o ACCOUNT NO. 332.51 - TUNNEL SPILLWAY

- The estimating assumptions for the tunnel are the same as used for the penstocks.

o ACCOUNT NO. 332.9 - TAILRACE

- A portion of one tailrace and one portal have been included with the diversion listing due to their common function.

3. The split between rock waste and rock usable has been eliminated for all portal excavations. It has been maintained for the main dam, main spillway, and intake approach channel to allow for inclusion of usable rock in the downstream dam shell.

SUSITNA HYDROELECTRIC PROJECT
List of Drawings - Watana

January 29, 1982

2.2

DRAWING NUMBER

SK-5700-C6-511

<u>DRAWING NUMBER</u>	<u>TITLE</u>
" 513A	General Arrangement
" 513B	Diversion - Tunnels Plan & Profile
" 513C	Diversion - Tunnels Profile
" 514	Diversion - Intake Structures
" 516*	Emergency Release Sections
" 524	Main Dam Sections
" 528*	Outlet Facilities Gate Structure Intake
" 529	Power Facilities Access Plan & Profile
" 530A	Powerhouse General Arrangement Plans Sheet 1
" 530B	Powerhouse General Arrangement Plans Sheet 1
" 531	Powerhouse General Arrangement Sections Sheet 2
SK #1	Transformer Gallery General Arrangement Plan and Sections
	Powerhouse Single Line Diagram
	Watana Construction Schedule

* Revision of drawings issued in Revision 2.

SUSITNA HYDROELECTRIC PROJECT
EBASCO Estimating Package
Devil Canyon Quantity Notes and Assumptions

January 29, 1982

3.1

1. Quantities were revised throughout to reflect updated design.
2. The following assumptions and notes apply to specific account items:

o ACCOUNT NO. 332.12 - ACCESS TUNNELS & PORTALS

- See note for Watana.
- Quantities for two tunnels which will be used to contain the pipe carrying downstream compensation water have been included. One tunnel (compensation water tunnel 10') connects the powerhouse/surge chamber to the penstock access tunnel. The other tunnel (compensation water tunnel 35') connects the penstock access tunnel to the portal and discharge point.
- These tunnels will be used for access during construction and will then have an 8' diameter steel pipe installed within them to carry the compensation water. This water is necessary to maintain a downstream flow between the dam and the tailrace outlet upon project completion. The compensation water pipe will be fed by pumps located in the powerhouse area.
- Estimating criteria for the smaller tunnel is the same as for grout galleries. Estimating criteria for the larger tunnel is the same as for the main access tunnels. The 8' pipe is included as an item with the powerhouse civil works.

o ACCOUNT NO. 332.53 - EMERGENCY SPILLWAY

- The emergency spillway has been redesigned and includes a pilot channel rather than a full rock cut channel. Quantities have been revised to reflect this change.
3. All rock usable and rock waste quantities have been combined except for the emergency spillway. It is assumed that the emergency spillway will produce enough usable rock to construct the adjacent saddle dam. All other rock excavation will either be wasted or used for road bases, etc.

SUSITNA HYDROELECTRIC PROJECT
List of Drawings - Devil Canyon

January 29, 1982

3.2

DRAWING NUMBER

SK-5700-C6-611

Diversion - General Arrangement
Plan and Profile

" 612

Diversion - Inlet and Outlet
Structures Plans and Sections

" 621*

Main Spillway
General Arrangement
Plan and Profile

" 623A*

Emergency Spillway
General Arrangement
Plan and Profile

" 623B*

Emergency Spillway Sections

625

Power Intake

Figure 1

Saddle Dam Section

SK #3

Powerhouse Single Line Diagram

Devil Canyon Construction Schedule

* Revision of drawings issued in Revision 1 and 2.

THE FOLLOWING PAGES
8 THROUGH 21
ARE ABSTRACTED FROM THE FIRST DRAFT
OF THE FEASIBILITY REPORT

DEVIL CANYON
TURBINES AND POWER PLANT
MECHANICAL EQUIPMENT DATA

TABLE 13. : PRELIMINARY UNIT DATA

1 - GENERAL DATA

- Number of units	4
- Nominal unit output	150 MW
- Headwater levels	
- normal maximum	E1 1445
- minimum	E1 1390
- Tailwater levels	
- minimum	E1 420
- normal	EL 425
- maximum	E1 440

2 - TURBINE DATA

- Type	vertical Francis
- Rated net head	575 ft
- Maximum head	597 ft
- Minimum head	538 ft
- Full gate output	
- at rated level	225,000 hp
- at maximum head	240,000 hp
- at minimum head	205,000 hp
- Best gate output	85% full gate output
- Full gate discharge at rated head	3,790 cfs
- Speed	225
- Specific speed	37.9
- Runner discharge diameter	135 in
- Runway speed	395 rpm
- Centerline distribution	
- Cavitation coefficient (sigma)	

3 - GENERATOR DATA

- Type	vertical modified umbrella
- Rated output	180 MVA
- Power factor	0.9 ¹⁵
- Voltage	25 kV
- Inertia constant (H)*	3.2 ¹⁵ 3.5 MW-sec/MVA
- Synchronous speed	225 rpm
- Flywheel effect (WR^2)*	79 ¹⁵ $\times 10^6$ lb-ft ²
- Heaviest lift	750,000 lb

* Including turbine

54

13.16 - Miscellaneous Mechanical Equipment

(a) Compensation Flow Pumps

The two pumps for providing minimum discharge into the Susitna River between the dam and the tailrace tunnel outlet portal will be vertical mixed flow or axial type located in the powerhouse service bay below the main erection floor, as shown on Plate _____. Each pump will be rated at 250 cfs (115,000 gal/min) at 35 feet total head, and will be driven by 1,400 hp induction motors. The preliminary pump and motor data is summarized on Table 13.

A single pump intake will be located in the surge chamber with an 8 foot diameter intake tunnel leading to the powerhouse. The intake tunnel will bifurcate into individual pump intake conduits within the powerhouse. The pump discharges will converge into a single pump discharge tunnel.

Butterfly type valves will be installed in the intake and discharge lines of each pump to permit isolation of a pump for inspection or maintenance. Trash screen guides and a trash screen will be provided in the surge chamber at the pump intake. It will be possible to remove the trash screen using the draft tube gate crane discussed below. The width of the guides will be selected so that one of the turbine draft tube gates may be installed in the intake to permit dewatering the pump intake tunnel for inspection and/or maintenance of the tunnel or the intake butterfly valves. Stoplog guides and a set of stoplogs will also be provided at the downstream end of the pump discharge tunnel to allow the discharge tunnel to be dewatered. The stoplogs will be handled with a mobile crane and a follower.

Pumping operation will be continuous; therefore, pumping equipment will be conservatively designed to provide efficient operation with minimal maintenance. Crane access will be provided for the pumps, motors, and valves to permit equipment servicing.

In the detailed design stages, consideration should also be given to turbine drawn rather than electric motor driven pumps. A header from at least two of the main turbine penstocks would supply water to the turbines, with the turbine draft tubes connected to the pump discharge.

(b) Powerhouse Cranes

Two overhead type powerhouse cranes will be provided at Devil Canyon as at Watana. The estimated crane capacity will be 200 tons.

(c) Draft Tube Gates

Draft tube gates will be provided to permit dewatering of the turbine water passages for inspection and maintenance of the turbines. The arrangement of the draft tube gates will be the same as for Watana, except that only two gates will be provided, each ~~20~~ feet by ~~20~~ feet. At the time of starting of Unit 1, one gate will be installed in Unit 4 with the other gate available for Unit 1. Bulkhead domes will be installed in Units 2 and 3.

21

21

(d) Draft Tube Gate Crane

A crane will be installed in the surge chamber for installation and removal of the draft tube gates. The crane will either be a monorail (or twin monorail) crane or a gantry crane. For the preliminary design, a twin monorail crane of approximately 25 ton capacity has been assumed. The crane will be pendant-operated and have a two point lift. A follower will be used with the crane for handling the gates. The crane runway will be located along the upstream side of the surge chamber and will extend over the intake for the compensation flow pumps, as well as a gate unloading area at one end of the surge chamber.

(e) Miscellaneous Cranes and Hoists

In addition to the powerhouse cranes and draft tube gate cranes, the following crane~~s~~ hoists will be provided in the power plant:
and

- A 5 ton monorail hoist in the transformer gallery for transformer maintenance;
- Small overhead, job, or A-frame type hoists in the machine shop for handling material; and
- A-frame or monorail hoists in other powerhouse areas for handling small equipment.

(f) Elevators

Access and service elevators will be provided for the power plant as follows:

- Access elevator from the control building to the powerhouse;
- Service elevator in the powerhouse service bay; and
- Inspection hoists in cable shafts.

The elevators will be as discussed in Section 12.17 for Watana.

(g) Power Plant Mechanical Service Systems

The power plant mechanical service systems for Devil Canyon will be essentially the same as discussed in Section 12.17 for Watana, except for the following:

- There will be no main generator breakers in the power plant; therefore circuit breaker air will not be required. The high pressure air system will be used only for governor as well as instrument air. The operating pressure will be 600 to 1,000 psig depending on the govenor system operating pressure. An air conditioning system will be installed in the powerhouse control room.
- For preliminary design purposes only, one drainage and one dewatering sump have been provided in the powerhouse. The dewatering system will also be used to dewater the intake and discharge lines for the compensation flow pumps.

(h) Surface Facilities Mechanical Service Systems

The entrance building at the top of the power plant will have only a heating and ventilation system. The mechanical services in the standby power building will include a heating and ventilation system, a fuel oil system, and a fire protection system, as at Watana.

(i) Machine Shop Facilities

A machine shop and tool room will be located in the powerhouse service bay area to take care of maintenance work at the plant. The facilities will not be as extensive as at Watana. Some of the larger components will be transported to Watana for necessary machinery work.

TABLE 13. : PRELIMINARY DISCHARGE PUMP DATA

Pump

Type vertical, axial, or
mixed flow
Rated head (total dynamic level) 35 ft
Rated discharge 115,000 gal/min
Pump input 1,300 hp
Speed 400 rpm
Impeller diameter 7 in (approx.)
51

Motor

Type vertical induction
Rated power 1,400 hp
Speed 400 rpm
Voltage 4,160 V
No. phases 3
Frequency 60 hz

WATANA

TURBINES AND POWER PLANT
MECHANICAL EQUIPMENT DATA

TABLE 12: PRELIMINARY UNIT DATA

1 - GENERAL DATA

- Number of Units	6
- Nominal Unit Output	170 MW
- Headwater Levels:	
-- normal maximum	El. 2185
-- minimum	El. 2045
- Tailwater Levels:	
-- minimum	El. 1452
-- normal	El. 1455
-- maximum	El. 1465

2 - TURBINE DATA

- Type	Vertical Francis
- Rated Net Head	680 feet
- Maximum Head	724 feet
- Minimum Head	584 feet
- Full Gate Output:	
-- at rated head	250,000 hp
-- at maximum head	275,000 hp
-- at minimum head	200,000 hp
- Best Gate Output	85 percent full
- Full Gate Discharge at Rated Head	3560 cfs
- Speed	225 rpm
- Specific Speed	32.4
- Runner Discharge Diameter	132 in
- Runaway Speed	385 rpm
- Centerline Distributor	El. 1422
- Cavitation Coefficient (sigma)	0.081

3 - GENERATOR DATA

- Type	Vertical Modified Umbrella
- Rated Output	190 MVA
- Power Factor	0.90
- Voltage	20 kV 15
- Synchronous Speed	225 rpm 3.5
- Inertia Constant (H)*	3.42 MW/sec/MVA
- Flywheel Effect (WR ²)*	57 $\times 10^6$ lb-ft ²
- Heaviest Lift	770,000 lb

*Including turbine

PRR

12.17 - Miscellaneous Mechanical Equipment

(a) Powerhouse Cranes

Two overhead travelling bridge type powerhouse cranes will be installed in the powerhouse. The cranes will be used for:

- Installation of turbines, generators, and other powerhouse equipment; and
- Subsequent dismantling and re-assembly of equipment during maintenance overhauls.

The cranes may also be used by the civil construction contractor for powerhouse construction. Alternatively, the civil contractor will provide a separate crane which will use the same runway as the main powerhouse cranes.

Each crane will have a main and auxiliary hoist. The combined capacity of the main hoist for both cranes will be sufficient for the heaviest equipment lift, which will be the generator rotor, plus an equalizing beam. A tentative crane capacity of 205 tons has been established. The auxiliary hoist capacity will be about 25 tons.

The powerhouse cranes will be cab controlled. Consideration may also be given to providing radio control for the cranes.

(b) Draft Tube Gates

Draft tube gates will be provided to permit dewatering of the turbine water passages for inspection and maintenance of the turbines. The draft tube gate openings (one opening per unit) will be located in the surge chamber. The ~~water~~ gates will be of the bulkhead type, installed under balanced head conditions using the surge chamber crane described below. Four gates have been assumed for the six units, with each gate a single leaf, ~~21~~ feet by ~~21~~ feet. ~~20~~ ~~20~~

When Unit 1 is ready for startup, the gates will be installed in Units 2, 5, and 6, with one gate available for Unit 1. Turbine bulkhead domes will be installed in Units 3 and 4.

(c) Surge Chamber Gate Crane

A crane will be installed in the surge chamber for installation and removal of the draft tube gates as well as the tailrace tunnel intake stoplogs. The crane will either be a monorail (or twin monorail) crane, a top running crane, or a gantry crane. For the preliminary design, a twin monorail crane has been assumed. The crane will be about ~~20~~ tons in capacity, pendant operated, and will have a two point lift. A follower will be used with the crane for handling the gates and stoplogs. The crane will normally travel along the upstream side of the surge chamber; however, the crane runway will have a transfer mechanism for moving the crane to the downstream side of the surge chamber for installation or removal of the tailrace tunnel intake stoplogs. The crane runway will extend over the tailrace tunnel stoplog storage area at one end of the surge chamber.

45

(d) Miscellaneous Cranes and Hoists

In addition to the powerhouse cranes and surge chamber gate crane, the following cranes ~~and~~ hoists will be provided in the power plant:

- A 5 ton monorail hoist in the transformer gallery for transformer maintenance;
- A 4 ton monorail hoist in the circuit breaker gallery for handling the main circuit breakers;
- Small overhead jib or A-frame type hoists in the machine shop for handling material; and
- A-frame or monorail hoists for handling miscellaneous small equipment in the powerhouse.

(e) Elevators

Access and service elevators will be provided for the power plant as follows:

- An access elevator from control buildings to powerhouse;
- A service elevator in the powerhouse service bay; and
- Inspection hoists in the cable shafts.

For preliminary design purposes, a 12,000 lb double deck elevator has been assumed for access to the powerhouse from the control building. The elevator will be located in the access shaft and will travel at a speed of about ~~1,000~~ ft/min; it will be operated by a friction type hoist located above the elevator shaft. The elevator will have a single landing at the control building plus four underground landings.

The service elevator in the powerhouse service bay will have a capacity of 2,000 to 4,000 lb and will provide access to the various powerhouse floors. The elevator will travel at about 100 to 150 ft/min and will be operated either by a friction hoist or a hydraulic cylinder.

"Alimak" type rack and pinion man hoists have been ~~assessed~~ ^{assumed} for the cable shafts, to use in inspection and/or maintenance of the oil filled cables and control cables. The hoist would also provide emergency access from the power plant. Each hoist will have a capacity of about 900 lb and travel at a speed of approximately 130 ft/min.

(f) Power Plant Mechanical Service Systems

The mechanical service systems for the power plant can be grouped into six major categories:

- Station water systems;
- Fire protection;
- Compressed air;

- Oil storage and handling;
- Drainage and dewatering; and
- Heating, ventilation and cooling.

(i) Station Water Systems

- The station water systems will include the water intake, cooling water systems, turbine seal water systems, and domestic water systems.

The water intakes will supply water for the various station water systems in addition to fire protection water. The water can be taken from the penstock; however, pressure reducing valves will be necessary because of the high pressure of the water (about 330 psig maximum). Alternatively, water can be supplied from the draft tube using pumps to provide suitable pressure. For preliminary design purposes, the latter approach has been adopted. ~~water intake will be provided at each draft tube.~~ The water will pass through an automatic backwash strainer which will limit the maximum particle size in the water to about 1/16 inch. An interconnecting header will permit a strainer to be taken out of service without affecting operation of a generating unit. Each strainer will be sized to handle the water requirements for two units.

On a unit basis, cooling water will be required for generator air coolers, turbine and generator bearing coolers, transformers, and powerhouse unit air coolers. The total cooling water requirements for each unit will be about 4,000 gpm. In addition, the compressed air systems in the service bay will require approximately 100 gpm of cooling water. One cooling water pump will be provided per unit which will take water from downstream of the water intake strainer. To ensure suitable reliability, the cooling water pumps for two units will be interconnected, with each pump capable of handling the flow for ~~two~~ units. Two cooling water pumps in the service bay will handle compressor cooling water requirements. The cooling water for each unit will discharge into the turbine draft tube, while the compressor cooling water will flow into the station drainage system.

work

Turbine seal water will be supplied to the seal on the main shaft and to the runner seals when the unit is spinning in air (i.e., in spinning reserve mode). Filtered water may or may not be required, depending on the type of shaft seal. If no filtration is needed, the seal water will be taken directly from the high pressure side of the cooling water pumps. If filtration is necessary, a single system will be provided for the powerhouse. The system will have two filters and two pumps which will take water from downstream of the water intake strainer and distribute the water to each unit via a looped header.

Domestic water will be required for the washrooms, lunch rooms, drinking fountains, and a service sink and emergency eyewash in the battery room. Peak domestic water requirements are expected to be about 30 gpm. The system will have two pumps and a hydropneumatic tank. Water will be taken from the water intake system and will be treated by chlorination or other means as necessary.

(ii) Fire Protection System

The power plant fire protection system will consist of a fire protection water system with fire hose stations located throughout the powerhouse and transformer gallery; sprinkler systems for the generators, transformers, and the oil rooms; and portable fire extinguishers located in strategic areas of the powerhouse and transformer gallery. Carbon dioxide could be used in the generator rather than a sprinkler system; however, the ~~sprinkler~~ system is recommended because of the safety hazard of CO₂. *water*

water
Fire protection water will be taken from the station water intakes. Pressurized water will be provided by a pumped system with two main fire pumps as well as a jockey pump, or alternatively by a head tank with two supply pumps to keep the head tank full. For preliminary design purposes, a system with a head tank has been selected because of the increased reliability of the system. With an underground powerhouse, a head tank can be provided quite easily at a suitable elevation as an adit to the access shaft.

The capacity of the head tank will be about 100,000 gallons; the tanks will have two compartments to permit draining of half the water for inspection and maintenance. For reliability, the water supply pumps will have two electrical power sources.

Fire hose stations will be provided on all floors of the powerhouse, in the transformer gallery, and in the bus tunnels. Service water outlets will be installed at the various fire hose stations to supply water for washing down floors or equipment. The sprinkler systems for generators, transformers, and oil rooms will be the dry deluge type, operated by a solenoid valve which in turn will be activated by detectors in the respective area.

The portable fire extinguishers will generally be carbon dioxide or a dry chemical type.

(iii) Compressed Air Systems

Compressed air will be required in the powerhouse for the following:

- Service air;
- Instrument air;
- Generator brakes;
- Draft tube water level depression;
- Air blast circuit breakers; and
- Governor accumulator tanks.

For the preliminary design, two compressed air systems have been assumed: a 100 psig air system for service air, brake air, and air for draft tube water level depression; and a 1,000 psig high pressure air system for governor air and circuit breaker air. For detailed plant design, a separate governor air system and circuit breaker air system may be provided.

The service air systems will have three air compressors of the rotary screw or reciprocating type, each with a capacity of about 200 cfm. The system will have four air receivers, two with approximately 800 ft³ capacity used for the draft tube water level depression system, and two with approximately 150 ft³ used for service and brake air. The system will be designed to give priority to the brake air system. Service air piping with air hose stations will be located on all floors of the powerhouse and in the transformer gallery.

The high pressure/governor/circuit breaker air system will have three reciprocating air compressors with approximately 30 cfm capacity each, and three small air receivers. The governor air system will supply air for initial filling of the governor system accumulator tanks and for make-up air to replace air lost through leakage and air dissolved in the governor system oil.

The circuit breaker air system will provide compressed air for operation of the main breakers. To ensure dry air for the breakers, the air will be stored at 1,000 psig and then reduced to about 350 psig for operation of the breakers.

Instrument air will also be taken from the high pressure air system.

(iv) Oil Storage and Handling

Facilities will be provided for replacing oil in the transformers and for topping-up or replacing oil in the governor pumping system. For preliminary design purposes, two oil rooms have been assumed, one in the transformer gallery and one in the powerhouse service bay.

The transformer gallery will have two oil storage tanks, one for filtered oil and the other for unfiltered oil. Each tank will have a capacity at least equal to the volume of oil in one transformer (about 8,000 gallons). A header with valve stations at each transformer will be used for transferring oil to and from the transformers. Oil will be transferred by a portable pump and filter unit.

A similar system will be provided in the powerhouse with a filtered and unfiltered oil tank and distribution header with valve stations at each unit. The oil tank capacity will be equal to the total oil volume for one unit (about 3,000 gallons).

*Turbine
and generator
and Governor
and oil system*

Drains Selected

piping

In the design stages, consideration should be given to the use of mobile oil tanks located in a packing area near the powerhouse and transformer gallery, near the access tunnel.

(v) Drainage and Dewatering Systems

The drainage and dewatering systems will consist of:

- A unit dewatering and filling system;
- A clear water discharge system; and
- A sanitary drainage system.

The dewatering and filling systems will consist of two sumps each with two dewatering pumps and associated piping and valves from each of the units. To prevent station flooding, the sump will be designed to withstand maximum tailwater pressure. For preliminary design purposes, submersible dewatering pumps have been assumed.

Vertical turbine type pumps ~~were also considered~~ were also considered; however, since the dewatering system acts as an emergency drainage system, the pump columns would have to be extended so that the motors are above maximum tailwater level. Another option is turbine driven pumps, but ~~they~~ they are generally very costly. A valved draft tube drain line will connect to a dewatering header running along the dewatering gallery. The spiral case will be drained by a valved line connecting the spiral case to the draft tube. Suitable provisions will be necessary to ensure that the spiral case drain valve is not open when the spiral case is pressurized to headwater level. The dewatering pump discharge line will discharge water into the surge chamber. The general procedure for dewatering the unit will be to close the intake gate, drain the penstock to tailwater level through the unit, then open the draft tube and spiral case ~~discharge~~ to dewater the unit. Unless the drainage gallery is below the bottom of the draft tube elbow, it will not be possible to completely unwater the draft tube through the unwatering header. If necessary, the remainder of the draft tube can be unwatered using a submersible pump lowered through the draft tube access door. Unit filling to tailwater level will be accomplished from the surge chamber through the dewatering pump discharge line (with a bypass around the pumps) and then through the draft tube and spiral case drain lines. Alternatively, the unit can be filled to tailwater level through the draft tube drain line from an adjacent unit. Filling the unit to headwater pressure will be accomplished by "cracking" the intake gate and raising it about 2 to 4 inches.

The clearwater drainage system will handle normal drainage into the power plant. Drainage will be collected by a network of floor drains, trench drains, pressure relief drains, and equipment drains which discharge into gravity drainage sumps where items are pumped to the surge chamber. The station will have three main sumps, two in the powerhouse adjacent to the dewatering sumps and one in the transformer gallery. Smaller sumps will be located in appropriate areas such as the elevator pits and the upstream drainage gallery.

The sumps in the powerhouse will have submersible pumps for the same reasons as discussed above for the dewatering system. The transformer gallery will have vertical turbine type pumps. The drainage sumps in the powerhouse will have an overflow line which will discharge water into the adjacent dewatering sump should inflow into the drainage sumps exceed the capacity of the drainage pumps. The overflow line will have a flap valve to prevent reverse flow from the dewatering sump.

Particular care will be taken to prevent ~~accelerated~~ oil spills from being discharged into the powerhouse. The following provisions will be made:

- All three main sumps will have oil contamination detectors to obtain the pressure of oil in the sumps;
- Drainage into the sumps will first pass through an oil separator;
- Controls for the drainage pumps into the transformer gallery will be interlocked with the transformer fire protection sprinkler system. Activation of the sprinklers, which signifies a transformer fire and the possibility of a major oil spill, will prevent the drainage pumps from starting until the drainage sump is almost full. It will be possible to retain about 40,000 gallons of oil/water in the sump before the pump start (each transformer holds about 8,000 gallons of oil). In this manner, it will be possible to retain a large amount of oil in the sump where it may be skimmed off; and
- Suitable oil retention curbs will be provided in the oil rooms.

Sanitary drainage from the ~~work rooms~~, lunch room, and drinking fountains will drain to a packaged sewage treatment plant and then will be discharged into the surge chamber via sewage lift pumps.

(vi) Heating, Ventilation and Cooling

The heating and ventilation system for the underground power plant will be designed primarily to maintain suitable temperatures for equipment operation and to provide a safe and comfortable atmosphere for operating and maintenance personnel. Air will be drawn into the power facilities through one or more shafts or tunnels, circulated throughout the power plant, and discharged from the power plant through other shafts and tunnels. For preliminary design purposes it has been assumed that air will be drawn down the access and the cable shafts, and discharged out through the access tunnel; however, the actual arrangement will depend upon the final design.

The power plant will be located in mass rock which has a constant year around temperature of about 40°F. Considering heat given off from the generators and other equipment, the primary requirement

will be for air cooling. Initially, some heating will be required to offset the heat loss to the rock, but after the first few years of operation an equilibrium will be reached with a powerhouse rock surface temperature of about 60 to 70°F.

Air cooling will be accomplished by providing suitable air changes incorporating cooling coils in the air circulation system. Cooling water from the station service water supply will be circulated through the cooling coils. In winter, some heating may be required to moderate the temperature of the incoming air into the power plant. Allowance must be made in the design for the possibility that large quantities of air (up to about 6,000 cfm per unit) may be required for turbine aeration.

Other factors which must be considered or incorporated in the design are:

- To prevent or minimize the circulation of combustion products in the event of a fire, powerhouse ventilation should be separate from transformer gallery ventilation and provision should be made for isolating the two areas; and
- Suitable air locks will be necessary to preclude adverse chimney effects in the shafts.

(g) Surface Facilities Mechanical Service Systems

The mechanical services at the control building on the surface will include:

- A heating, ventilation, and air conditioning system for the control room;
- Domestic water and washroom facilities; and
- A halon type fire protection system for the control room.

Domestic water will be supplied from the powerhouse domestic water system, with pumps located in the powerhouse and piping up through the access shaft. Sanitary drainage from the control building will drain to the sewage treatment plant in the powerhouse through piping in the access tunnel.

The standby generator building will have the following services:

- A heating and ventilation system;
- A fuel oil system with buried fuel oil storage tanks outside the building, and transfer pumps and a day tank within the building; and
- A fire protection system of the carbon dioxide or halon type.

(h) Machine Shop Facilities

A machine shop and tool room will be located in the powerhouse service bay area with sufficient equipment to take care of all normal maintenance work at the plant, as well as machine shop work for the larger components at Devil Canyon. For preliminary design purposes, an area of about 1,500 ft² has been allocated for the machine shop and tool room. The actual equipment to be installed in the machine shop will be decided during the design stages of the project; however, it will generally include drill presses, lathes, an hydraulic press, power hacksaw, shaper, and grinders.

WATANA & DEVIL CANYON
SCHEDULES

SCHEDULE 1

**SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK BOLTING
WATANA**

<u>STRUCTURE</u>	<u>LOCATION</u>	<u>SIZE</u>	<u>SPACING/PATTERN</u>				
			38%	21%	21% PERCENT TUNNEL LENGTH BOLTED	11%	9%
TUNNELS							
Diversion	Ceiling Walls	1" x 12' 1" x 9'	NA NA	1 Bolt/10 LF Tunnel NA	5' x 5' 1 Bolt/10 LF Tunnel	3' x 3' 6' x 6'	NA NA
Main Access*	Ceiling Walls	1" x 12' 1" x 9'	NA NA	1 Bolt/10 LF Tunnel NA	6' x 6' 1 Bolt/10 LF Tunnel	3' x 3' 6' x 6'	NA NA
Penstock	Ceiling	1" x 6'	NA	NA	NA	3' x 3'	3' x 3'
Tailrace	Ceiling Walls	1" x 12' 1" x 9'	NA NA	NA	5' x 5' 1 Bolt/10 LF Tunnel	3' x 3' 6' x 6'	NA NA
Grout & Drainage**	Ceiling	3/4" x 6"	NA	4 Bolts/3 LF Tunnel	NA	NA	NA
CHAMBERS							
			40%	20%	30%	10%	
				PERCENT AREA BOLTED			
Powerhouse	Ceiling Walls	1" x 25' 1" x 15'	6' x 6' H.Y. NA	6' x 6' H.Y. 5' x 5'	6' x 6' H.Y. 5' x 5'	NA NA	
Surge Chamber	Ceiling Walls	1" x 25' 1" x 15'	6' x 6' H.Y. NA	6' x 6' H.Y. 5' x 5'	6' x 6' H.Y. 5' x 5'	NA NA	
Transformer Gallery	Ceiling Walls	1" x 25' 1" x 15'	6' x 6' H.Y. NA	6' x 6' H.Y. 1/360 SF	5' x 5' H.Y. 6' x 6'	NA NA	

SCHEDULE 1 (continued)

SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK BOLTING
WATANA

<u>SHAFTS</u>	<u>LOCATION</u>	<u>SIZE</u>	
Cable	Walls	3/4" x 6'	4' x 4' pattern
Main Access	Walls	3/4" x 6'	4' x 4' pattern
Grout & Drainage	Walls	3/4" x 6'	6 Bolts/3 LF shaft

ADDITIONAL BOLTS AT OPENINGS

Bus Gallery	18 Bolts	1" x 25'
Draft Tube	24 Bolts	1" x 25'
Penstocks	24 Bolts	1" x 25'

* For All Access Tunnels Greater Than 10' In Diameter.

** For All Access Tunnels Less Than or Equal to 10' In Diameter.

All Bolts Grade 60 Unless Noted As H.Y. (High Yield).

SCHEDULE 1

**SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK BOLTING
DEVIL CANYON**

STRUCTURE	LOCATION	SIZE	SPACING/PATTERN				
			48%	25%	13% PERCENT TUNNEL LENGTH BOLTED	6%	8%
TUNNELS							
Diversion	Ceiling Walls	1" x 12' 1" x 9'	NA NA	1 Bolt/10 LF Tunnel NA	6' x 6' NA	3' x 3' 6' x 6'	NA NA
Main Access*	Ceiling Walls	1" x 12' 1" x 9'	NA NA	1 Bolt/10 LF Tunnel NA	6' x 6' NA	3' x 3' 6' x 6'	NA NA
Penstock	Ceiling	1" x 6'	NA	NA	NA	3' x 3'	3' x 3'
Tailrace	Ceiling Walls	1" x 12' 1" x 9'	NA NA	1 Bolt/10 LF Tunnel NA	6' x 6' NA	3' x 3' 6' x 6'	NA NA
Grout & Drainage**	Ceiling	3/4" x 6'	NA	4 Bolts/3 LF Tunnel	NA	NA	NA
CHAMBERS							
			79%	9%	2% PERCENT AREA BOLTED	5%	5%
Powerhouse	Ceiling Walls	1" x 25' 1" x 15'	6' x 6'H.Y. 1/360 SF	6' x 6'H.Y. 6' x 6'	6' x 6'H.Y. 6' x 6'	NA NA	NA NA
Surge Chamber	Ceiling Walls	1" x 25' 1" x 15'	6' x 6'H.Y. 1/360 SF	6' x 6'H.Y. 6' x 6'	6' x 6'H.Y. 6' x 6'	NA NA	NA NA
Transformer Gallery	Ceiling Walls	1" x 25' 1" x 15'	1/360 SF H.Y.	6' x 6'H.Y. 1/360 SF	5' x 5'H.Y. 6' x 6'	5' x 5'H.Y. 5' x 5'	NA NA

SCHEDULE 1 (continued)

**SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK BOLTING
DEVIL CANYON**

<u>SHAFTS</u>	<u>LOCATION</u>	<u>SIZE</u>		
Cable	Walls	3/4" x 6'	4' x 4' pattern	25% of shaft length
Main Access	Walls	3/4" x 6'	4' x 4' pattern	25% of shaft length
Grout & Drainage	Walls	3/4" x 6'	6 Bolts/3 LF shaft	25% of shaft length

ADDITIONAL BOLTS AT OPENINGS

Bus Gallery	18 Bolts	1" x 25'
Draft Tube	24 Bolts	1" x 25'
Penstocks	24 Bolts	1" x 25'

* For All Access Tunnels Greater Than 10' In Diameter.

** For All Access Tunnels Less Than or Equal to 10' In Diameter.

All Bolts Grade 60 Unless Notes As H.Y. (High Yield).

SCHEDULE 2

1) Revision 1/25/82

**SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK-STEEL SUPPORT
WATANA**

<u>STRUCTURE</u>	<u>PERCENT OF EXCAVATION LENGTH SUPPORTED</u>	<u>SPACING BETWEEN SETS</u>	<u>SET SECTION</u>	<u>WEIGHT *</u> <u>Tb/LF</u>
Diversion Tunnels	9	4'	10" x 10" Column	36
Main Access Tunnels	9	3'	10" x 10" Column	36
Penstocks	NA	NA		
Tailrace Tunnels	9	4'	10" x 10" Columns	36
Grout & Drainage Galleries	5	3'	4" x 4" Column	15
Powerhouse	10	3'	16" I-BEAM Heavy Section	90
Surge Chamber	10	3'	16" I-BEAM Heavy Section	90
Transformer Gallery	10	3'	10" x 10" Column	36

* Includes 10 percent allowance for hardware and tiebacks.

- 1) Supports embedded in insitu concrete.

SCHEDULE 2
1) Revision 1/25/82

SUSITNA HYDROELECTRIC PROJECT
UNDERGROUND ROCK-STEEL SUPPORT
DEVIL CANYON

<u>STRUCTURE</u>	<u>PERCENT OF EXCAVATION LENGTH SUPPORTED</u>	<u>SPACING BETWEEN SETS</u>	<u>SET SECTION</u>	<u>WEIGHT*</u> <u>lb/LF</u>
Diversion Tunnels	8	4'	10" x 10" Column	36
Main Access Tunnels	8	3'	10" x 10" Column	36
Penstocks	NA	NA	NA	
Tailrace Tunnels	8	4"	10" x 10" Column	36
Grout & Drainage Galleries	5	3'	4" x4" Column	15
Powerhouse	10	3'	16" I-BEAM Heavy Section	90
Surge Chamber	10	3'	16" I-BEAM Heavy Section	90
Transformer Gallery	5	3'	10" x 10" Column	36

* Includes 10 percent allowance for hardware and tiebacks.

1) Supports imbedded in insitu concrete.

SCHEDULE 3

1) Revision 1/25/82

**SUSITNA HYDROELECTRIC PROJECT
SHOTCRETE
WATANA**

STRUCTURE	LOCATION	THICKNESS SHOTCRETE			
		59%	21%	.11%	9%
PERCENT OF TUNNEL LENGTH (1)					
Diversion*	Ceiling Walls	NA	2"	2"	NA
		NA	NA	NA	NA
Main Access Tunnels**	Ceiling Walls	NA	2"	2"	NA
		NA	NA	NA	NA
Penstock Tunnels*	Ceiling Walls	NA	NA	2"	3"
		NA	NA	NA	3"
Tailrace Tunnels*	Ceiling Walls	NA	2"	2"	NA
		NA	NA	NA	NA
Grout & Drainage Tunnels***	Ceiling	NA	NA	2"	NA
OTHER					
All shafts	25% of length	2" Shotcrete			
Powerhouse & Surge Chamber:)	30% of ceiling area 30% of wall area	4" Shotcrete 4" Shotcrete			
Transformer Gallery:	NA				

* Tunnels are concrete lined; shotcrete used as protective measure during construction until covered by concrete lining.

** For all access tunnels greater than 10' diameter.

*** For all access tunnels less than or equal to 10' diameter.

SCHEDULE 3

1) Revision 1/25/82

**SUSITNA HYDROELECTRIC PROJECT
SHOTCRETE
DEVIL CANYON**

<u>STRUCTURE</u>	<u>LOCATION</u>	<u>THICKNESS SHOTCRETE</u>		
		<u>86%</u>	<u>6%</u>	<u>8%</u>
<u>PERCENT OF TUNNEL LENGTH (1)</u>				
Diversion*	Ceiling Walls	NA NA	2" NA	NA NA
Main Access Tunnels **	Ceiling Walls	NA NA	2" NA	NA NA
Penstock Tunnels*	Ceiling Walls	NA NA	2" NA	2" 2"
Tailrace Tunnels*	Ceiling Walls	NA NA	2" NA	NA NA
Grout & Drainage Tunnels ***	Ceiling	NA	2"	NA
<u>OTHER</u>				
All Shafts	25% of length	2" Shotcrete		
Powerhouse & Surge Chamber }	11% of ceiling area 2% of wall area "	3" Shotcrete 2" Shotcrete		
Transformer Gallery:	5% of ceiling area	3" Shtocrete		

* Tunnels are concrete lined; shotcrete used as protective measure during construction until covered by concrete lining.

** For all access tunnels greater than 10' diameter.

*** For all access tunnels less than or equal to 10' diameter.

SCHEDULE 4

SUSITNA HYDROELECTRIC PROJECT
REINFORCING STEEL RATIOS LB/CY
WATANA & DEVIL CANYON

DESCRIPTION

lb STEEL/cy CONCRETE

REMARKS

Diversion Tunnels &
Other Water Passages

75

Reinforcement shall be
used for 2 diameter
lengths at exit end only.

Spillway

130

o Piers & Rollways

80

o Apron, Slab, Guide
Wall Downstream
Against Rock

80

o Upstream Guidewall

70

o Gravity Type
Retaining Wall

130

Intake & Portal
Structures

100

Power Facilities

7

Devil Canyon Dam &
Thrust Blocks

70

Access Tunnels

165

Draft Tube

Throughout.

Throughout.

If lined and for slab.

SUSITNA HYDROELECTRIC PROJECT
GROUTING FOR PENSTOCK TUNNELS & UPSTREAM OF POWERHOUSE
WATANA & DEVIL CANYON

SCHEDULE 5

Curtain Grouting - From Grout Gallery off Access Tunnels

- o 1 Row, 150' Long at 5' O.C. for 600 lf Tunnel Length
- o 1 Row, 115' Long at 5' O.C. for 600 lf Tunnel Length
- o 1 Row, 100' Long at 5' O.C. for 600 lf Tunnel Length
(Partially Grouted from Penstocks)
- o Cement Take 0.4 cf/lf of Drill Hole

Contact Grouting

- o Included with Concrete Liner Installation

3" Drain Holes - From Grout Gallery off Access Tunnels

- o 1 Row, 150' Long at 10' O.C. for 600 lf Tunnel Length
- o 1 Row, 100' Long at 10' O.C. for 600 lf Tunnel Length

SUSITNA HYDROELECTRIC PROJECT
POWER FACILITY DRAINAGE
WATANA & DEVIL CANYON

SCHEDULE 6

Transformer Gallery

- o 8 Rows, 25' Long Holes at 10' O.C. for Full Length of Cavern

Powerhouse Cavern

- o 12 Rows, 40' Long Holes at 10' O.C. for Full Length of Cavern
- o 1 Row, 130' Long Holes at 10' O.C. for Full Length of Cavern

Surge Chamber

- o 13 Rows, 35' Long at 10' O.C. for Full Length of Cavern

All Holes 3" Diameter.

SUSITNA HYDROELECTRIC PROJECT
GROUTING FOR DIVERSION TUNNELS
WATANA & DEVIL CANYON

SCHEDULE 7

WATANA

For Permanent Plug - Lower Tunnel
For Each Valve Plug - Upper Tunnel

Curtain Grouting

- o Drill Holes, 4 Rows of 17 Holes Each, 30' Long
- o Cement Take 0.2 cf/lf Drill Hole

-34-

Contact Grouting

- o Included with Plug Installation

DEVIL CANYON

For Permanent Plug

Curtain Grouting

- o Included with Main Curtain Grouting

Contact Grouting

- o Included with Plug Installation

WATANA & DEVIL CANYON
MEMORANDUMS



OFFICE MEMORANDUM

TO: Dave MacDonald

Date: January 13, 1982

FROM: James Plummer

File: P5700.07.09

SUBJECT: Susitna Hydroelectric Project
Cost Estimate Indirects-Electric
Power & Water
January 11 Memo, AN-AB9

With regard to your assumptions, please note the following comments:

1. The outside supply of electrical power should be available by early 1986. *Revised to mid 1987*
2. The contractor will have to provide for power generation for his own use during this period, as well as, standby power for construction activities during the course of construction.
3. The cost of power supplied to contractors at site will have to be included in the cost of work. We are presently determining the January 1982 costs of power to be used for estimating.
4. Power supplied by APA will be available for lighting, operation of machinery, heating of office buildings, but not for heating of construction works such as concrete, hoardings, etc.

It is also necessary that the contractor or contractors provide their own construction water supply.

A handwritten signature in black ink, appearing to read "James R. Plummer".

James R. Plummer

JRP:dmr

Attachment

cc: E.D. Meilhede
R. Tilghman



OFFICE MEMORANDUM

TO: See Distribution **Date:** January 16, 1982
FROM: J. R. Plummer **File:** P5700.07.09
SUBJECT: Susitna Hydroelectric Project
Main.Dam Assumptions-Revision No. 2

The notes of the meeting held on December 30, 1981, have been revised as of January 15, 1982, to reflect the latest assumptions to be used for estimating.

A handwritten signature of James R. Plummer is written over a horizontal line. The signature is cursive and appears to read "J. R. Plummer".
James R. Plummer

JRP:dmh

Attachment

Distribution: D. Lamb
L. Duncan
N. Bond
R. Miller
F. Toth
~~D. McThede~~
J. Lawrence
D. MacDonald
J. Hayden
R. Ibbotson

Revised 1/15/82 (2)
Revised 1/05/82
P5700.09

MINUTES OF MEETING
December 30, 1981

SUSITNA HYDROELECTRIC PROJECT

PRESENT: D. Lamb
L. Duncan
N. Bond
R. Miller
J. Plummer
F. Toth
D. Meilhede

cc: J. Lawrence
D. MacDonald
J. Hayden
R. Ibbotson

PURPOSE: Review and resolve any outstanding matters relative to cost estimating for the Watana Main Dam.

1 - CHANGES

It was stated that final quantities and final estimates are currently being prepared and that any changes affecting cost should only be made through the senior person responsible for the task work.

2 - DAM - GENERAL

Quantities have been taken off using a 2,205 ft elevation. Remaining work to be done includes the take off of zones and the additional material to raise the dam to 2,210 ft.

3 - EXCAVATIONS

a) Overburden

- All overburden on side slopes considered wasted.
- Overburden in river channel (river gravel).
- Assume that 50% of this material will be reusable in the downstream shell.

b) Rock Excavation

- Upper 10 ft of rock considered wasted.
- Rock below 10 ft considered reusable. This applies to core area both on side slopes and under the main dam and the river channel.
- Excavation depths assumed are 10 ft under shell and 40 feet under core.
- Controlled blasting required under core and transition zones.

4 - FOUNDATION TREATMENT

a) Dental Concrete

- An allowance based on the total area of core and transition zone by 1 ft depth; in addition, a formwork allowance to be made.

b) Consolidation Grouting

- Assumed pattern 10 ft x 10 ft x 30 ft deep.
- Grout take estimate at 1 cu ft of cement per linear foot of depth. (2)

4 - FOUNDATION TREATMENT (Continued)

b) Consolidation Grouting

- Current price for drilling to be rechecked. Drilling can generally be estimated using an air track with allowances for test holes, water pressure testing, etc. Curtain grouting also mentioned, 0.4 cu ft cement/linear ft hole. Primary holes core drilled, remainder rotary percussion. All holes washed and pressure tested. (2)

c) Slush Grout

- Estimate to assume any slush grouting requirements included under dental concrete and consolidation grouting.

5 - DOWNSTREAM SHELL

- Material that can be used in the downstream shell:

- a) unprocessed river gravel (removal of 12"(+) only) (2)
- b) rock from underground excavations
- c) rock from aboveground excavations
- Material used to be 12 in minus and placed in 2 ft lifts and compacted with 5 passes of a vibrator 10-ton roller or equivalent. (2)
- The use of rock to be done on a 50/50 gravel/rock blend, ie., layers of rock only are not acceptable.
- Unprocessed river gravel to be passed through grizzly to remove oversize. Estimate of oversize 10%.
- For rock used from excavation, the following recovery assumptions to be used for underground rock, 80%, for aboveground, 90%. Estimate to be based on moving excavated rock to stockpiles, reloading, transporting and placing in the dam with gravel.

6 - UPSTREAM SHELL

- Material specifications acceptable for upstream shell adjusted to maximum size of 12 in to less than 10% passing 3/8 in. (2)
- Wastage estimate on this material for oversized, 10%, undersized, 30%; assumed Borrow Area "E" as source.
- Oversized material can be crushed and incorporated into downstream shell. Undersized material can be considered for concrete fine aggregate and road subgrade.
- Of the estimated undersized of approximately 10 million cu yds less than 20% of this amount can be considered reusable.
- Compaction requirements on upstream shell, stated for downstream. F. Toth to check equivalent compaction use heavier equipment and fewer passes.

SUSITNA HYDROELECTRIC PROJECT
Road Gradients

January 19, 1982

HAUL ROADS (Temporary)

Maximum gradient generally 10 percent with exceptions for access into tunnels. Runouts required for downhill hauling on roads with gradients above 7 percent.

PERMANENT SITE ROADS

Main access has maximum gradient of 6 percent.
Site roads generally up to 8 percent maximum gradient.

cc: F. Toth
D. McDonald
R. Lang
D. Meilhede

WATANA & DEVIL CANYON
TRANSMISSION LINE SPECIFICATIONS PACKAGE

TRANSMISSION LINE SPECIFICATIONS

January 26, 1982
P5700.07.08

Transmission line lengths required after Intertie is constructed

- single circuit 644 mi
- double circuit 18 mi

Description

Single Circuit

Tower - X-type, hinged, guyed, hollow steel pole, 4.4 towers per mile, approximate weight per tower - 15,400 lb, Corten finish, two extensions for shield wire.

Conductor - 2 x 954 komil, 45/7 ACSR per phase

Shield Wire - 3/8 in., 7 strand, EHS Steel (2/tower)

Insulators - 18/string on outside phases and V-string in middle phase.

Double Circuit

Tower - Double circuit, self-supporting steel pole, span 1,000 ft, approximate weight per tower - 33,000 lb. Corten finish, two arms for shield wire.

Conductor - 2 x 1,351 kcmil, 54/19 ACSR per phase

Shield Wire - 3/8 in., 7 strand, EHS Steel (2/tower)

Insulators - 18/string on all phases.

Submarine Cables

Approximate length - 3.25 mi of submarine and 0.75 under-ground of each cable

No. of cables - 9

Trenching - embed 8 ft

Size of Conductor - 1,000 to 1,500 mm²

Substations

Figure 14.1 entitled "Railbelt 345 kV Transmission System Single Line Diagram" is attached as part of the specifications and equipment requirement at each switching station. The

following additional information is added to the figure

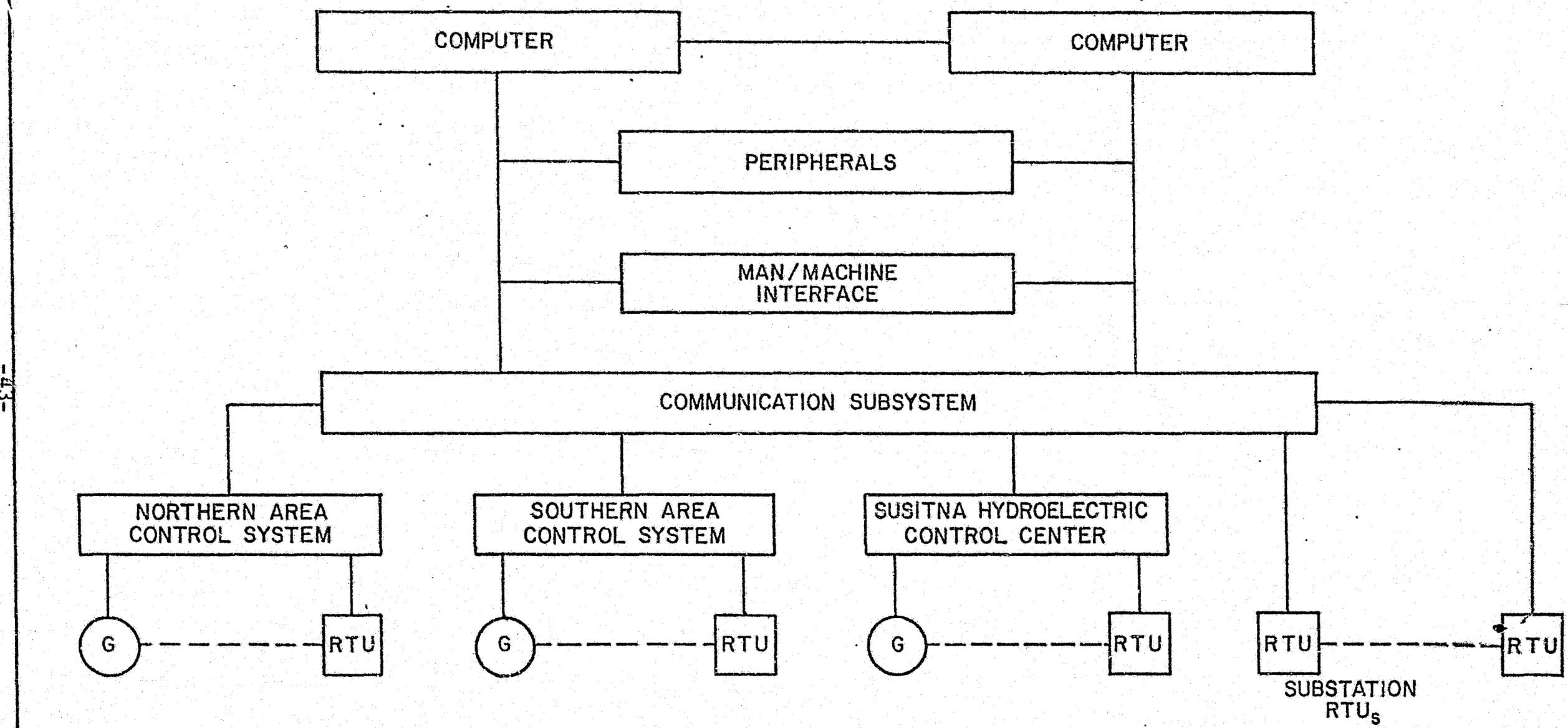
- (i) each circuit breaker will have 2 disconnect switches
- (ii) static var compensators
 - 400 MVAR at Anchorage
 - 100 MVAR at Fairbanks
- (iii) shunt reactor
 - 2 x 75 MVAR at Fairbanks.

Dispatch Center
and Communications

There will be a dispatch center. Figure 14.2 entitled "Energy Management System, Alternative I, Configuration Block Diagram" is attached for information. The lines of communication will be via microwave. The system control center will be located in the Willow Station compound. The energy management system will include two computers, please see attached Figure 14.3 entitled, "Energy Management System, Alternative I, System Configuration" for further information.

ENS:jlh

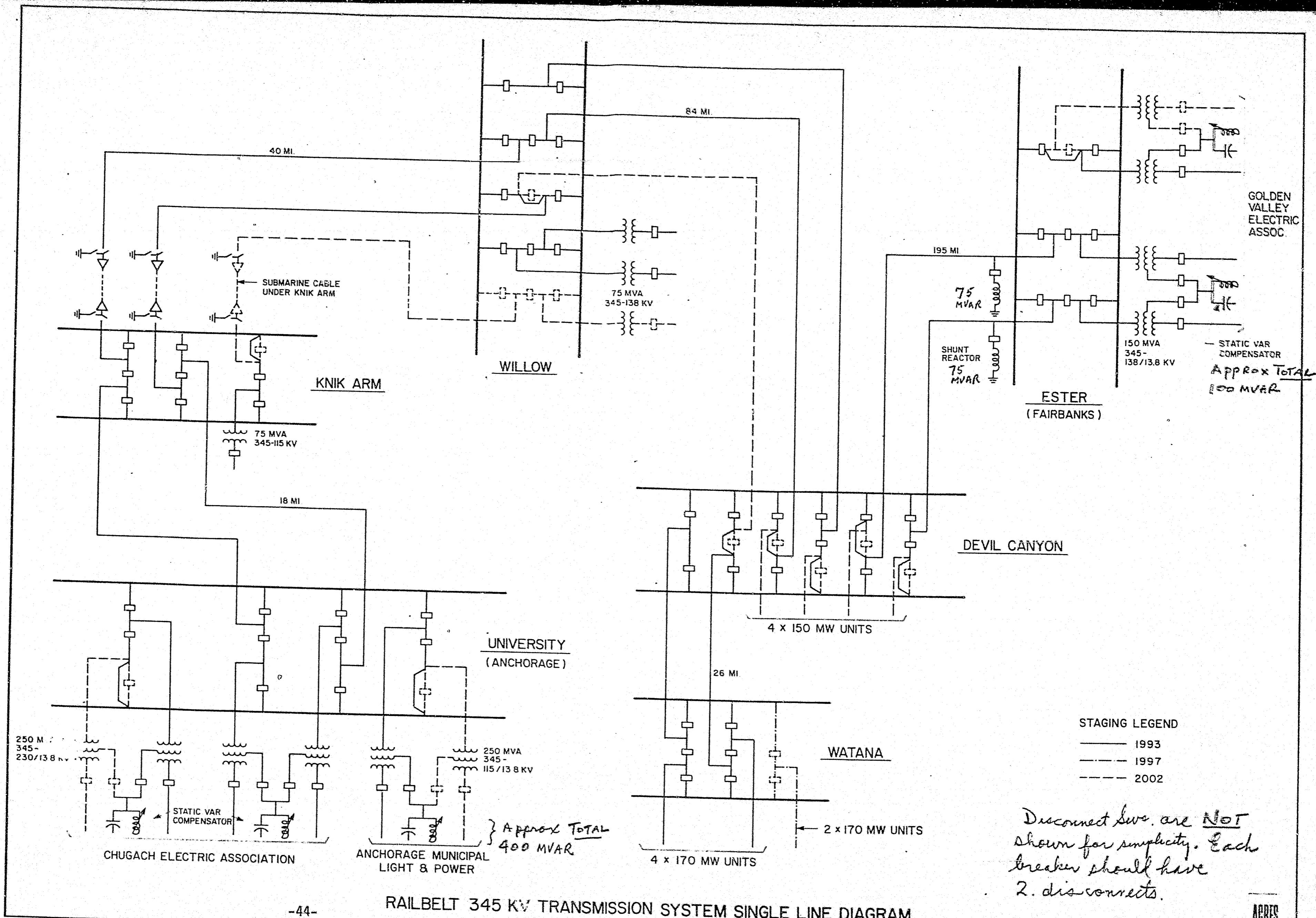
Attachment



ENERGY MANAGEMENT SYSTEM, ALTERNATIVE I; SYSTEM CONFIGURATION

FIGURE 14.5

ACRES



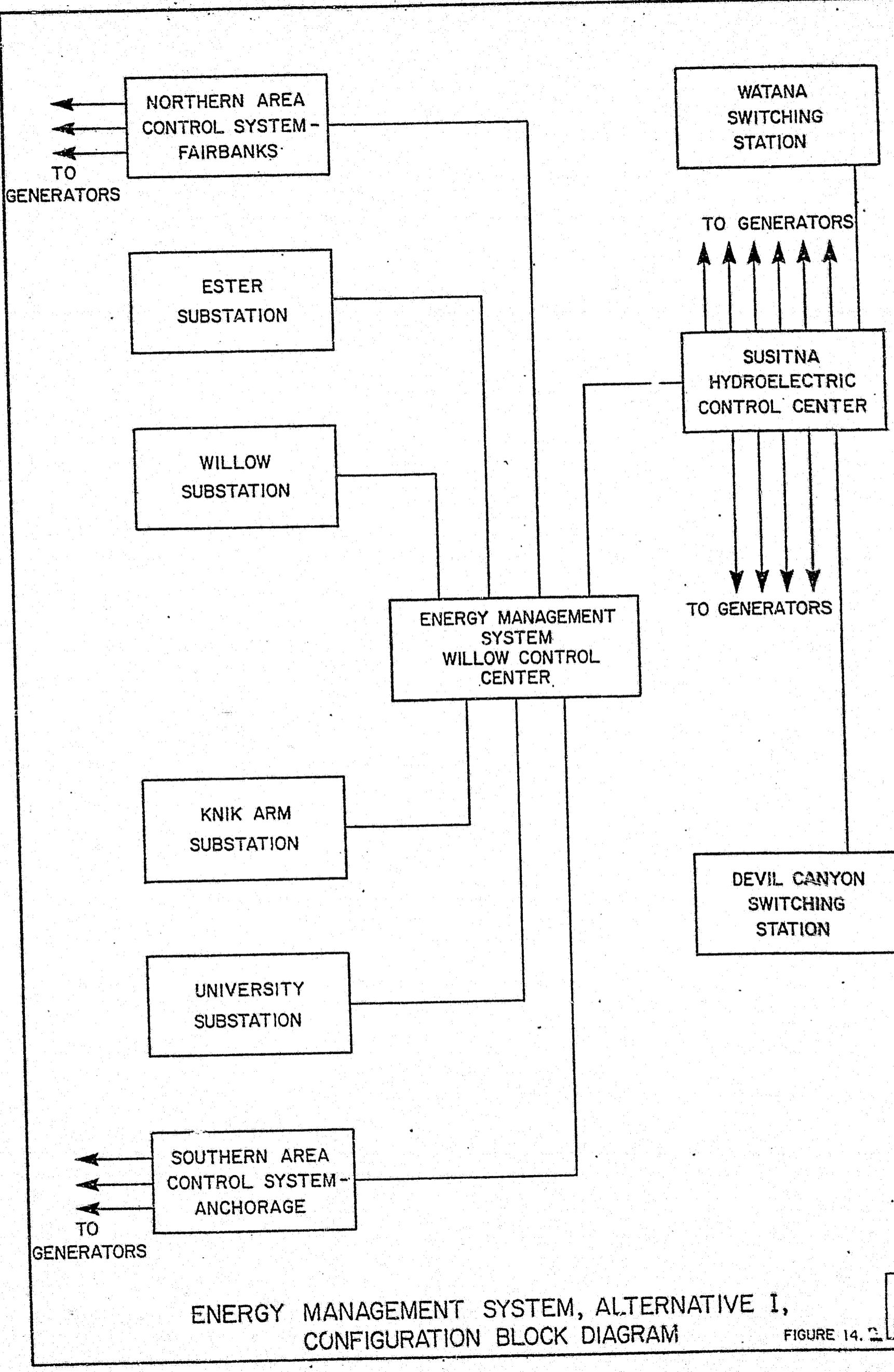
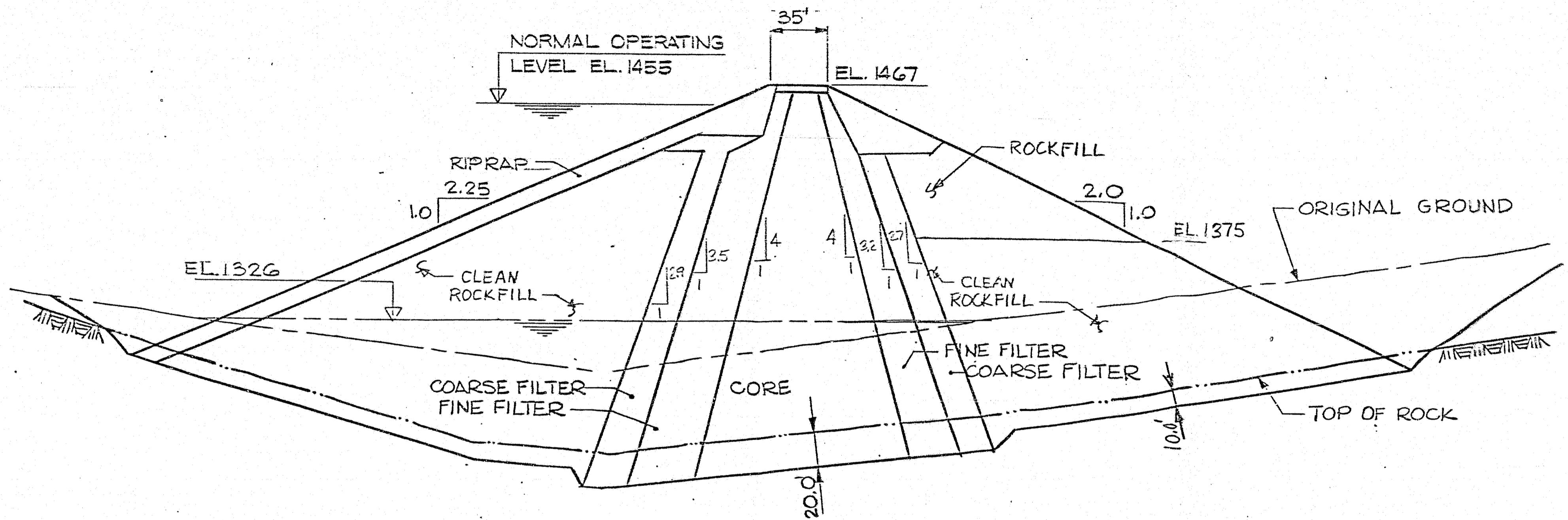


FIGURE 14.2





DEVIL CANYON SADDLE DAM
MAXIMUM HEIGHT SECTION

SCALE: 0 60 120 FEET

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEB53.DAT156
 page: 1

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
PRODUCTION PLANT							
330	LAND & LAND RIGHTS						
.1	LAND						
	LAND	1	LS				
.2	LAND RIGHTS						
	LAND RIGHTS	A	LS				
.3	MISC CHARGES & CREDITS						
	MISC CHARGES & CREDITS	A	LS				
331	POWERPLANT STRUCTURE IMPROVEMENTS						
.1	POWERHOUSE						
.11	POWERHOUSE & DRAFT TUBE						
.111	EXCAVATION						
	POWERHOUSE VAULT ROCK	122,500	CY				33
	DRAFT TUBE ROCK	25,200	CY				
.113	SURFACE PREPARATION/GROUTING						
	POWERHOUSE						34
	SURFACE PREPARATION	107,200	SF				
	DRAFT TUBE						35
	SURFACE PREPARATION	95,400	SF				
	GROUT CURTAIN (U/S OF P-H)						36
	DRILL HOLES	43,800	LF				
	CEMENT	17,500	CF				37
.114	CONCRETE & SHOTCRETE						
	POWERHOUSE						38
	CONCRETE	31,500	CY				
	REINFORCING STEEL	1,580	TON				39
	4" SHOTCRETE	44,000	SF				
	CONC OVERBREAK 12"H/6"V	2,400	CY				40
	DRAFT TUBE						41
	CONCRETE	12,000	CY				
	REINFORCING STEEL	990	TON				42
	2" SHOTCRETE	6,050	SF				
	CONCRETE OVERBREAK 6"	2,500	CY				43

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-62
file: WAER53.DAT160
page: 2

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.115	SUPPORT & ANCHORS						
	POWERHOUSE						
	ROCKBOLTS 1" @ 25' HY	1,040	EACH				
	ROCKBOLTS 1" @ 15'	2,110	EACH				
	STEEL MESH	46,800	SF				
	STEEL SUPPORT	137	TON				
	DRAFT TUBE						
	ROCKBOLTS 1" @ 25'	150	EACH				
	ROCKBOLTS 1" @ 12'	400	EACH				
	ROCKBOLTS 1" @ 9'	180	EACH				
	STEEL MESH	20,000	SF				
.117	DRAINAGE						
	HOLES (U/S OF POWERHOUSE)	15,000	LF				
	HOLES (POWERHOUSE CROWN)	28,500	LF				
.118	STRUCTURAL - MISC STEELWORK						
	POWERHOUSE & DRAFT TUBE						
	STRUCTURAL STEEL/CRANE RAILS	1	LS				
.119	ARCHITECTURAL						
	POWERHOUSE						
	ARCHITECTURAL	1	LS				
.11C	MECHANICAL						
	DRAFT TUBE GATES	4	SETS				
	DRAFT TUBE GUIDES	6	SETS				
	CONSTR HEATING & VENT.	1	LS				
.12	ACCESS TUNNELS & PORTALS						
.121	EXCAVATION						
	TUNNELS - ROCK						
	MAIN TUNNEL	50,250	CY				
	TRANSFORMER GALLERY TUNNEL	17,750	CY				
	GROUTING GALLERY TUNNEL	1,900	CY				
	SURGE CHAMBER ACCESS TUN	7,250	CY				
	PENSTOCK ACCESS TUNNEL	61,500	CY				
	PENSTOCK ELBOW ACCESS TUN	15,000	CY				
	ACCESS SHAFT TUNNEL	12,000	CY				
	CONNECTOR TUNNEL	1,900	CY				
	PORTALS						
	OVERBURDEN	6,000	CY				
	ROCK	3,000	CY				

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-83
file: WAERB3.DAT136
page: 3

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
,123	SURFACE PREPARATION						
	TUNNELS						
	MAIN TUNNEL SLAB	53,100	SF				
	PENSTOCK TUNNEL SLAB	65,200	SF				
	PORTALS						
	HORIZONTAL	200	SF				
	INCLINED	1,400	SF				
,124	CONCRETE & SHOTCRETE						
	PORTALS						
	CONCRETE SLAB	30	CY				
	CONCRETE WALLS	570	CY				
	CONC OVERBREAK 12'H/9"V	50	CY				
	REINFORCING STEEL	40	TON				
	TUNNELS						
	CONC SLAB MAIN TUNNEL	1,950	CY				
	CONC OVERBREAK MAIN TUN 6'	1,000	CY				
	CONC PLUGS PENS ELBOW ACC	25,000	CY				
	REINFORCING STEEL	40	TON				
	MAIN TUNNEL 2" SHOTCRETE	20,100	SF				
	TRANSF GAL 2" SHOTCRETE	7,100	SF				
	SURGE CHAM ACC 2" SHOTCRETE	3,900	SF				
	PENSTOCK ACC 2" SHOTCRETE	24,700	SF				
	PENS ELBOW ACC 2" SHOTCRETE	7,100	SF				
	ACCESS SHAFT 2" SHOTCRETE	300	SF				
	GROUTING GAL 2" SHOTCRETE	1,300	SF				
	CONNECTOR TUN 2" SHOTCRETE	1,300	SF				
,125	SUPPORT & ANCHORS						
	MAIN TUNNEL						
	ROCKBOLTS 1" @ 12'	1,200	EACH				
	ROCKBOLTS 1" @ 9'	250	EACH				
	STEEL SUPPORT	66	TUN				
	STEEL MESH	63,000	SF				
	PORTALS						
	ROCKBOLTS 1" @ 15'	50	EACH				
	TRANSFORMER GALLERY TUNNEL						
	ROCKBOLTS 1" @ 12'	410	EACH				
	ROCKBOLTS 1" @ 9'	70	EACH				
	STEEL SUPPORT	21	TUN				
	STEEL MESH	22,500	SF				
	GROUTING GALLERY TUNNEL						
	ROCKBOLTS 3/4" @ 6'	160	EACH				
	STEEL SUPPORT	2	TUN				
	STEEL MESH	260	SF				
	SURGE CHAMBER TUNNEL						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

Date: 31-JAN-82
 file: WAERS3.DAT#56
 page: 4

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	ROCKBOLTS 1" @ 12'	230	EACH				13
	ROCKBOLTS 1" @ 9'	50	EACH				13
	STEEL SUPPORT	14	TON				13
	STEEL MESH	12,050	SF				13
	PENSTOCK ACCESS TUNNEL						
	ROCKBOLTS 1" @ 12'	1,430	EACH				13
	ROCKBOLTS 1" @ 9'	240	EACH				13
	STEEL SUPPORT	58	TON				13
	STEEL MESH	77,500	SF				13
	FENSTOCK ELBOW ACCESS TUNNEL						
	ROCKBOLTS 1" @ 12'	420	EACH				13
	ROCKBOLTS 1" @ 9'	120	EACH				13
	STEEL SUPPORT	30	TON				13
	STEEL MESH	22,500	SF				13
	ACCESS SHAFT TUNNEL						
	ROCKBOLTS 1" @ 12'	20	EACH				13
	ROCKBOLTS 1" @ 9'	20	EACH				13
	STEEL SUPPORT	8	TON				13
	STEEL MESH	930	SF				13
	CONNECTOR TUNNEL						
	ROCKBOLTS 3/4" @ 9'	160	EACH				13
	STEEL SUPPORT	2	TON				13
	STEEL MESH	260	SF				13
.129	ARCHITECTURAL PORTAL DOORS (2 SETS)	1	LS				
.130	MECHANICAL VENTILATING SYSTEM (INCL IN 335.16)						
.131	ACCESS SHAFT EXCAVATION ROCK	13,620	CY				3
.132	SURFACE PREPARATION SHAFT	64,000	SF				3
.134	CONCRETE & SHOTCRETE CONCRETE LINING CONCRETE OVERBREAK 6"	3,350 1,220	CY CY				3
.135	SUPPORT & ANCHORS ROCKBOLTS 3/4" @ 6'	1,050	EACH				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

Date: 31-JAN-82
 File: WAERS3.DAT#56
 Page: 3

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.138	STRUCTURAL - MISC STEELWORK MISC STEELWORK	50	TON				3
.139	ARCHITECTURAL CONTROL BUILDING (INC IN 331.2 CONT BLDG)						
.13C	MECHANICAL ELEVATORS	1	LS				
.14	FIRE PROTECTION HEADTANK						
.141	EXCAVATION ROCK	1,150	CY				3
.143	SURFACE PREPARATION HEADTANK	2,800	SF				3
.144	CONCRETE & SHOTCRETE CONCRETE CONC OVERBREAK 6" REINFORCING STEEL	250 45 10	CY CY TON				3
.145	SUPPORT & ANCHORS ROCKBOLTS 1" @ 12' ROCKBOLTS 1" @ 9' STEEL MESH STEEL SUPPORT	15 5 1,200 2	EACH EACH SF TON				3 3 3 3
.148	STRUCTURAL - MISC STEELWORK MISC STEELWORK	5	TON				3
.14C	MECHANICAL PIPING & VALVES-SEE 335.12						
.15	BUS TUNNELS						
.151	EXCAVATION ROCK HORIZONTAL ROCK INCLINED	2,700 1,300	CY CY				3 3
.153	SURFACE PREPARATION TUNNELS	4,500	SF				3

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-62
file: WAEBS3.DAT/36
page: 6

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.154	CONCRETE & SHOTCRETE CONCRETE SLAB 2" SHOTCRETE CONCRETE OVERBREAK 12" REINFORCING STEEL	300 5,500 200 15	CY SF CY TON				3
.155	SUPPORT & ANCHORS ROCKBOLTS 1" @ 25' ROCKBOLTS 1" @ 12' ROCKBOLTS 1" @ 9' STEEL MESH STEEL SUPPORT	60 325 80 17,100 11	EACH EACH EACH SF TON				3
.16	TRANSFORMER GALLERY						3
.161	EXCAVATION ROCK	30,250	CY				3
.163	SURFACE PREPARATION TRANSFORMER GALLERY	19,600	SF				3
.164	CONCRETE & SHOTCRETE CONCRETE BASE SLAB REINFORCING STEEL 3" SHOTCRETE CONC OVERBREAK 12"H/6"V	2,900 145 1,000 700	CY TON SF CY				3
.165	SUPPORT & ANCHORS ROCKBOLTS 1" @ 25' HY ROCKBOLTS 1" @ 15' STEEL MESH STEEL SUPPORT	570 260 19,800 28	EACH EACH SF TON				3
.167	DRAINAGE HOLES (IN GALLERY CROWN)	8,300	LF				3
.17	CABLE SHAFTS						3
.171	EXCAVATION ROCK	3,400	CY				3
.173	SURFACE PREPARATION SHAFTS	21,600	SF				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 7

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.174	CONCRETE & SHOTCRETE CONCRETE LINING CONCRETE OVERBREAK 6"	1,000 760	CY CY			3	3
.175	SUPPORT & ANCHORS ROCKBOLTS 3/4" @ 6'	340	EACH			3	
.178	STRUCTURAL - MISC STEELWORK MISC STEELWORK	18	TON			3	
.179	ARCHITECTURAL ENCLOSURES	1	LS			3	
.17C	MECHANICAL MANHOIST	2	EACH			3	
.18	DEWATERING						
.181	DEWATERING (POWER FACS) DEWATERING	1	LS				
.19	INSTRUMENTATION						
.191	INSTRUMENTATION INSTRUMENTATION	1	LS				
.2	MISC. BUILDINGS & STRUCTURES CONTROL BUILDING	1	LS				
.3	PERMANENT VILLAGE (INCLUDED IN 63.5)						
332	RESERVOIR, DAMS & WATERWAYS						
.1	RESERVOIR						
.11	CLEARING CLEARING	37.500	ACRE			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT;56
 page: 8

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.2	DIVERSION TUNNELS/COFFERDAMS						
.21	DIVERSION TUNNELS/PORTALS - (INCL COMBINED TAILRACE/DIV- ERSION TUNNEL & PORTAL - SEE 332.9)						
.211	EXCAVATION UPPER TUNNEL ROCK	221,000	CY			3	
	LOWER TUNNEL ROCK	208,000	CY			3	
	EXC CONC FOR PLUG	700	CY			3	
	UPSTREAM UPPER PORTAL ROCK USEABLE (FACE ONLY)	11,200	CY			3	
	UPSTREAM LOWER PORTAL (INCL MOST EXC FOR UPPER PORTAL) ROCK USEABLE	96,300	CY			3	
	ROCK WASTE	21,200	CY			3	
	DOWNSTREAM PORTALS OVERBURDEN-DRY	17,600	CY			3	
	ROCK USEABLE	126,600	CY			3	
	ROCK WASTE	31,000	CY			3	
	EMERGENCY RELEASE CHAMBERS EXC CONC FOR PLUGS	1,800	CY			3	
	GATE CHAMBER	5,000	CY			3	
	ACCESS TUN TO GATE CHAMBER ROCK	19,100	CY			3	
.212	FILL TEMPORARY COFFERAM TO CON- STRUCT UPSTREAM PORTALS	23,000	CY			3	
.213	SURFACE PREP/GROUTING						
	UPSTREAM UPPER PORTAL HORIZONTAL	3,200	SF			3	
	INCLINED	8,600	SF			3	
	UPSTREAM LOWER PORTAL HORIZONTAL	1,300	SF			3	
	INCLINED	14,900	SF			3	
	DOWNSTREAM UPPER PORTAL HORIZONTAL	6,100	SF			3	
	INCLINED	20,500	SF			3	
	DOWNSTREAM LOWER PORTAL HORIZONTAL	600	SF			3	
	INCLINED	5,600	SF			3	
	GROUT UPPER TUNNEL PLUGS DRILL HOLES	4,100	LF			3	

SUSITNA HYDROELECTRIC PROJECT
 •FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT#56
 page: 9

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CEMENT	820	CF			3	
	GROUT LOWER TUN PERM PLUG					3	
	DRILL HOLES	2,050	LF			3	
	CEMENT	410	CF			3	
.214	CONCRETE & SHOTCRETE						
	UPPER TUNNEL						
	CONCRETE LINING	42,400	CY			3	
	CONC LINING OVERBREAK 6"	10,200	CY			3	
	2" SHOTCRETE	56,000	SF			3	
	REINFORCING STEEL	24	TON			3	
	LOWER TUNNEL						
	CONCRETE LINING	37,600	CY			3	
	CONC LINING OVERBREAK 6"	10,000	CY			3	
	2" SHOTCRETE	57,900	SF			3	
	CONCRETE FOR PLUG	6,200	CY			3	
	REINFORCING STEEL	13	TON			3	
	UPSTREAM UPPER PORTAL						
	CONCRETE HEADWALL	3,200	CY			3	
	CONCRETE LINING	1,300	CY			3	
	CONCRETE SLAB	700	CY			3	
	CONCRETE PIERS	800	CY			3	
	CONCRETE OVERBREAK 12'H/6'V	300	CY			3	
	REINFORCING STEEL	390	TON			3	
	UPSTREAM LOWER PORTAL						
	CONCRETE HEADWALL	4,500	CY			3	
	CONCRETE LINING	4,200	CY			3	
	CONCRETE SLAB	300	CY			3	
	CONCRETE PIERS	700	CY			3	
	CONCRETE OVERBREAK 12'H/6'V	350	CY			3	
	REINFORCING STEEL	630	TON			3	
	DOWNSTREAM UPPER PORTAL						
	CONCRETE HEADWALL	500	CY			3	
	CONCRETE SLAB	100	CY			3	
	CONCRETE OVERBREAK 12'H/6'V	100	CY			3	
	REINFORCING STEEL	40	TON			3	
	DOWNSTREAM FLIP BUCKET						
	CONCRETE SLAB	800	CY			3	
	CONCRETE WALLS	2,300	CY			3	
	CONCRETE INVERT	1,200	CY			3	
	CONCRETE OVERBREAK 12'H/6'V	400	CY			3	
	REINFORCING STEEL	280	TON			3	
	DOWNSTREAM RETAINING WALL						
	CONCRETE SLAB	200	CY			3	
	CONCRETE WALLS	2,000	CY			3	
	CONCRETE OVERBREAK 12'H/6'V	110	CY			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT;56
 page: 10

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	REINFORCING STEEL	90	TON			3	
	DOWNSTREAM LOWER PORTAL CONCRETE HEADWALL	2,500	CY			3	
	CONCRETE SLAB	100	CY			3	
	CONCRETE OVERBREAK 12" H/6" V	150	CY			3	
	REINFORCING STEEL	170	TON			3	
	EMERGENCY RELEASE CHAMBERS	15,300	CY			3	
	CONCRETE PLUG	2,790	SF			3	
	4" SHOTCRETE					3	
	ACCESS TUNNEL TO GATE CHAMB	12,800	SF			3	
	2" SHOTCRETE					3	
.215	SUPPORT & ANCHORS						
	LOWER TUNNEL					3	
	ROCKBOLTS 1" @ 12'	3,590	EACH			3	
	ROCKBOLTS 1" @ 9'	620	EACH			3	
	STEEL MESH	217,100	SF			3	
	STEEL SUPPORT 10" x 10"	220	TON			3	
	UPPER TUNNEL					3	
	ROCKBOLTS 1" @ 12'	3,590	EACH			3	
	ROCKBOLTS 1" @ 9'	620	EACH			3	
	STEEL MESH	210,200	SF			3	
	STEEL SUPPORT 10" x 10"	213	TON			3	
	UPSTREAM LOWER PORTAL					3	
	ROCKBOLTS 1" @ 15'	230	EACH			3	
	ANCHORS	1,600	EACH			3	
	UPSTREAM UPPER PORTAL					3	
	ROCKBOLTS 1" @ 15' (INCL IN LOWER PORT)	700	EACH			3	
	ANCHORS	0	EACH			3	
	DOWNSTREAM LOWER PORTAL					3	
	ROCKBOLTS 1" @ 15'	200	EACH			3	
	ANCHORS	0	EACH			3	
	DOWNSTREAM UPPER PORTAL					3	
	ROCKBOLTS 1" @ 15'	100	EACH			3	
	ANCHORS	0	EACH			3	
	RETAINING WALL ANCHORS	100	EACH			3	
	EMERGENCY RELEASE CHAMBERS					3	
	ROCKBOLTS 1" @ 25'	100	EACH			3	
	ROCKBOLTS 1" @ 15'	125	EACH			3	
	STEEL MESH	3,600	SF			3	
	STEEL SUPPORT	14	TON			3	
	METAL ROOF ANCHORS	20	EACH			3	
	ACCESS TUN TO GATE CHAMBER	775	EACH			3	
	ROCKBOLTS 1" @ 12'	240	EACH			3	
	ROCKBOLTS 1" @ 9'					3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT;56
 page: 11

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	STEEL SUPPORT	55	TON				3
	STEEL MESH	41,000	SF				3
.218	STRUCTURAL - MISC STEELWORK SUSPENDED METAL ROOF EMERGENCY RELEASE CHAMBERS	2,775	SF				3
.21C	MECHANICAL UPSTREAM LOWER GATES GATE EQUIPMENT	2	EACH				3
	UPSTREAM UPPER GATES GATE EQUIPMENT	2	EACH				3
	TRASHRACKS	1	LS				3
	DOWNSTREAM LOWER OUTLET STOPLOG GUIDES	1	LS				3
	STOPLOGS INC FOLLOWER	1	LS				3
	DOWNSTREAM UPPER OUTLET STOPLOG GUIDES	1	LS				3
	LOW LEVEL RELEASE SLIDE GATES INC STL LINER	9	EACH				3
.22	UPSTREAM COFFERDAM						
.221	EXCAVATION OVERBURDEN REMOVAL	1,000	CY				3
.222	FILL CORE	38,400	CY				3
	FINE/FILTER	16,600	CY				3
	COARSE FILTER	15,900	CY				3
	ROCK SHELL	196,500	CY				3
	CLOSURE DIKE	58,500	CY				3
	RIP RAP	21,200	CY				3
.223	SURFACE PREP/GROUTING						
	SLURRY WALL						
	SLURRY WALL	43,600	SF				3
.22D	DEWATERING DEWATERING	1	LS				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBSS3.DAT;56
 page: 12

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.23	DOWNTREAM COFFERDAM						
.231	EXCAVATION OVERBURDEN	5,000	CY			3	
	ROCK	500	CY			3	
	REMOVAL OF COFFERDAM	14,500	CY			3	
.232	FILL						
	RIP RAP	1,800	CY			3	
	CLOSURE DIKE	-15,200	CY			3	
.233	FOUNDATION PREP/GROUTING						
	SLURRY WALL						
	SLURRY WALL	16,500	SF			3	
.3	MAIN DAM						
.31	MAIN DAM						
.311	EXCAVATION						
	OVRBRDN-ABOVE EL 1470	2,026,000	CY			2	
	OVRBRDN-ALLUV-BELOW 1470	5,320,000	CY			2/3	
	ROCK USEABLE	1,767,000	CY			2	
	ROCK WASTE	2,820,000	CY			2	
.312	FILL						
	RIP RAP (UPSTREAM)	1,547,000	CY			2/3	
	GRAVEL (UPSTREAM)	25,194,000	CY			2/3	
	COARSE FILTER (UPSTREAM)	1,646,000	CY			2/3	
	FINE FILTER (UPSTREAM)	2,011,000	CY			2/3	
	CORE (IMPERVIOUS)	8,254,000	CY			2/3	
	FINE FILTER (DOWNSTREAM)	2,253,000	CY			2/3	
	COARSE FILTER (DOWNSTREAM)	1,910,000	CY			2/3	
	SHELL - ROCK & GRAVEL (D/S)	16,760,000	CY			2	
	CORBLES (DOWNSTREAM FACE)	2,003,000	CY			2	
	ROAD BASE	12,000	CY			2	
	FROST PROTECTION						
	PROC & PLACE PROTECTION	960,000	CY			2	
	REMOVE 1' PROTECT & WASTE	93,000	CY			2	
	SCARIFY CORE SURFACE	193	ACRE			2/3	
	FILTER FABRIC						
	FILTER FABRIC	730,000	SF				
.313	SURFACE PREP/GROUTING						
	SURFACE PREPARATION						
	UNDER CORE/FILTERS	2,298,000	SF			2	
	UNDER SHELL	5,482,000	SF			2	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 13

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	CONSOLIDATION GROUT						
	DRILL HOLES	687,000	LF			2	
	CEMENT	687,000	CF			2	
	GROUT CURTAIN					2	
	DRILL HOLES	465,000	LF			2	
	CEMENT	186,000	CF			2	
	DENTAL CONCRETE					2	
	DENTAL CONCRETE	85,000	CY			2	
.317	DRAINAGE Holes	136,000	LF			2	
.32	GROUT GALLERIES/PORTALS						
.321	EXCAVATION						
	TUNNELS/SHAFTS - CORE AREA					2	
	ROCK HORIZONTAL	10,100	CY			2	
	ROCK INCLINED	11,300	CY			2	
	ROCK VERTICAL	2,000	CY			2	
	TUNNELS/SHAFTS - ACCESS					3	
	ROCK HORIZONTAL	13,000	CY			3	
	ROCK INCLINED	2,000	CY			3	
	PORTALS					3	
	OVERBURDEN	3,600	CY			3	
	ROCK	1,000	CY			3	
.323	SURFACE PREPARATION						
	PORTALS					3	
	HORIZONTAL	30	SF			3	
	INCLINED	200	SF			3	
.324	CONCRETE & SHOTCRETE						
	TUNNELS - CORE AREA					2	
	CONCRETE PLUGS	1,000	CY			2	
	CONCRETE SLAB	2,300	CY			2	
	REINFORCING STEEL	80	TON			2/3	
	CONCRETE OVERBREAK 6"	11,500	CY			3	
	2" SHOTCRETE	15,000	SF			2/3	
	TUNNELS - ACCESS					3	
	CONCRETE SLAB	1,600	CY			3	
	REINFORCING STEEL	60	TON			3	
	CONCRETE OVERBREAK 6"	800	CY			3	
	2" SHOTCRETE	10,000	SF			3	
	SHAFTS - CORE AREA					2/3	
	2" SHOTCRETE	5,000	SF			2/3	

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAEBS3.DAT#56
page: 14

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	PORTALS (2 PORTALS)						3
	CONCRETE	20	CY				3
	REINFORCING STEEL	2	TON				
.325	SUPPORT & ANCHORS						
	TUNNELS - CORE AREA						2/3
	ROCKBOLTS 3/4" @ 6'	1,800	EACH				2/3
	STEEL SUPPORT	20	TON				3
	STEEL MESH	3,000	SF				
	TUNNELS - ACCESS						3
	ROCKBOLTS 3/4" @ 6'	1,200	EACH				3
	STEEL SUPPORT	20	TON				3
	STEEL MESH	1,000	SF				
	SHAFTS - CORE AREA						2/3
	ROCKBOLTS 3/4" @ 6'	350	EACH				
	PORTALS						3
	ROCKBOLTS 1" @ 15'	30	EACH				
.329	ARCHITECTURAL						
	PORTAL DOORS	2	EACH				3
.320	MECHANICAL						
	DEWATERING						
	VENT. SYS. (INC W/331.12C)	1	LS				
.33	INSTRUMENTATION						
.331	INSTRUMENTATION (POWER FACS)						
	INSTRUMENTATION	1	LS				
.4	RElict CHANNEL						
.41	SHORE PROTECTION						
.411	EXCAVATION						3
	OVERBURDEN STRIPPING-2' THK	2,200	CY				
.412	FILL						
	DUMP & SPREAD						3
	FILTER MAT'L - 2' LAYER	2,200	CY				3
	ROCK SPALLS/RIP RAP-3' AVE	3,300	CY				3
	SHORE PROTECTION						
	RIP RAP	24,000	CY				
	WASTE ROCK	24,000	CY				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 15

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.44	CHANNEL FILTER BLANKET						
.442	FILL						
	COARSE FILTER	2,900,000	CY			3	
	FINE FILTER	2,180,000	CY			3	
	RIP RAP	182,000	CY			3	
.443	FOUNDATION PREP						
	CLEARING & GRUBBING	140	ACRE			3	
	SURFACE GRADING	3,630,000	CY			3	
.5	TUNNEL SPILLWAY						
.51	TUNNEL SPILLWAY - (INTAKE CIVIL WORK INCL IN POWER INTAKE - SEE 332.6; OUTLET CIVIL WORK INCL IN 332.5i)						
.511	EXCAVATION						
	INLET (SEE 332.611)						
	OUTLET (SEE 332.521)						
	TUNNELS						
	ROCK HORIZONTAL	83,000	CY			3	
	ROCK INCLINED	9,000	CY			3	
.513	SURFACE PREP/GROUTING						
	SURFACE PREPARATION						
	INLET (SEE 332.613)						
	OUTLET (SEE 332.523)						
	TUNNELS	323,500	SF			3	
.514	CONCRETE & SHOTCRETE						
	INLET (SEE 332.614)						
	OUTLET (SEE 332.524)						
	TUNNELS						
	CONCRETE LINING	27,200	CY			3	
	CONCRETE OVERBREAK 6"	6,200	CY			3	
	2" SHOTCRETE	12,000	SF			3	
	3" SHOTCRETE	29,100	SF			3	
.515	SUPPORT & ANCHORS						
	INLET (SEE 332.615)						
	OUTLET (SEE 332.525)						
	TUNNELS						
	ROCKBOLTS 1" @ 6'	2,400	EACH			3	
	STEEL MESH	94,500	SF			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEB53.DAT;56
 page: 16

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.51C	MECHANICAL						
	INLET						
	TRASH RACKS/GUIDES	1	LS			3	
	GATE EQUIPMENT	2	EACH			3	
	STOPLOG GUIDES	2	SETS			3	
	OUTLET						
	FIXED CONE VALVES-6+1SPARE	1	LS			3	
	RING FOLLOWER GATES	6	EACH			3	
	STEEL MANIFOLD LINER	3,500	TON			3	
	MISC MECH EQUIPMENT	1	LS			3	
.52	MAIN (CHUTE) SPILLWAY (INCL CIVIL WORKS FOR TUNNEL SPILLWAY OUTLET - SEE 332.51)						
.521	EXCAVATION						
	APPROACH						
	OVERBURDEN	64,000	CY			3	
	ROCK USEABLE	318,500	CY			3	
	ROCK WASTE	64,000	CY			3	
	CONTROL STRUCTURE (TO END OF ROLLWAY)						
	OVERBURDEN	8,500	CY			2/3	
	ROCK WASTE	18,500	CY			2/3	
	ROCK USEABLE (INCLINED)	37,500	CY			2/3	
	ROCK USEABLE (VERTICAL)	76,500	CY			2/3	
	UPPER CHUTE (END ROLLWAY TO STA 11+00)						
	OVERBURDEN	104,500	CY			2/3	
	ROCK WASTE	77,500	CY			2/3	
	ROCK USEABLE (INCLINED)	215,000	CY			2/3	
	ROCK USEABLE (VERTICAL)	134,000	CY			2/3	
	LOWER CHUTE (STATION 11+00 TO 17+00)						
	OVERBURDEN	79,500	CY			2	
	ROCK WASTE	43,500	CY			2	
	ROCK USEABLE (INCLINED)	107,500	CY			2	
	ROCK USEABLE (VERTICAL)	45,000	CY			2	
	VALVE BLOCK/FLIP & DUTTFALL (FROM STA 17+00 TO END FLIP)						
	OVERBURDEN	52,000	CY			2	
	ROCK WASTE	71,000	CY			2/3	
	ROCK USEABLE (INCLINED)	316,000	CY			2/3	
	ROCK USEABLE (VERTICAL)	58,000	CY			2/3	
	DRAIN TUNNEL						

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAEBS3.DAT:56
page: 17

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
	ROCK HORIZONTAL	4,500	CY	\$	\$ 000	\$ 000	2/3
	ROCK INCLINED	3,000	CY				2
	RIVER CHANNEL						3
	ALLUVIUM EXCAVATION	1,100,000	CY				
.522	FILL						
	GRANULAR BACKFILL	5,000	CY				2
	IMPERVIOUS	1,000	CY				2
.523	FOUNDATION PREP/GROUTING						
	FOUNDATION PREP						
	SPILLWAY						
	ROCK HORIZONTAL	240,000	SF				2
	ROCK INCLINED	167,000	SF				2
	CONSOLIDATION GROUTING						
	DRILL HOLES	54,000	LF				2
	CEMENT	54,000	CF				2
	GROUT CURTAIN (SEE 332.313)						
.524	CONCRETE & SHOTCRETE						
	CONC APPROACH & STRUCTURE						
	CONCRETE OUTERWALLS	20,500	CY				2
	CONC PIERS (FULL LENGTH)	8,000	CY				2
	CONCRETE DECK	1,600	CY				2/3
	CONCRETE ROLLWAY SLABS	19,500	CY				2
	CONC OVERBREAK 12'H/6'V	1,500	CY				3
	REINFORCING STEEL	2,700	TON				3
	CONCRETE CHUTE						
	(INCL BOX DRAIN GALLERIES)						
	(FROM END OF ROLLWAY)						
	CONCRETE SLAB	22,000	CY				2/3
	CONCRETE WALLS	10,500	CY				2/3
	CONC OVERBREAK 18'H/6'V	11,500	CY				2/3
	REINFORCING STEEL	1,300	TON				
	CONCRETE VALVE BLOCK/FLIP -						
	& OUTFALL						
	CONCRETE BLOCK/BUCKET	29,500	CY				2/3
	CONCRETE OUTFALL LINING	2,500	CY				2/3
	CONC OVERBREAK 12'H/6'V	2,200	CY				2/3
	REINFORCING STEEL	1,300	TON				3
	CONCRETE DRAIN GALLERY						
	CONCRETE SLAB	1,000	CY				2/3
	2' SHOTCRETE DOME	5,000	SF				2/3
	REINFORCING STEEL	30	TON				3
	CONC OVERBREAK 6'	500	CY				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT:56
 page: 18

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.525	SUPPORT & ANCHORS						
	DRAINAGE TUNNEL						
	STEEL SUPPORT	7	TON			2	
	STEEL MESH	1,000	SF			2/3	
	ROCKBOLTS DRAINAGE GALLERY						
	3/4" @ 6'	576	EACH			2/3	
	ROCKBOLTS CHUTE & STRUCTURE						
	1" @ 15'	112	EACH			2	
	ROCKBOLTS VALVE BLOCK/BUCKET						
	1" @ 15'	46	EACH			2	
	SLAB/WALL ANCHORS						
	1" @ 10'	9,300	EACH			2/3	
.527	DRAINAGE						
	DRILL HOLES						
	BOX DRAINS (TO DRAIN TUNNEL)	54,000	LF			2	
	3" RELIEF	640	LF			2	
.52C	MECHANICAL						
	GATE EQUIPMENT	3	EACH			3	
	STOPLOG GUIDES	3	SETS			3	
	STOPLOGS INC FOLLOWER	1	SET			3	
.53	EMERGENCY SPILLWAY						
.531	EXCAVATION						
	(INCLUDING BRIDGE & FUSE PLUG)						
	OVERBURDEN	4,158,000	CY			2	
	ROCK USEABLE	2,562,000	CY			2	
	ROCK WASTE	523,000	CY			2	
.532	FILL						
	FUSE PLUG	27,000	CY			2/3	
.533	SURFACE PREP/GROUTING						
	SURFACE PREP (UNDER -						
	FUSE PLUG)						
	INCLINED	4,700	SF			2	
	HORIZONTAL	42,000	SF			2/3	
	CONSOLIDATION GROUTING						
	DRILL HOLES	13,800	LF			2	
	CEMENT	13,800	CF			2	
	GROUT CURTAIN (SEE 332.313)						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEB53.DAT#56
 page: 19

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.535	SUPPORT & ANCHORS ROCKBOLTS 1" @ 15'	740	EACH			2	
.538	BRIDGE BRIDGE	1	LS			3	
.6	POWER INTAKE (INCL INLET & IN- LET STRUCTURE CIVIL WORKS FOR TUNNEL SPILLWAY - SEE 332.5)						
.61	INTAKE STRUCTURE					3	
.611	EXCAVATION OVERBURDEN ROCK USEABLE ROCK WASTE	524,000 1,306,000 138,000	CY CY CY			3 3 3	
.613	SURFACE PREPARATION HORIZONTAL INCLINED	29,000 92,400	SF SF			3 3	
.614	CONCRETE & SHOTCRETE STRUCTURE CONCRETE STRUCTURE REINFORCING STEEL CONC OVERBREAK 12'H/6'V	125,000 8,130 2,600	CY TON CY			3 3 3	
.615	SUPPORT & ANCHORS STRUCTURE ROCKBOLTS 1" @ 15'	400	EACH			3	
.61C	MECHANICAL TRASH RACKS/GUIDES GATE EQUIPMENT BULKHEAD GATE GUIDES BULKHEAD GATE INC FOLLOWER SHUTTER WITH GUIDES ICE BULKHEAD WITH HOIST ICE BULKHEAD GUIDES INTAKE SERVICE CRANE BUBBLER SYSTEM	6 6 6 1 6 6 6 1 1	SETS EACH SETS SET SETS SETS SETS EACH LS			3 3 3 3 3 3 3 3 3	
.61D	INTAKE BUILDING INTAKE BUILDING	1	LS			3	

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAERS3.DAT;56
page: 20

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.7	SURGE CHAMBER						
.71	SURGE CHAMBER						
.711	EXCAVATION						
	CHAMBER ROCK	101,000	CY				3
	VENT SHAFT ROCK	2,200	CY				3
.713	SURFACE PREPARATION						
	SURFACE PREPARATION	98,100	SF				3
.714	CONCRETE & SHOTCRETE						
	CHAMBER						
	CONCRETE	6,000	CY				3
	4" SHOTCRETE	38,400	SF				3
	REINFORCING STEEL	300	TON				3
	CONCRETE OVERBREAK	1,000	CY				3
	VENT SHAFT						
	2" SHOTCRETE	5,900	SF				3
.715	SUPPORT & ANCHORS						
	CHAMBER						
	ROCKBOLTS 1" @ 25'	570	EACH				3
	ROCKBOLTS 1" @ 15'	2,110	EACH				3
	STEEL SUPPORT	66	TON				3
	STEEL MESH	28,900	SF				3
	VENT SHAFT						
	ROCKBOLTS 3/4" @ 6'	370	EACH				3
	STEEL MESH	1,200	SF				3
.717	DRAINAGE						
	HOLES (IN CHAMBER CROWN)	17,500	LF				3
.71C	MECHANICAL						
	STOPLOG GUIDES	2	SETS				3
	STOPLOG INC FOLLOWER	1	SET				3
	CRANE	1	LS				3
.8	PENSTOCKS						
.81	PENSTOCKS						
.811	EXCAVATION						
	TUNNELS						
	ROCK HORIZONTAL	53,400	CY				3
	ROCK INCLINED	54,000	CY				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT;56
 page: 21

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000.	\$ 000	
.813	SURFACE PREP/GROUTING SURFACE PREPARATION TUNNELS	489,600	SF			3	
	CONTACT GROUTING CONTACT GROUTING	1	LS			3	
	CONSOLIDATION GROUTING CONSOLIDATION GROUTING	1	LS			3	
.814	CONCRETE & SHOTCRETE CONCRETE LINER	37,200	CY			3	
	REINFORCING STEEL	34	TON			3	
	3" SHOTCRETE	49,000	SF			3	
	2" SHOTCRETE	30,000	SF			3	
	CONC OVERBREAK 6"	10,500	CY			3	
	CONCRETE PLUG	11,100	CY			3	
	CONC OVERBREAK PLUG	960	CY			3	
.815	SUPPORT & ANCHORS ROCKBOLTS 1" @ 25'	150	EACH			3	
	ROCKBOLTS 1" @ 6'	6,040	EACH			3	
	STEEL MESH	186,000	SF			3	
	SUPPORT STEEL	127	TON			3	
.818	STRUCTURAL - MISC STEELWORK STEEL LINER	2,400	TON			3	
.9	TAILRACE WORKS (1 PORTAL WITH TUNNEL COMBINED TAILRACE/DIV- ERSION INCL IN DIVERSION WORKS 332.21)						
.91	TAILRACE TUNNELS/PORTALS						
.911	EXCAVATION TUNNELS						
	ROCK	135,000	CY			3	
	PORTALS						
	OVERBURDEN	3,200	CY			3	
	ROCK USEABLE	46,000	CY			3	
	ROCK WASTE	14,500	CY			3	
.913	SURFACE PREPARATION PORTALS						
	HORIZONTAL	.600	SF			3	
	INCLINED	6,000	SF			3	
	TUNNELS						

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAEBS3.DAT#56
page: 22

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	TUNNELS	428,400	SF			3	
.914	CONCRETE & SHOTCRETE						
	TUNNELS					3	
	CONCRETE LINING	14,500	CY			3	
	CONCRETE OVERBREAK 6"	7,500	CY			3	
	2" SHOTCRETE	44,500	SF			3	
	REINFORCING STEEL	22	TON			3	
	PORTAL					3	
	CONCRETE BASE SLAB	100	CY			3	
	CONCRETE WALLS	2,900	CY			3	
	CONC OVERBREAK 12"H/6"V	110	CY			3	
	REINFORCING STEEL	195	TON			3	
.915	SUPPORT & ANCHORS					3	
	TUNNELS					3	
	ROCKBOLTS 1" @ 12'	2,860	EACH			3	
	ROCKBOLTS 1" @ 9'	600	EACH			3	
	STEEL MESH	141,700	SF			3	
	PORTAL					3	
	ROCKBOLTS 1" @ 15'	50	EACH			3	
.91C	MECHANICAL					3	
	STOPLOG GUIDES	1	SET			3	
	STOPLOG INC FOLLOWER	1	SET			3	
333	WATERWHEELS, TURBINES & GENERATORS						
.1	TURBINES & GOVERNORS						
.11	TURBINES & GOVERNORS						
.111	SUPPLY	6	EACH			3	
.112	INSTALL	6	EACH			3	
.2	GENERATORS & EXCITERS						
.21	GENERATORS & EXCITERS (SUPPLY & INSTALL)						
.211	GENERATORS & EXCITERS	6	EACH			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEB53.DAT#56
 page: 23

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
334	ACCESSORY ELECTRICAL EQUIPMENT						
.1	CONNECTION, SUPPORTS & STRUCT.						
.11	STRUCTURES (SUPPLY & INSTALL)						
.12	CONDUCTORS & INSULATORS						
.121	GENERATOR ISOLATED PHASE BUS	1	LS				
.122	HV POWER CABLES & ACC	1	LS				
.123	LV POWER CABLES & ACC	1	LS				
.124	CONDUT CABLES & ACC	1	LS				
.125	GROUNDING SYSTEM	1	LS				
.13	CONDUITS & FITTINGS						
.131	CONDUITS & FITTINGS	1	LS				
.2	SWITCHGEAR & CONTROL EQUIPMENT						
.21	AUXILIARY TRANSFORMERS						
.211	AUXILIARY TRANSFORMERS	4	EACH			3	
.22	CIRCUIT BREAKERS GEN						
.221	CIRCUIT BREAKERS GEN	6	EACH			3	
.23	SURGE PROT & GEN CUBICLES						
.231	SURGE PROT & GEN CUB	1	LS				
.24	SWITCHBOARDS						
.241	SWITCHBOARDS	1	LS				
.25	AUX. POWER EQPT-INCL BAT						
.251	AUX. POWER EQUIPMENT	1	LS				
.3	CUBICLES & APPURTENENCES						
.31	CONTROL, RELAY & METER. BRDS						
.311	CONTROL, RELAY & METER. BOARD	1	LS				
.32	COMPUTER CONTROL SYSTEM						
.321	COMPUTER CONTROL SYSTEM						INCL IN TRANS-EMS
.33	SUPERVIS. & TELEMETER. SYS.						
.331	SUPERVIS & TELEMETER SYS						INCL IN TRANS-EMS
.4	POWER TRANSFORMERS						
.41	POWER TRANSFORMERS						
.411	POWER TRANSFORMERS	10	EACH			3	
.5	LIGHTING SYSTEM						
.51	POWERHOUSE & TRANS. GALLERY						
.511	POWERHOUSE & TRANS. GALLERY	1	LS				
.52	ACCESS TUNNELS & ROADS						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 24

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	.521 ACCESS TUNNELS & ROADS	1	LS				
	.6 MISC. ELECTRICAL EQUIPMENT						
	.61 MISC. ELECTRICAL EQUIPMENT	1	LS				
	.611 MISC. ELECTRICAL EQUIPMENT	1	LS				
	.7 SURFACE ACCESSORY ELEC EQPMT						
	.71 34.5 EQUIPMENT	1	LS				
	.711 SWITCHBOARD	2	SETS				
	.712 CABLES	1	LS				
	.713 TRANSFORMER 34/5/4.16	1	LS				
	.713 TRANSFORMER 34.5/480	1	LS				
	.72 LV TO SPILLWAY INTAKE	1	LS				
	.721 4.16KV CABLES	1	LS				
	.722 480KV CABLES	1	LS				
	.73 DIESEL STANDBY	1	LS				
	.731 DIESEL STANDBY	1	LS				
	.74 EXTERIOR LIGHTING	1	LS				
	.741 EXTERIOR LIGHTING	1	LS				
	.75 MIMIC BOARD - CONTROL BLDG	1	LS				
	.751 MIMIC BOARD - CONTROL BLDG	1	LS				
335	MISCS. POWERPLANT EQUIPMENT						
	.1 AUXILIARY SYSTEMS - UNDERGROUND						
	.11 STATION WATER SYSTEMS	1	LS				
	.111 STATION WATER SYSTEMS	1	LS				
	.12 FIRE PROTECTION SYSTEMS	1	LS				
	.121 FIRE PROTECTION SYSTEMS	1	LS				
	.13 COMPRESSED AIR SYSTEMS	1	LS				
	.131 COMPRESSED AIR SYSTEMS	1	LS				
	.14 OIL HANDLING SYSTEMS	1	LS				
	.141 OIL HANDLING SYSTEMS	1	LS				
	.15 DRAINAGE & DEWATERING	1	LS				
	.151 DRAINAGE & DEWATERING	1	LS				
	.16 HEAT., VENT. & COOLING SYS.	1	LS				
	.161 HEAT., VENT. & COOLING SYS.	1	LS				
	.17 MISCELLANEOUS	1	LS				
	.171 MISCELLANEOUS	1	LS				

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAERS3.DAT;56
page: 25

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.2	AUXILLIARY SYS - SURFACE FACS						
.21	AUX SYS - SURFACE FACS						
.211	AUX SYS - SURFACE FACS	1	LS				
.3	AUXILIARY EQUIPMENT						
.31	POWERHOUSE CRANES						3
.311	POWERHOUSE CRANES	2	EACH				
.32	ELEVATORS						
.321	ELEVATORS	1	LS				
.33	MISC. CRANES & HOIST						
.331	MISC. CRANES & HOIST	1	LS				
.34	MACHINE SHOP EQUIPMENT						
.341	MACHINE SHOP EQUIPMENT	1	LS				
.4	GENERAL STATION EQUIPMENT						
	GENERAL STATION EQUIPMENT	1	LS				
.5	COMMUNICATIONS EQUIPMENT						
	COMMUNICATIONS EQUIPMENT	1	LS				
336	ROADS, RAIL & AIR FACILITIES						
.1	ROADS						
.11	PIONEER ROADS & BRIDGES						
.111	GOLD CREEK-DEVIL CANYON ROAD (12.31 MILES)						
	CLEARING	113	ACRE				3
	WASTE EXCAVATION	324,998	CY				3
	COMMON EXCAVATION	291,163	CY				3
	ROCK EXCAVATION	0	CY				3
	BORROW	0	CY				3
	18" CULVERTS	3,460	LF				3
	36" CULVERTS	1	LS				3
	BRIDGES	0	SF				3
	D-1 BASE MATERIAL	66,444	TON				3
	FABRIC	3,192	SY				3
	MAINTENANCE						
	MAINTENANCE	25	MI/YRS				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT#56
 page: 26

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.112	DEVIL CANYON-WATANA ROAD (41.25 MILES)						
	CLEARING	369	ACRE			3	
	WASTE EXCAVATION	855,321	CY			3	
	COMMON EXCAVATION	619,500	CY			3	
	ROCK EXCAVATION	0	CY			3	
	BORROW	0	CY			3	
	18" CULVERTS	9,200	LF			3	
	36" CULVERTS	1	LS			3	
	BRIDGES	0	SF			3	
	D-1 BASE MATERIAL	222,640	TON			3	
	FABRIC	14,946	SY			3	
	MAINTENANCE					3	
	MAINTENANCE	83	MI/YRS			3	
.113	DEVIL CANYON LOW LEVEL CROSS-CROSSING (7.88 MILES)						
	CLEARING	170	ACRE			3	
	WASTE EXCAVATION	498,845	CY			3	
	COMMON EXCAVATION	549,417	CY			3	
	ROCK EXCAVATION	749,641	CY			3	
	BORROW	0	CY			3	
	18" CULVERTS	5,100	LF			3	
	36" + CULVERTS	1	LS			3	
	BRIDGE	1	LS			3	
	D-1 BASE MATERIAL	36,966	TON			3	
	FABRIC	0	SY			3	
	MAINTENANCE					3	
	MAINTENANCE	118	MI/YRS			3	
.12	PERMANENT ROADS & BRIDGES						
.121	FARKS HWY-GOLD CREEK R & M SEGMENT E-1 13.26 MILE						
	CLEARING	210	ACRE				
	WASTE EXCAVATION	575,480	CY				
	COMMON EXCAVATION	570,180	CY				
	ROCK EXCAVATION	35,850	CY				
	BORROW	126,600	CY				
	NFS SUBBASE MATERIAL	136,500	CY				
	GRADE "A" BASE MATERIAL	74,480	CY				
	D-1 BASE MATERIAL	31,080	TON				
	A. C. SURFACING	28,462	TON				

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - 'REVISION 3'

date: 31-JAN-82
file: WAEBS3.DAT;56
page: 27

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	GUARDRAIL	9,800	LF				
	18" CULVERTS	7,055	LF				
	36" + CULVERTS	1	LS				
	FABRIC	18,844	SY				
	THAW PIPES	7,555	LF				
	TOPSOIL & SEED	130	ACRE				
	TRAFFIC CONTROL DEVICES	13.3	MILE				
	BRIDGES	90,440	SF				
	MAINTENANCE						3
	MAINTENANCE	13.3	MI/YRS				
.122	GOLD CREEK - DEVIL CANYON						
	R & M SEGMENT B-2 12.31 MILE						
	MAIN ROAD						
	CLEARING	28	ACRE				3
	WASTE EXCAVATION	97,892	CY				3
	COMMON EXCAVATION	44,772	CY				3
	ROCK EXCAVATION	23,625	CY				3
	BORROW	416,311	CY				3
	NFS SUBBASE MATERIAL	126,750	CY				3
	GRADE 'A' BASE MATERIAL	39,160	CY				3
	D-1 BASE MATERIAL	28,860	TON				3
	A. C. SURFACING	26,429	TON				3
	GUARDRAIL	6,700	LF				3
	18" CULVERTS	4,950	LF				3
	36" + CULVERTS	1	LS				3
	FABRIC	5,585	SY				3
	THAW PIPES	8,845	LF				3
	TOPSOIL & SEED	86	ACRE				3
	TRAFFIC CONTROL DEVICES	12	MILE				3
	BRIDGES	0	SF				3
	MAINTENANCE						3
	MAINTENANCE	130	MI/YRS				3
.123	DEVIL CANYON - WATANA						
	R & M SEGMENT A-2 41.25 MILE						
	MAIN ROAD						
	CLEARING	207	ACRE				3
	WASTE EXCAVATION	681,179	CY				3
	COMMON EXCAVATION	984,473	CY				3
	ROCK EXCAVATION	146,527	CY				3
	BORROW	73,145	CY				3
	NFS SUBBASE MATERIAL	424,710	CY				3
	GRADE 'A' BASE MATERIAL	231,739	CY				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT;56
 page: 28

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	D-1 BASE MATERIAL	96,704	TON				
	A. C. SURFACING	88,557	TON				3
	GUARDRAIL	6,050	LF				3
	18" CULVERTS	13,840	LF				3
	36" + CULVERTS	1	LS				3
	FABRIC	34,874	SY				3
	THAW PIPES	24,335	LF				3
	TOPSOIL & SEED	326	AC				3
	TRAFFIC CONTROL DEVICES	41	MILE				3
	BRIDGES	0	SF				3
	MAINTENANCE						
	MAINTENANCE	248	MI/YRS				3
.13	SITE ROADS						
	SITE ROADS	26	MILE				
	MAINTENANCE	26	MILE				
	MAINTENANCE						
.2	RAIL FACILITIES						
.21	RAILHEAD-GOLD CREEK						
	RAILHEAD						
	CLEARING	25	ACRE				3
	WASTE EXCAVATION	78,000	CY				3
	COMMON EXCAVATION	505,000	CY				3
	GRADE "A" BASE MATERIAL	4,900	CY				3
	D-1 BASE MATERIAL	2,400	TON				3
	A.C. SURFACING	2,200	TON				3
	TOPSOIL & SEED	15	ACRE				3
	RAILYARD CONTROL DEVICES	1	LS				3
	SUBBALLAST	25,800	CY				3
	TRACKAGE	19,700	LF				3
	DOCK LUMBER	16	MBF				3
	MAINTENANCE						
	MAINTENANCE	15	YEARS				3
	MAINTENANCE						
.3	AIRSTRIPE						
.31	AIRSTRIPE						
	PERMANENT AIRSTRIPE	1	LS				
	TEMPORARY AIRSTRIPE	1	LS				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT#56
 page: 29

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
TRANSMISSION PLANT							
350	LAND & LAND RIGHTS LAND & LAND RIGHTS TRANSMISSION SUBSTATIONS (4 SITES)	179	1	MILE LS			2/3 2
352	SUBSTATION & SWITCHING STATION SUBSTATION & SWITCHING STATION STRUCTURES & IMPROVEMENTS .1 SWITCHYARD .11 SWITCHYARD		i	LS			
353	SUBSTATION/SWITCHING STA EQUIF SUBSTATION/SWITCHING STA EQUIP ESTER WILLOW KNIK ARM UNIVERSITY DEVIL CANYON	1 1 1 1 1		LS LS LS LS LS			
	WILLOW ENERGY MNGMT SYS (EMS) EQFMT & SYSTEM COSTS MICROWAVE COMMUN EQFMT EMS CONTROL CENTER BLDG & WATANA & DEV CAN (IN- PLANT MONTR & CNTRL EQFMT)	1 1 1 1		LS LS LS LS			

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT#56
 page: 30

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES TOWERS (INCLUDING FOUNDATION & HARDWARE)	2,447	EACH				3
356	OVERHEAD CONDUCTORS & DEVICES OVERHEAD CONDUCTORS & DEVICES CNDTRS 2 x 954 kcmil/phase SHIELD WIRE (3/8", 2 CIRCUIT) SUBMARINE CABLES (6)	556	MILE				
		1	LS				
359	ROADS & TRAILS ROADS & TRAILS ROADS & TRAILS CLEARING & ROADS	200	MILE				
		170	MILE				
GENERAL PLANT							
389	LAND & LAND RIGHTS LAND & LAND RIGHTS INCLUDED IN 330						
390	STRUCTURES & IMPROVEMENTS STRUCTURES & IMPROVEMENTS INCLUDED IN 331.2						

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAERS3.DAT#56
page: 31

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

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEB3.DAT;56
 page: 32

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
	COMMUNICATIONS EQUIPMENT		E		\$ 000	\$ 000	
398	MISCELLANEOUS EQUIPMENT		E				
	MISCELLANEOUS EQUIPMENT		E				
399	OTHER TANGIBLE PROPERTY						
	OTHER TANGIBLE PROPERTY						
	OTHER TANGIBLE PROPERTY	1	L\$				
	INDIRECT COSTS						
61	TEMPORARY CONSTRUCTION FACILITIES						
	TEMPORARY CONSTRUCTION FACILITIES						
	(INCLUDED IN DIRECT COSTS)						
62	CONSTRUCTION EQUIPMENT						
	CONSTRUCTION EQUIPMENT						
	(INCLUDED IN DIRECT COSTS)						
63	MAIN CONSTRUCTION CAMP						
.1	MAIN CONSTRUCTION CAMP						
.11	SITE PREPARATION						
	CLEARING & STRIPPING	163	ACRE				
	FINE GRADE	0	SY				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT#56
 page: 33

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	INSTALL GRANULAR PAD	885,000	CY				
	CONSTRUCT ROADWAYS						3
	MAIN ROADS IN CAMP [34']	10,200	LF				
	CONNECT. RD. TO ACCESS RD.	1,800	LF				
	DRAINAGE						
	DITCHING	27,000	LF				
	CULVERTS	1,200	LF				
	PERIMETER FENCING						
	PERIMETER FENCING	11,000	LF				
	PARKING AREAS						
	PARKING AREAS	1	LS				
	PLUG-INS	500	EACH				
.12	BUILDINGS						3
	BACHELR DORMS-108 MAN CMPLX	48	EACH				
	BACHELOR DORMS-MGMNT-TYPE A	10	EACH				26' x 224'
	BACHELOR DORMS-MGMNT-TYPE B	14	EACH				28' x 120'
	GUEST HSS-1 EA OWN/MGR/CON	3	EACH				24' x 120'
	CAMP MANAGER'S OFFICES	3	EACH				28' x 120'
	STAFF CLUBHOUSE	1	EACH				30' x 40'
	DINING HALL	1	EACH				50' x 80'
	DINING HALL	1	EACH				120' x 150'
	RECREATION BLDG.	1	EACH				120' x 220'
	RECREATION BLDG.	1	EACH				120' x 160'
	GYMNASIUM	1	EACH				120' x 200'
	SECURITY OFFICE	1	EACH				200' x 200'
	FIRE STATION	1	EACH				50' x 60'
	SOILS/MATERIALS LAB.	1	EACH				40' x 80'
	MAINTENANCE BLDG.	1	EACH				40' x 80'
	WAREHOUSE - MANAGERS	1	EACH				80' x 100'
	WAREHJSE - FOOD SERVICE	1	EACH				120' x 160'
	COMMUNICATION BLDG.	1	EACH				100' x 120'
	HOSPITAL	1	EACH				20' x 30'
	ICE RINK	1	EACH				140' x 160'
	BANK	1	EACH				140' x 300'
	STORE	1	EACH				50' x 60'
	LAUNDRY	1	EACH				30' x 60'
	SWIMMING POOL	1	EACH				20' x 80'
	PERMAWALK	1	EACH				100' x 120'
	6 FEET WIDE	1,000	LF				
	10 FEET WIDE	3,000	LF				
	16 FEET WIDE	1,300	LF				
.13	UTILITIES						
	WATER						
	SUPPLY SYSTEM						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAERS3.DAT#56
 page: 34

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	INTAKE - 3.4 MG POND	1	LS				
	PUMP STA - 1200 GPM	1	LS				
	BOOSTER PUMP STA - 1200GPM	1	LS				
	SUPPLY LINE - 2 LINES -	10,000	LF				1-6", 1-8", UTILDR, HT
	TREATMENT PLANT - 1.7 MGD	1	LS				
	BACK-UP WELLS	1	LS				
	DISTRIBUTION						
	LINE TO CAMP - 2 LINES -	3,500	LF				1-6", 1-8", UTILDR, HT
	RESERVOIRS - 1 @ 1.7 MG &	1	LS				
	PUMP STA - 5500GPM	1	LS				1 @ 1.4 MG
	DISTRIBUTION SYSTEM						
	DISTRIB LINES-BURIED						
	12"	2,700	LF				
	6"	300	LF				
	DISTRIBUT LINE UTILDR						
	12" DI	3,100	LF				
	6" DI	4,300	LF				
	4" DI	960	LF				
	HYDRANTS	15	EACH				3
	HEAT TRACING						
	12" PIPE	5,800	LF				
	6" PIPE	4,600	LF				
	4" PIPE	960	LF				
	VALVES						
	VALVES	1	LS				
	UTILIDORS						
	UTILIDORS	8,400	LS				
	SEWAGE						
	COLLECTION SYSTEM						
	4" PIPE	1,900	LF				
	6" PIPE	1,600	LF				
	8" PIPE	3,300	LF				
	12" PIPE	2,300	LF				
	16" PIPE	1,200	LF				
	HEAT TRACING						
	4"	1,900	LF				
	6"	1,600	LF				
	8"	3,300	LF				
	12"	2,300	LF				
	16"	1,200	LF				
	UTILIDORS						
	UTILIDORS	1,200	LF				
	TREATMENT PLANT						
	SKIMMING TANK	1	EACH				
	LAGOONS. - [1 @ 385' x 205'	5	EACH				
	RBC's	9	EACH				
							2 4 @ 280' x 155' I

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 35

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	PHYS/CHEM UNIT	1	EACH				
	CLARIFIER	1	EACH				
	DISINFECTION	1	EACH				
	HEAT PUMP	1	EACH				
	THICKENER	1	EACH				
	FILTER PRESS	1	EACH				
	DRYING BEDS	2	EACH				
	OUTFALL LINE [10"]	2,000	LF				
	OUTFALL	1	EACH				
	BUILDING	1	EACH				
	CONTROLS/INSTRUMENTATION	1	LS				
	PIPING, VALVES, FITTINGS	1	LS				
	LABORATORY	1	EACH				
	ELECTRICAL						
	GENERATING STATIONS						
	BUILDINGS	1	EACH				
	GENERATORS [850 KW]	3	EACH				
	DAY TANK	1	EACH				
	FUEL STORAGE TANK	1	EACH				
	SUBSTATION	1	EACH				
	DISTRIBUTION	1	LS				
	LIGHTING						
	POLE MOUNTED LUMINAIRES	70	EACH				
	FLOOD LIGHTS	25	EACH				
	FIRE ALARM SYSTEM						
	FIRE ALARM SYSTEM	1	LS				
	TELEPHONE SYSTEM						
	CAMP (WIRE)	1	LS				
	MICROWAVE	1	LS				
	TV/RADIO STATION	1	LS				
	TV/RADIO STATION	1	LS				
	SOLID WASTE FACILITY	1	LS				
	SOLID WASTE FACILITY	1	LS				
POL							50' x 60'
	GARAGE/MAINTENANCE BLDG	1	EACH				
	TANKS						
	50,000 GAL	4	EACH				
	100,000 GAL	36	EACH				
	EARTHWORK						
	CLEARING & GRUBBING	14	ACRE				
	BERMS	45,000	CY				
	PIPING	1	LS				
	FUEL STATION	1	LS				

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAEB53.DAT:56
page: 36

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.2	MAIN CONSTRUCTION VILLAGE						
.21	SITE PREPARATION						
	CLEARING & STRIPPING	130	ACRE				
	FINE GRADING	0	SY				
	INSTALL GRANULAR PAD	835,000	CY				
	CONSTRUCT ROADWAYS						
	ROADWAYS IN VILLAGE						
	MAIN ROAD 34' WIDE	2,200	LF				
	SECONDARY ROADS 24' WIDE	22,000	LF				
	CONNECTION TO ACC RD 34'	1,600	LF				
	DRAINAGE						
	BITCHING	51,600	LF				
	CULVERTS - 560 LOTS	13,200	LF				
	PERIMETER FENCING						
	PERIMETER FENCING	12,000	LF				
	PARKING AREAS						
	PARKING AREAS	6,000	SF				
							GRANULAR SURFACE
.22	BUILDINGS						
	SINGLE FAMILY UNIT - 2 BDRM	72	EACH				
	SINGLE FAMILY UNIT - 3 BDRM	200	EACH				
	SINGLE FAMILY UNIT - 2 BDRM	16	EACH				
	SINGLE FAMILY UNIT - 3 BDRM	16	EACH				
	SINGLE FAMILY UNIT - 4 BDRM	16	EACH				
	SCHOOL - 34,000 SF	1	LS				
	GYMNASIUM	1	LS				
	SWIMMING POOL	1	LS				
	RECREATION CENTER	1	LS				
	STORE	1	LS				
	FIRE STATION	1	LS				
	GAS STATION [6 PUMP, 3-BAY]	1	LS				
							w/ 2-10,000 GAL TANK
.23	UTILITIES						
	WATER						
	SUPPLY LINE 6"	8,300	FT				
	PUMP STATION	1	LS				
	WATER STOR TANK - 1.4 MG	1	EACH				
	DISTRIBUTION LINES						
	6" DI	13,200	LF				
	8" DI	1,500	LF				
	10" DI	1,000	LF				
	12" DI	1,300	LF				
	HEAT TRACING						
	6" PIPE	21,500	LF				
	8" PIPE	1,500	LF				
	10" PIPE	1,000	LF				
							CINCL SUPPLY RUN FROM VIL TO TREAT- MENT PLANT]

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAERS3.DAT;56
page: 37

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	12" PIPE	1,300	LF				
	VALVES	20	EACH				
	6"	2	EACH				
	8"	2	EACH				
	10"	2	EACH				
	12"	2	EACH				
	HYDRANTS						
	[VALVES & STUBS INC - 1 EA	20	EACH				@ APPROX 400'
	SEWERAGE						
	COLLECTION SYSTEM						
	6" PIPE	7,800	LF				
	8" PIPE	6,500	LF				
	10" PIPE	1,100	LF				
	12" PIPE	800	LF				
	14" PIPE	700	LF				
	HEAT TRACING						
	6" PIPE	21,600	LF				
	8" PIPE	6,500	LF				
	10" PIPE	1,100	LF				
	12" PIPE	800	LF				
	14" PIPE	700	LF				
	PUMPING SYSTEM						
	PUMP STATION	1	LS				
	BOOSTER PUMP STATION	1	LS				
	6" FORCE MAIN	13,800	LF				
	ELECTRICAL						
	GENERATING STATIONS						
	BUILDING	1	EACH				
	GENERATORS - 850 KW	4	EACH				
	GENERATORS - 500 KW	2	EACH				
	DAY TANKS	2	EACH				
	FUEL STORAGE TANKS	2	EACH				
	SUBSTATIONS WITH WIRING	2	EACH				
	DISTRIBUTION						
	DISTRIBUTION	1	LS				
	FIRE ALARM SYSTEM	1	LS				
	FIRE ALARM SYSTEM	1	LS				
	TELEPHONE SYSTEM	1	LS				
	TELEPHONE SYSTEM	1	LS				
	TV RADIO STATION	1	LS				
	TV RADIO STATION	1	LS				
	UTILIDORS						
	MAIN RUNS IN VILLAGE	16,900	LF				
	STREET CROSSING 50 LF EA	1,000	LF				
	PUMP STA TO TREATMT PLANT	8,300	LF				
	STUBS TO HSE 560 LOTS @ 20'	11,200	LF				
							INCL 4" SVC, ETC.

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 WATANA - "REVISION 3"

date: 31-JAN-82
 file: WAEBS3.DAT;56
 page: 38

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
	STUBS TO BLDGS - 10 @ 25'	250	LF	\$	\$ 000	\$ 000	
	INTEGRATED OFC AREA						
	OWNER/MGRS OFFICE	1	EACH				120' x 160"
	CONTRACTORS OFFICES	1	EACH				120' x 160"
.3	ACCESS ROAD CAMPS						
.31	PIONEER ROAD CAMP						
	FAC'S, CATERING & OPER SPRT	21,100	MANDAY				3
.32	ACCESS ROAD/RAILHEAD CAMP						
	FAC'S, CATERING & OPER SPRT	70,900	MANDAY				3
.4	CAMP BUILDINGS CREDIT						
	25% OF LUMP SUM COST	1	LS				3
.5	PERMANENT TOWN						
	PERMANENT TOWN	1	LS				
.6	MAIN CONSTR CATERING & SUPPORT						
	CATERING & SUPPORT	5,750,000	MANDAY				
.7	CONSTRUCTION POWER						
	CONSTRUCTION POWER	1	LS				
64	LABOR EXPENSE						
	LABOR EXPENSE						
	(INCLUDED IN DIRECT COSTS)						
65	SUPERINTENDENCE						

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
WATANA - "REVISION 3"

date: 31-JAN-82
file: WAEBS3.DAT;56
page: 39

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	SUPERINTENDENCE (INCLUDED IN DIRECT COSTS)						
66	INSURANCE INSURANCE						
69	FEES FEES						
				\$			

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 1

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
PRODUCTION PLANT							
330	LAND & LAND RIGHTS						
.1	LAND						
	LAND	1	LS				
.2	LAND RIGHTS						
	LAND RIGHTS	1	LS				
.3	MISC CHARGES & CREDITS						
	MISC CHARGES & CREDITS	A	1	LS			
331	POWERPLANT STRUCTURE IMPROVEMENTS						
.1	POWERHOUSE						
.11	POWERHOUSE & DRAFT TUBE						
.111	EXCAVATION						
	POWERHOUSE VAULT ROCK	90,000	CY				3
	DRAFT TUBE ROCK	16,800	CY				3
.113	SURFACE PREPARATION/GROUTING						
	POWERHOUSE						
	SURFACE PREPARATION	85,500	SF				3
	DRAFT TUBE						
	SURFACE PREPARATION	51,300	SF				3
	GROUT CURTAIN-(U/S OF P-H)	A					3
	DRILL HOLES	43,800	LF				3
	CEMENT	17,520	CF				3
.114	CONCRETE & SHOTCRETE						
	POWERHOUSE						
	CONCRETE	23,600	CY				3
	REINFORCING STEEL	1,200	TON				3
	2" SHOTCRETE	1,700	SF				3
	3" SHOTCRETE	3,500	SF				3
	CONC OVERBREAK 12"H/6"V	1,800	CY				3
	DRAFT TUBE						
	CONCRETE	8,000	CY				3
	REINFORCING STEEL	660	TON				3
	2" SHOTCRETE	800	SF				3
	CONCRETE OVERBREAK 6"	1,650	CY				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 2

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.115	SUPPORT & ANCHORS						
	POWERHOUSE						
	ROCKBOLTS 1" @ 25' HY	790	EACH				3
	ROCKBOLTS 1" @ 15'	440	EACH				3
	STEEL MESH	31,600	SF				3
	STEEL SUPPORT	102	TON				3
	DRAFT TUBE						
	ROCKBOLTS 1" @ 25' HY	100	EACH				3
	ROCKBOLTS 1" @ 12'	140	EACH				3
	ROCKBOLTS 1" @ 9'	70	EACH				3
	STEEL MESH	13,200	SF				3
.117	DRAINAGE						
	HOLES (U/S OF POWERHOUSE)	15,000	LF				3
	HOLES (POWERHOUSE CROWN)	21,960	LF				3
.118	STRUCTURAL - MISC STEELWORK						
	POWERHOUSE & DRAFT TUBE						
	STRUCTURAL STEEL/CRANE RAILS	1	LS				
	STEEL COMP. WATER PIPE(8')	1,520	LF				3
.119	ARCHITECTURAL						
	POWERHOUSE						
	ARCHITECTURAL	1	LS				
.11C	MECHANICAL						
	DRAFT TUBE GATE GUIDES	4	SETS				3
	DRAFT TUBE GATES	2	SETS				3
	DRAFT TUBE CRANE	1	EACH				3
	PUMP INTAKE TRSHRKS & GDS	1	LS				3
	CONSTR HEATING & VENT	1	LS				3
	PUMP OUTLET STOPLOGS/GUIDES	1	LS				3
.12	ACCESS TUNNELS & PORTALS						
.121	EXCAVATION						
	TUNNELS - ROCK						
	MAIN TUNNEL	106,000	CY				3
	TRANSFORMER GALLERY TUNNEL	17,000	CY				3
	GROUTING GALLERY TUNNEL	2,300	CY				3
	SURGE CHAMBER ACCESS TUN	7,800	CY				3
	PENSTOCK ACCESS TUNNEL	50,000	CY				3
	PENSTOCK ELBOW ACCESS TUN	10,000	CY				3
	ACCESS SHAFT TUNNEL	3,300	CY				3
	CONNECTOR TUNNEL	1,600	CY				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 3

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	COMP. WATER TUNNEL 10'D	2,200	CY			3	
	COMP. WATER TUNNEL 35'D	27,000	CY			3	
MAIN PORTAL	ROCK	5,000	CY			3	
	COMP. WATER PORTAL	300	CY			3	
	ROCK						
.123	SURFACE PREPARATION						
	TUNNELS						
	MAIN TUNNEL SLAB	112,000	SF			3	
	COMP. WATER TUN 35'D SLAB	28,400	SF			3	
	PENSTOCK ACC TUNNEL SLAB	52,560	SF			3	
MAIN PORTAL	HORIZONTAL	200	SF			3	
	INCLINED	1,400	SF			3	
	COMP. WATER PORTAL	200	SF			3	
	HORIZONTAL	1,400	SF			3	
	INCLINED						
.124	CONCRETE & SHOTCRETE						
	MAIN PORTALS						
	CONCRETE SLAB	30	CY			3	
	CONCRETE WALLS	570	CY			3	
	CONC OVERBREAK 12'H/6'V	40	CY			3	
	REINFORCING STEEL	40	TON			3	
COMP. WATER PORTAL	CONCRETE SLAB	30	CY			3	
	CONCRETE WALLS	570	CY			3	
	CONC OVERBREAK 12'H/6'V	30	CY			3	
	REINFORCING STEEL	40	TON			3	
TUNNELS	CONC. SLAB MAIN TUNNEL	4,030	CY			3	
	CONC OVERBREAK MAIN TUN 6'	2,130	CY			3	
	CONC PLUGS PENS ELBOW ACC	10,000	CY			3	
	CONC. COMP WATER SLAB 35'D	1,030	SF			3	
	CONC COMP WATR SLAB 6'0/B	540	SF			3	
	MAIN TUNNEL 2' SHOTCRETE	7,950	SF			3	
	TRANSF GAL 2' SHOTCRETE	1,260	SF			3	
	SURGE CHAM ACC 2' SHOTCRETE	800	SF			3	
	PENSTOCK ACC 2' SHOTCRETE	7,940	SF			3	
	PENS ELBOW ACC 2' SHOTCRETE	3,750	SF			3	
	ACCESS SHAFT 2' SHOTCRETE	750	SF			3	
	GROUTING GAL TUN SHOTCRETE	470	SF			3	
	CONNECTOR TUN 2' SHOTCRETE	330	SF			3	
	COMP. WATER 35'D 2' SHOTCRT	4,900	SF			3	
	COMP. WATER 10'D 2' SHOTCRT	450	SF			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 4

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.125	SUPPORT & ANCHORS						
	MAIN TUNNEL						3
	ROCKBOLTS 1" @ 12'	1,400	EACH				
	ROCKBOLTS 1" @ 9'	190	EACH				
	STEEL SUPPORT	120	TON				
	STEEL MESH	132,500	SF				
	MAIN TUNNEL PORTAL						3
	ROCKBOLTS 1" @ 15'	50	EACH				
	TRANSFORMER GALLERY TUNNEL						3
	ROCKBOLTS 1" @ 12'	230	EACH				
	ROCKBOLTS 1" @ 9'	30	EACH				
	STEEL SUPPORT	20	TON				
	STEEL MESH	20,940	SF				
	GROUTING GALLERY TUNNEL						3
	ROCKBOLTS 3/4" @ 6'	220	EACH				
	SUPPORT STEEL	3	TON				
	STEEL MESH	100	SF				
	SURGE CHAMBER TUNNEL						3
	ROCKBOLTS 1" @ 12'	150	EACH				
	ROCKBOLTS 1" @ 9'	30	EACH				
	STEEL SUPPORT	13	TON				
	STEEL MESH	13,200	SF				
	PENSTOCK ACCESS TUNNEL						3
	ROCKBOLTS 1" @ 12'	680	EACH				
	ROCKBOLTS 1" @ 9'	90	EACH				
	STEEL SUPPORT	60	TON				
	STEEL MESH	62,150	SF				
	PENSTOCK ELBOW ACC TUN						3
	ROCKBOLTS 1" @ 12'	280	EACH				
	ROCKBOLTS 1" @ 9'	8	EACH				
	STEEL SUPPORT	20	TON				
	STEEL MESH	14,760	SF				
	ACCESS SHAFT TUNNEL						3
	ROCKBOLTS 1" @ 12'	50	EACH				
	ROCKBOLTS 1" @ 9'	50	EACH				
	STEEL SUPPORT	20	TON				
	STEEL MESH	2,500	SF				
	CONNECTOR TUNNEL						3
	ROCKBOLTS 3/4" @ 9'	160	EACH				
	STEEL SUPPORT	2	TON				
	STEEL MESH	70	SF				
	COMP. WATER TUNNEL 35' D.						3
	ROCKBOLTS 1" @ 12'	370	EACH				
	ROCKBOLTS 1" @ 9'	50	EACH				
	STEEL SUPPORT	30	TON				
	STEEL MESH	33,600	SF				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 5

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	COMP. WATER TUNNEL PORTAL ROCKBOLTS 1" @ 15'	40	EACH			3	
	COMP. WATER TUNNEL 10' D ROCKBOLTS 3/4" @ 6'	210	EACH			3	
	STEEL SUPPORT	3	TON			3	
	STEEL MESH	90	SF			3	
.129	ARCHITECTURAL MAIN PORTAL DOORS (2 SETS)	1	LS			3	
	COMP. WATER PORTAL DOOR	1	LS			3	
.12C	MECHANICAL VENTILATING SYSTEM (INCL IN 335.16)						
.13	ACCESS SHAFTS						
.131	EXCAVATION ROCK	14,500	CY			3	
.132	SURFACE PREPARATION SHAFT	70,200	SF			3	
.134	CONCRETE & SHOTCRETE CONCRETE LINING	3,600	CY			3	
	CONCRETE OVERBREAK 6"	1,300	CY			3	
.135	SUPPORT & ANCHORS ROCKBOLTS 3/4" @ 6'	1,120	EACH			3	
.138	STRUCTURAL - MISC STEELWORK MISC. STEELWORK	50	TON				
.139	ARCHITECTURAL (INCL IN 331.2 CONT. BLDG)					3	
.13C	MECHANICAL ELEVATORS	1	LS				
.14	FIRE PROTECTION HEADTANK						
.141	EXCAVATION ROCK	1,150	CY			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 6

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.143	SURFACE PREPARATION HEAD TANK	2,800	SF	.	.	3	
.144	CONCRETE & SHOTCRETE CONCRETE CONC. OVERBREAK 6"	250	CY			3	
	REINFORCING STEEL	45	CY			3	
		10	TON			3	
.145	SUPPORT & ANCHORS ROCKBOLTS 1" @ 12'	15	EACH			3	
	ROCKBOLTS 1" @ 9'	5	EACH			3	
	STEEL MESH	1,200	SF			3	
	STEEL SUPPORT	2	TON			3	
.148	STRUCTURAL - MISC STEELWORK MISC STEELWORK	1	LS			3	
.14C	MECHANICAL PIPING & VALVES-SEE 335.					3	
.15	BUS TUNNELS					3	
.151	EXCAVATION ROCK HORIZONTAL	6,200	CY			3	
	ROCK INCLINED	3,120	CY			3	
.153	SURFACE PREPARATION TUNNEL	6,480	SF			3	
.154	CONCRETE & SHOTCRETE CONCRETE SLAB	700	CY			3	
	2" SHOTCRETE	1,400	SF			3	
	CONCRETE OVERBREAK 12"	500	CY			3	
	REINFORCING STEEL	0	TON			3	
.155	SUPPORT & ANCHORS ROCKBOLTS 1" @ 25'	100	EACH			3	
	ROCKBOLTS 1" @ 12'	260	EACH			3	
	ROCKBOLTS 1" @ 9'	40	EACH			3	
	STEEL MESH	22,800	SF			3	
	STEEL SUPPORT	0	TON			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 7

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.16	TRANSFORMER GALLERY						
.161	EXCAVATION ROCK	22,000	CY			3	
.163	SURFACE PREPARATION TRANSFORMER GALLERY	14,850	SF			3	
.164	CONCRETE & SHOTCRETE CONCRETE BASE SLAB REINFORCING STEEL 3" SHOTCRETE CONC OVERBREAK 12"H/6'V	2,100 130 800 530	CY TON SF CY			3 3 3 3	
.165	SUPPORT & ANCHORS ROCKBOLTS 1" @ 25' HY ROCKBOLTS 1" @ 15' STEEL MESH STEEL SUPPORT	110 60 14,400 14	EACH EACH SF TON			3 3 3 3	
.167	DRAINAGE HOLES (IN GALLERY CROWN)	9,200	LF			3	
.17	CABLE SHAFTS						
.171	EXCAVATION ROCK	6,000	CY			3	
.173	SURFACE PREPARATION SHAFTS	396,000	SF			3	
.174	CONCRETE & SHOTCRETE CONCRETE LINING CONCRETE OVERBREAK 6"	1,840 1,340	CY CY			3 3	
.175	SUPPORT & ANCHORS ROCKBOLTS 3/4" @ 6'	620	EACH			3	
.178	STRUCTURAL - MISC STEELWORK MISC STEELWORK	13	TON				
.179	ARCHITECTURAL ENCLOSURES	1	LS				
.170	MECHANICAL MANHODIST	2	EACH			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 8

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.18	DEWATERING						
.181	DEWATERING (POWER FACS) DEWATERING	1	LS				
.19	INSTRUMENTATION						
.191	INSTRUMENTATION INSTRUMENTATION	1	LS			3	
.2	MISC. BUILDINGS & STRUCTURES						
	MISC. BUILDINGS & STRUCTURES	1	LS				
332	RESERVOIR, DAMS & WATERWAYS						
.1	RESERVOIR						
.11	CLEARING CLEARING	6,350	ACRE			3	
.2	DIVERSION TUNNELS/COFFERDAMS						
.21	DIVERSION TUNNELS/PORTALS						
.211	EXCAVATION TUNNELS						
	ROCK	48,300	CY			3	
	EXC. CONC. FOR PLUG	450	CY			3	
	PORTAL UPSTREAM						
	OVERBURDEN	1,950	CY			3	
	ROCK	50,450	CY			3	
	PORTAL DOWNSTREAM						
	OVERBURDEN	23,400	CY			3	
	ROCK	54,000	CY			3	
.213	SURFACE PREP/GROUTING						
	PORTAL UPSTREAM						
	HORIZONTAL	4,400	SF			3	
	INCLINED	15,300	SF			3	
	PORTAL DOWNSTREAM						
	HORIZONTAL	1,300	SF			3	
	INCLINED	2,900	SF			3	
	GROUT TUNNEL PLUG						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 Page: 9

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	DRILL HOLES	2,050	LF				3
	CEMENT	410	CF				3
.214	CONCRETE & SHOTCRETE						
	TUNNEL						
	CONCRETE LINING	8,100	CY				3
	CONCRETE OVERBREAK 6'	3,200	CY				3
	2" SHOTCRETE	4,400	SF				3
	CONCRETE PLUG	3,000	CY				3
	REINFORCING STEEL	3	TON				3
	PORTAL UPSTREAM						
	CONCRETE HEADWALL	2,800	CY				3
	CONCRETE LINING	1,550	CY				3
	CONCRETE PIER	400	CY				3
	REINFORCING STEEL	310	TON				3
	OVERBREAK 12'H/6'V	500	CY				3
	PORTAL DOWNSTREAM						
	CONCRETE HEADWALL	1,000	CY				3
	OVERBREAK 12'H/6'V	100	CY				3
	REINFORCING STEEL	50	TON				3
.5.15	SUPPORT & ANCHORS						
	TUNNELS						
	ROCKBOLTS 1" @ 12'	800	EACH				3
	ROCKBOLTS 1" @ 9'	90	EACH				3
	STEEL MESH	76,900	SF				3
	STEEL SUPPORT	90	TON				3
	PORTAL UPSTREAM						
	ROCKBOLTS 1" @ 15'	80	EACH				3
	ANCHORS	40	EACH				3
	ROCK DOWELS	60	EACH				3
	PORTAL DOWNSTREAM						
	ROCKBOLTS 1" @ 15'	120	EACH				3
	ANCHORS	30	EACH				3
	ROCK DOWELS	0	EACH				3
.21C	MECHANICAL						
	UPSTREAM GATE						
	GATE EQUIPMENT	2	EACH				3
	DOWNSTREAM OUTLET						
	STOPLOG GUIDES	1	SET				3
	STOPLOGS INCL. FOLLOWERS	1	LS				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 10

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.22	UPSTREAM COFFERDIAM						
.222	FILL						
	CORE	4,600	CY				3
	FINE/FILTER	2,800	CY				3
	COARSE FILTER	2,700	CY				3
	ROCK SHELL	19,800	CY				3
	CLOSURE DIKE	41,900	CY				3
	RIP RAP	7,000	CY				3
.223	SURFACE PREP/GROUTING						
	CUTOFF & GROUT						
	HOLES	1,600	LF				3
	GROUT	256,000	CF				3
.22D	DEWATERING						
	DEWATERING	1	LS				
.23	DOWNSTREAM COFFERDIAM						
.231	EXCAVATION						
	REMOVAL OF COFFERDIAM	42,000	CY				3
.232	FILL						
	RIP RAP	1,650	CY				3
	CLOSURE DIKE	47,000	CY				3
.233	FOUNDATION PREP/GROUTING						
	CUTOFF & GROUT						
	HOLES	2,300	LF				3
	CEMENT	368,000	CF				3
.3	MAIN DAM						
.31	MAIN DAM						
.311	EXCAVATION						
	OVERBURDEN	35,600	CY				3
	ROCK	320,700	CY				3
.313	SURFACE PREP/GROUTING						
	SURFACE PREP						
	UNDER DAM/THRUST BLOCKS	171,000	SF				
	CONSOLIDATION GROUT						
	DRILL HOLES	176,900	LF				3
	CEMENT	176,900	CF				2/3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 11

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	GROUT CURTAIN						
	DRILL HOLES	259,000	LF				
	CEMENT	103,600	CF				2/3
.314	CONCRETE & SHOTCRETE						
	DAM						2/3
	CONCRETE	1,281,000	CY				
	REINFORCING STEEL	4,500	TON				3
	CONCRETE OVERBREAK	10,400	CY				3
	THRUSTBLOCKS						3
	CONCRETE	105,500	CY				3
	REINFORCING STEEL	375	TON				3
	CONCRETE OVERBREAK	1,100	CY				3
	JOINT GROUTING						
	GROUTING	1	LS				
.315	SUPPORT & ANCHORS						
	ROCKBOLTS @	0	TON				
	TIEBACKS	0	TON				
	STEEL MESH (ON SLOPES)	0	SF				
.317	DRAINAGE						
	HOLES	65,800	LF				2
.32	GROUT GALLERIES/PORTALS						
.321	EXCAVATION						
	TUNNELS/SHAFTS - CORE AREA						
	ROCK HORIZONTAL	13,100	CY				2
	ROCK INCLINED	5,300	CY				2
	ROCK VERTICAL	.3,400	CY				2
	TUNNELS/SHAFTS ACCESS						
	ROCK HORIZONTAL	12,400	CY				2
	PORTALS						
	OVERBURDEN	28,700	CY				2
	ROCK	16,500	CY				2
.323	SURFACE PREPARATION						
	PORTALS						
	HORIZONTAL	50	SF				3
	INCLINED	410	SF				3
.324	CONCRETE & SHOTCRETE						
	TUNNELS - CORE AREA						
	CONCRETE SLAB	1,800	CY				2

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT:61
 page: 12

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	REINFORCING STEEL	62	TON				2/3
	CONCRETE OVERBREAK 6"	900	CY				3
	2" SHOTCRETE	6,800	SF				2/3
	TUNNELS - ACCESS						
	CONCRETE SLAB	1,400	CY				2
	REINFORCING STEEL	50	TON				2/3
	CONCRETE OVERBREAK 6"	700	CY				3
	2" SHOTCRETE	5,850	SF				2/3
	SHAFTS - CORE AREA						
	2" SHOTCRETE	6,500	SF				2/3
	PORTALS (4 PORTALS)						3
	CONCRETE	40	CY				3
	REINFORCING STEEL	3	TON				3
.325	SUPPORT & ANCHORS						
	TUNNELS - CORE AREA						
	ROCKBOLTS 1" @ 12'	250	EACH				3
	ROCKBOLTS 1" @ 9'	200	EACH				3
	ROCKBOLTS 3/4" @ 6'	1,250	EACH				2/3
	STEEL SUPPORT	18	TON				2/3
	STEEL MESH	12,200	SF				3
	TUNNELS ACCESS						
	ROCKBOLTS 3/4" @ 6'	1,200	EACH				2
	STEEL SUPPORT	12	TON				2/3
	STEEL MESH	1,200	SF				3
	SHAFTS - CORE AREA						
	ROCKBOLTS 3/4" @ 6'	300	EACH				2
	STEEL MESH	1,300	SF				3
	PORTALS						
	ROCKBOLTS 1" @ 15'	150	EACH				2
.329	ARCHITECTURAL						
	PORTAL DOORS	4	EACH				3
.320	DEWATERING						
	DEWATERING	1	LS				3
	VENTILATION SYSTEM						
	(INCLUDED W/ 331,12C)						
.33	INSTRUMENTATION						
.331	INSTRUMENTATION						
	INSTRUMENTATION	1	LS				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 13

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.4	SADDLE DAM						
.41	MAIN SADDLE DAM						
.411	EXCAVATION						
	OVERBURDEN	1,145,000	CY				3
	ROCK	301,000	CY				3
.412	FILL						
	IMPERVIOUS CORE	313,500	CY				3
	FINE FILTER	231,000	CY				3
	COARSE FILTER	193,000	CY				3
	ROCK SHELL (UPSTREAM)	534,000	CY				3
	RIP RAP	174,500	CY				3
	ROCK SHELL (DOWNSTREAM)	345,000	CY				3
	ROAD BASE	3,500	CY				3
	ROCKFILL	127,000	CY				3
.413	SURFACE PREP & GROUTING						
	SURFACE PREPARATION						
	UNDER DAM CORE	191,500	SF				3
	UNDER DAM SHELL	432,500	SF				3
	DENTAL CONCRETE						
	DENTAL CONCRETE	191,500	CY				3
	CONSOLIDATION GROUT						
	DRILL HOLES	57,500	LF				3
	CEMENT	57,500	CF				2/3
	GROUT CURTAIN (SEE 332.313)						
.417	DRAINAGE (SEE 332.317)						2/3
.5	SPILLWAY VALVES (IN DAM)						
.51	SPILLWAY VALVES						
.519	CONTROL STR (IN DAM)						
	MECH/ELEC SYSTEMS	1	LS				3
	MISC	1	LS				3
.51C	MECHANICAL						
	TRASHRACKS/GUIDES	1	LS				3
	BULKHEAD GATE GUIDES	1	LS				3
	BULKHEAD GATES & FOLLOWERS	2	EACH				3
	GANTRY CRANE	1	LS				3
	FIXED CONE VALVES						
	7 PLUS 2 SPARE	1	LS				3
	RING FOLLOWER GATES (7)	1	LS				3
	MISC. MECHANICAL EQUIPMENT	1	LS				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 14

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.52	MAIN (CHUTE) SPILLWAY						
.521	EXCAVATION APPROACH						
	OVERBURDEN	44,000	CY				2
	ROCK	97,000	CY				2/3
	CONTROL STRUCTURE (TO END OF ROLLWAY)						
	OVERBURDEN	21,500	CY				2
	ROCK	102,000	CY				2
	CHUTE & FLIP (END ROLLWAY TO END FLIP)						
	OVERBURDEN	128,500	CY				2
	ROCK (INCLINED)	131,500	CY				2/3
	ROCK (VERTICAL)	401,000	CY				2
	OUTFALL (FROM END OF BASIN)						
	OVERBURDEN	44,500	CY				2
	ROCK	183,500	CY				2/3
	DRAIN TUNNEL						
	ROCK HORIZONTAL	1,500	CY				3
	ROCK INCLINED	2,300	CY				3
	RIVER CHANNEL						
	ALLUVIUM EXCAVATION	67,000	CY				3
.523	SURFACE PREP/GROUTING						
	SURFACE PREPARATION						
	SPILLWAY						
	ROCK HORIZONTAL	108,000	SF				2
	ROCK INCLINED	41,500	SF				2/3
	CONSOLIDATION GROUT						
	DRILL HOLES	22,000	LF				2
	CEMENT	22,000	CF				2
	GROUT CURTAIN (SEE 332.313)						
.524	CONCRETE & SHOTCRETE						
	CONCRETE STRUCTURE (TO END OF ROLLWAY)						
	(INCLUDING STORAGE AREAS)						
	CONC OUTER WALLS	15,500	CY				2
	CONC PIERS (FULL LENGTH)	7,700	CY				2
	CONC DECK	1,600	CY				2
	CONC ROLLWAY SLAB	33,000	CY				2
	CONC OVERBREAK 12'H/6'V	1,400	CY				2
	REINFORCING STEEL	2,300	TON				3
	CONCRETE CHUTE & FLIP						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - 'REVISION 3'

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 15

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	(END ROLLWAY TO END FLIP) (INCL BOX DRAIN GALLERIES)						
	CONCRETE SLAB	13,000	CY			2	
	CONCRETE WALLS	20,500	CY			2	
	CONC OVERBREAK 18'H/6'V	6,300	CY			2	
	REINFORCING STEEL	1,300	TON				
	CONCRETE DRAIN GALLERY					3	
	CONCRETE SLAB	400	CY			3	
	2" SHOTCRETE DOME	2,500	SF			3	
	REINFORCING STEEL	8	TON			3	
	CONC OVERBREAK 6"	200	CY			3	
.525	SUPPORT & ANCHORS						
	DRAINAGE TUNNEL					3	
	STEEL SUPPORT	4	TON			3	
	STEEL MESH	1	TON			3	
	ROCKBOLTS DRAINAGE GALLERY					3	
	3/4" @ 6'	400	EACH			3	
	ROCKBOLTS APPROACH					2	
	1" @ 15'	140	EACH			2	
	ROCKBOLTS CHUTE & STRUCTURES					2	
	1" @ 15'	85	EACH			2	
	SLAB/WALL ANCHORS					2	
	1" @ 10'	3,700	EACH			2	
.527	DRAINAGE						
	DRILL HOLES					3	
	BOX DRAINS-TO DRAIN TUNNEL	28,000	LF			3	
	3" RELIEF	500	LF			3	
.528	MECHANICAL						
	GATE EQUIPMENT	3	EACH			3	
	STOPLOG GUIDES	3	SETS			3	
	STOPLOGS AND FOLLOWERS	1	SET			3	
.53	EMERGENCY SPILLWAY						
.531	EXCAVATION (INCLUDING -						
	BRIDGE & FUSE PLUG)						
	OVERBURDEN	281,500	CY			2/3	
	ROCK USEABLE	1,019,000	CY			2/3	
	ROCK WASTE	215,000	CY			2/3	
.532	FILL						
	FUSE PLUG	26,000	CY			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 16

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.533	SURFACE PREP/GROUTING SURF. (PREP UNDER FUSE PLUG) HORIZONTAL INCLINED CONSOLIDATION GROUTING DRILL HOLES CEMENT GROUT CURTAIN (SEE 332,313)	2,500 75,500 23,000 23,000	SF SF LF CF				2/3 2/3 2/3 2/3 2/3
.534	CONCRETE GROUND SLAB REINFORCING STEEL CONC OVERBREAK	6,000 210 3,000	CY TON CY				3 3 3
.535	SUPPORT & ANCHORS ROCKBOLTS 1" @ 15' ROCK ANCHORS 1" @ 15'	300 760	EACH EACH				2/3 2/3
.538	STRUCTURAL-MISC. STEELWORK GUARD RAILS, PADS, ETC	650	LF				2/3
.538	BRIDGE BRIDGE	1	LS				3
.6	POWER INTAKES						
.61	POWER INTAKE STRUCT & APP						
.611	EXCAVATION OVERBURDEN ROCK	88,000 202,500	CY CY				3 3
.613	SURFACE PREPARATION HORIZONTAL INCLINED	6,800 68,000	SF SF				3 3
.614	CONCRETE & SHOTCRETE STRUCTURE CONCRETE STRUCTURE REINFORCING STEEL CONCRETE OVERBREAK	17,500 1,140 1,500	CY TON CY				3 3 3
.615	SUPPORT & ANCHORS APPROACH ROCKBOLTS 1" @ 15'	140	EACH				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - REVISION 3

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 17

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.61C	MECHANICAL						
	TRASHRACKS & GUIDES	4	SETS			3	
	BULKHEAD GATE GUIDES	4	SETS			3	
	BULKHEAD GATES & FOLLOWERS	1	SET			3	
	INTAKE GANTRY CRANE	1	EACH			3	
	INTAKE GATE EQUIPMENT	4	EACH			3	
.61D	INTAKE BUILDING						
	INTAKE BUILDING	1	LS			3	
.7	SURGE CHAMBER						
.71	SURGE CHAMBER						
.711	EXCAVATION						
	CHAMBER ROCK	59,000	CY			3	
	VENT SHAFT ROCK	2,300	CY			3	
.713	SURFACE PREPARATION						
	SURFACE PREP	55,800	SF			3	
.714	CONCRETE & SHOTCRETE						
	CHAMBER						
	CONCRETE CHAMBER	3,200	CY			3	
	3* SHOTCRETE	1,400	SF			3	
	2* SHOTCRETE	1,300	SF			3	
	REINFORCING STEEL	160	TON			3	
	CONCRETE OVERBREAK	500	CY			3	
	VENT SHAFT						
	2* SHOTCRETE	6,300	SF			3	
.715	SUPPORT & ANCHORS						
	CHAMBER						
	ROCKBOLTS 1" @ 25'	320	EACH			3	
	ROCKBOLTS 1" @ 15'	330	EACH			3	
	STEEL SUPPORT	66	TON			3	
	STEEL MESH	12,900	SF			3	
	VENT SHAFT						
	ROCKBOLTS 3/4" @ 6'	400	EACH			3	
	STEEL MESH	1,300	TON			3	
.717	DRAINAGE						
	HOLES (IN CHAMBER CROWN)	13,650	LF			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 Page: 18

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.8	PENSTOCKS						
.81	PENSTOCKS						
.811	EXCAVATION						
	TUNNELS						
	ROCK HORIZONTAL	16,000	CY				3
	ROCK INCLINED	20,400	CY				3
.813	SURFACE PREP/GROUTING						
	TUNNELS	144,000	SF				3
	CONTACT GROUTING						
	CONTACT GROUTING	1	LS				3
	CONSOLIDATION GROUTING						
	CONSOLIDATION GROUTING	1	LS				
.814	CONCRETE & SHOTCRETE						
	CONCRETE LINER	12,600	CY				3
	REINFORCING STEEL	4	TON				3
	2" SHOTCRETE	35,900	SF				3
	CONCRETE OVERBREAK 6"	3,600	CY				3
	CONCRETE PLUG	5,000	CY				3
	CONC OVERBREAK PLUG	520	CY				3
.815	SUPPORT & ANCHORS						
	ROCKBOLTS 1" @ 25'	100	EACH				3
	ROCKBOLTS 1" @ 6'	610	EACH				3
	STEEL MESH	63,300	SF				3
.818	STRUCTURAL - MISC STEELWORK						
	STEEL LINER	1,600	TON				3
.9	TAILRACE WORKS						
.91	TAILRACE TUNNELS/PORTALS						
.911	EXCAVATION						
	TUNNELS						
	ROCK						
	PORTAL	334,500	CY				3
	OVERBURDEN-DRY	42,000	CY				
	ROCK	15,000	CY				
.913	SURFACE PREPARATION						
	PORTAL						
	HORIZONTAL	A	0	SF			
	INCLINED	A	0	SF			
	TUNNEL						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 19

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	TUNNEL	831,800	SF			3	
.914	CONCRETE & SHOTCRETE						
	TUNNEL						
	CONCRETE LINING	32,100	CY			3	
	CONC OVERBREAK 6"	16,500	CY			3	
	2" SHOTCRETE	17,600	SF			3	
	REINFORCING STEEL	13	TON			3	
	PORTAL						
	CONCRETE BASE SLAB	100	CY			3	
	CONCRETE WALLS	650	CY			3	
	CONC OVERBREAK 12"H/6"W	50	CY			3	
	REINFORCING STEEL	30	TON			3	
.915	SUPPORT & ANCHORS						
	TUNNEL					3	
	ROCKBOLTS 1" @ 12'	3,180	EACH			3	
	ROCKBOLTS 1" @ 9'	600	EACH			3	
	STEEL MESH	298,200	SF			3	
	STEEL SUPPORT	232	TON			3	
	PORTAL					3	
	ROCKBOLTS 1" @ 15'	300	EACH			3	
.91C	MECHANICAL					3	
	STOPLOG GUIDES	1	LS			3	
	STOPLOGS INCL. FOLLOWER	1	LS			3	
333	WATERWHEELS, TURBINES & GENERATORS						
.1	TURBINES & GOVERNORS						
.11	TURBINES & GOVERNORS					3	
.111	SUPPLY	4	EACH			3	
.112	INSTALL	4	EACH			3	
.2	GENERATORS & EXCITERS						
.21	GENERATORS & EXCITERS (SUPPLY & INSTALL)						
.211	GENERATORS & EXCITERS	4	EACH			3	

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

Date: 1-FEB-82
 file: DEER53.DAT:61
 Page: 20

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
334	ACCESSORY ELECTRICAL EQUIPMENT						
.1	CONNECTION, SUPPORTS & STRUCT.						
.11	STRUCTURES						
.111	STRUCT (INCL BELOW)						3
.12	CONDUCTORS & INSULATORS						
.121	GNRTR ISOLATED PHASE BUS	1	LS				
.122	HV POWER CABLES & ACCESS.	1	LS				
.123	LV POWER CABLES & ACCESS.	1	LS				
.124	CONTROL CABLES & ACCESSORIES	1	LS				
.125	GROUNDING SYSTEM	1	LS				
.13	CONDUITS & FITTINGS						
.131	CONDUITS & FITTINGS	1	LS				
.2	SWITCHGEAR & CONTROL EQUIPMENT						
.21	AUXILIARY TRANSFORMERS						
.211	AUXILIARY TRANSFORMERS	4	EACH				3
.22	CIRCUIT BREAKERS						
.221	CIR BRKRS (NOT REQ'D)						3
.23	SURGE PROT & GEN CUBICLES						
.231	SURGE PROT & GEN CUBICLES	1	LS				3
.24	SWITCHBOARDS						
.241	SWITCHBOARDS	1	LS				
.25	AUX. POWER EQPT-INCL BAT						
.251	AUX. POWER EQPT INCL BAT	1	LS				3
.3	CUBICLES & APPURTENENCES						
.31	CNTRL,RELAY & METER, BRDS						
.311	CONTROL,RELAY & METER, BRD	1	LS				
.32	COMPUTER CONTROL SYSTEM						
.321	COMPUTER CONTROL SYS						3 INCL IN 353
.33	SUPERVIS. & TELEMEETER. SYS						
.331	SPVSRY & TELEMEETER SYS						3 INCL IN 353
.4	POWER TRANSFORMERS						
.41	POWER TRANSFORMERS						
.411	POWER TRANSFORMERS	13	EACH				3
.5	LIGHTING SYSTEM						
.51	LGT, P/H & TRANS GAL						
.511	LIGHTING P/H & TRANS GAL	1	LS				
.52	ACCESS TUNNELS & ROADS						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 21

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	.521 ACCESS TUNNELS & ROADS	1	LS				
	.6 MISC. ELECTRICAL EQUIPMENT						
	.61 MISC. ELECTRICAL EQUIPMENT	1	LS				
	.611 MISC. ELECTRICAL EQUIPMENT						
335	MISCS. POWERPLANT EQUIPMENT						
	.1 AUXILIARY SYSTEMS - UNDERGROUND						
	.11 STATION WATER SYSTEMS	1	LS				
	.111 STATION WATER SYSTEMS						
	.12 FIRE PROTECTION SYSTEMS	1	LS				
	.121 FIRE PROTECTION SYSTEMS						
	.13 COMPRESSED AIR SYSTEMS	1	LS				
	.131 COMPRESSED AIR SYSTEMS						
	.14 OIL HANDLING SYSTEMS	1	LS				
	.141 OIL HANDLING SYSTEMS						
	.15 DRAINAGE & DEWATERING	1	LS				
	.151 DRAINAGE & DEWATERING						
	.16 HEAT, VENT & COOLING SYS.	1	LS				
	.161 HEAT, VENT & COOLING SYS.						
	.17 MISCELLANEOUS	1	LS				
	.171 MISCELLANEOUS						
	.2 AUX. SYST. - SURFACE FAC.						
	.21 AUX. SYST.-SURFACE FAC.	1	LS				3
	.3 AUXILIARY EQUIPMENT						
	.31 POWERHOUSE CRANES	2	EACH				3
	.311 POWERHOUSE CRANES						
	.32 ELEVATORS	1	LS				
	.321 ELEVATORS						
	.33 MISC. CRANES & HOIST	1	LS				
	.331 MISC. CRANES & HOIST						
	.34 COMPENSATION PUMPS	2	EACH				
	.341 PUMPS AND MOTORS	4	EACH				3
	.342 VALVES						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 22

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.4	GENERAL STATION EQUIPMENT GENERAL STATION EQUIPMENT	1	LS				
.5	COMMUNICATIONS EQUIPMENT COMMUNICATIONS EQUIPMENT	1	LS				
336	ROADS						
.1	ROADS						
.12	SITE ROADS SITE ROADS MAINTENANCE	9	MILE			3	
		12	MILE			3	
.13	TRANS DAM CROSSING CONSTRUCTION	7	MILE			3	
.14	PARKS HWY - DEVIL CANYON MAINTENANCE	212	MI/YRS			3	
TRANSMISSION PLANT							
350	LAND & LAND RIGHTS LAND & LAND RIGHTS						
352	SUBSTATION & SWITCHING STATION						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 23

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
.1	SUBSTATION & SWITCHING STATION STRUCTURES & IMPROVEMENTS SWITCHYARD .11 SWITCHYARD SWITCHYARD	1	LS				
353	SUBSTATION/SWITCHING STA EQUIP SUBSTATION/SWITCHING STA EQUIP ESTER WILLOW KNIK ARM UNIVERSITY	1 1 1 1	LS LS LS LS				
	WILLOW ENERGY MANAGE SYS (EMS) WATANA & DEVIL CANYON IN- PLANT MONITOR & CNTRL EQPMT	1	LS				
354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES TOWERS (INCLUDING FOUND- ATION & HARDWARE)	546	EACH			3	
356	OVERHEAD CONDUCTORS & DEVICES OVERHEAD CONDUCTORS & DEVICES CNDTRS 2 x 954 kcmil/phase SUBMARINE CABLES (3)	124 1	MILE LS			3	

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
DEVIL CANYON - 'REVISION 3'

date: 1-FEB-82
file: DEEBS3.DAT;61
page: 24

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 (INCLUDED IN 330)						
390	STRUCTURES & IMPROVEMENTS STRUCTURES & IMPROVEMENTS (INCLUDED IN 331.2)						
391	OFFICE FURNITURE/EQUIPMENT OFFICE FURNITURE/EQUIPMENT	B					
392	TRANSPORTATION EQUIPMENT TRANSPORTATION EQUIPMENT	B					
393	STORES EQUIPMENT STORES EQUIPMENT	B					

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
file: DEEBS3.DAT;61
page: 25

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
394	TOOLS SHOP & GARAGE EQUIPMENT TOOLS SHOP & GARAGE EQUIPMENT	B					
395	LABORATORY EQUIPMENT LABORATORY EQUIPMENT	B					
396	POWER OPERATED EQUIPMENT POWER OPERATED EQUIPMENT	B					
397	COMMUNICATIONS EQUIPMENT COMMUNICATIONS EQUIPMENT	B					
398	MISCELLANEOUS EQUIPMENT MISCELLANEOUS EQUIPMENT	B					
399	OTHER TANGIBLE PROPERTY OTHER TANGIBLE PROPERTY OTHER TANGIBLE PROPERTY	1	LS				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT;61
 page: 26

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
INDIRECT COSTS							
61	TEMPORARY CONSTRUCTION FACILITIES TEMPORARY CONSTRUCTION FACILITIES (INCLUDED IN DIRECT COSTS)						
62	CONSTRUCTION EQUIPMENT CONSTRUCTION EQUIPMENT (INCLUDED IN DIRECT COSTS)						
63	MAIN CONSTRUCTION CAMP						
.1	MAIN CONSTRUCTION CAMP						
.11	SITE PREPARATION						
	CLEARING & STRIPPING	83	ACRE				
	INSTALL GRANULAR FAD	439,400	CY				3
	CONSTRUCT ROADWAYS						
	MAIN ROADS IN CAMP [34']	6,100	LF				
	CONNECT, RD. TO ACCESS RD.	7,200	LF				
	SECONDARY RD [24']	400	LF				
	DRAINAGE						
	DITCHING	31,400	LF				
	CULVERTS	640	LF				
	PERIMETER FENCING						
	PERIMETER FENCING	7,850	LF				
	PARKING AREAS						
	PARKING AREAS	37,000	SF				
.12	BUILDINGS						
	BACHLR DORMS-108 MAN CMPLX	28	EACH				26' x 224'
	BACHLR DORMS-MGMNT-TYPE A	6	EACH				28' x 120'
	BACHLR DORMS-MGMNT-TYPE B	9	EACH				24' x 120'
	GUEST HSSES-1 EA DWN/MGR/CON	3	EACH				28' x 120'
	CAMP MANAGER'S OFFICES	3	EACH				30' x 40'
	STAFF CLUBHOUSE	1	EACH				50' x 80'
	DINING HALL	1	EACH				120' x 80'

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEB53.DAT#61
 page: 27

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
			\$	\$ 000	\$ 000		
	DINING HALL	1	EACH			150' x 120'	
	RECREATION BLDG.	1	EACH			120' x 160'	
	RECREATION BLDG.	1	EACH			100' x 120'	
	GYMNASIUM	1	EACH			200' x 200'	
	SECURITY OFFICE	1	EACH			50' x 60'	
	FIRE STATION	1	EACH			40' x 80'	
	SOILS/MATERIALS LAB.	1	EACH			40' x 80'	
	MAINTENANCE BLDG.	1	EACH			80' x 100'	
	WAREHOUSE - MANAGERS	1	EACH			100' x 120'	
	WAREHOUSE - FOOD SERVICE	1	EACH			100' x 120'	
	COMMUNICATION BLDG.	1	EACH			20' x 30'	
	HOSPITAL	1	EACH			120' x 140'	
	ICE RINK	1	EACH			150' x 300'	
	BANK	1	EACH			50' x 60'	
	STORE	1	EACH			30' x 60'	
	LAUNDRY	1	EACH			20' x 30'	
	SWIMMING POOL	1	EACH			100' x 100'	
	PERMAWALK						
	6 FEET WIDE	600	LF				
	10 FEET WIDE	2,250	LF				
	16 FEET WIDE	1,000	LF				

.13 UTILITIES

WATER

SUPPLY SYSTEM						SUSITNA RIVER
INTAKE POOL & CRIB IN	1	LS				
PUMP STA - 720 GPM	1	LS				
BOOSTER PUMP STA - 720 GPM	1	LS				
SPLY LINES (2EA) 1-4" &	4,500	LF				1-6", UTILDS, HT
TREATMENT PLANT - 1.0 MGD	1	LS				
RESERVOIR	2	LS				800,000 GAL
DISTRIBUTION SYSTEM						
DISTRIB LINES - BURIED	0					
10"	800	LF				
8"	240	LF				
6"	100	LF				
DISTRIB LINE UTLDR						
10" DI	1,800	LF				
8" DI	2,500	LF				
6" DI	2,000	LF				
4" DI	1,800	LF				
HEAT TRACING & INSUL						
10" PIPE	2,600	LF				
8" PIPE	2,740	LF				
6" PIPE	2,100	LF				
4" PIPE	1,800	LF				

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT;61
 page: 28

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	PIPE FITTINGS						
	VALVES	1	LS				
	HYDRANTS	12	EA				3
	UTILIDORS						
	UTILIDORS	8,100	LF				
	SEWAGE						
	COLLECTION SYS [UTLDR]						
	4" PIPE	2,000	LF				
	6" PIPE	3,000	LF				
	8" PIPE	2,400	LF				
	10" PIPE	800	LF				
	12" PIPE	2,800	LF				
	HEAT TRACING & INSUL						
	4"	2,000	LF				
	6"	3,000	LF				
	8"	2,400	LF				
	10"	800	LF				
	12"	2,800	LF				
	TREATMENT PLANT						
	SKIMMING TANK	1	EACH				
	LAGOONS (1 @ 385' x 205' &	3	EACH				@ 280' x 155')
	RBC's	5	EACH				
	PHYS/CHEM UNIT	1	EACH				
	CLARIFIER	1	EACH				
	DISINFECTION	1	EACH				
	HEAT PUMP	1	EACH				
	THICKENER	1	EACH				
	FILTER PRESS	1	EACH				
	DRYING BEDS	2	EACH				
	OUTFALL LINE [10"]	4,200	LF				
	UTILIDOR	1,100	LF				
	OUTFALL	1	EACH				
	ELECTRICAL						
	GENERATING STATIONS						
	BUILDINGS	1	EACH				
	GENERATORS [850 KW]	3	EACH				3/20' x 20'
	DAY TANK	1	EACH				3
	FUEL STORAGE TANK	1	EACH				3
	SUBSTATION	1	EACH				3
	LIGHTING						
	POLE MOUNTED LUMINAIRES	44	EACH				
	FLOOD LIGHTS	15	EACH				
	DISTRIBUTION	1	LS				
	FIRE ALARM SYSTEM						
	FIRE ALARM SYSTEM	1	LS				
	TELEPHONE SYSTEM						

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT:61
 page: 29

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	TELEPHONE SYSTEM	1	LS				
	TV/RADIO STATION	1	LS				
	TV/RADIO STATION	1	LS				
	SOLID WASTE FACILITY	1	LS				
	SOLID WASTE FACILITY	1	LS				
POL	GARAGE/MAINTENANCE BLDG	1	EACH				50' x 60'
	TANKS	4	EACH				
	50,000 GAL	20	EACH				
	100,000 GAL						
EARTHWORK	CLEARING & GRUBBING	9	ACRE				
	BERMS	30,000	CY				
	PIPING	1	LS				
	FUEL STATION	1	LS				
.2 MAIN CONSTRUCTION VILLAGE							
.21 SITE PREPARATION							
	CLEARING & STRIPPING	95	ACRE				3/TOTAL A=5.636,000
	INSTALL GRANULAR PAD	459,800	CY				3/DEPTH 8'
	CONSTRUCT ROADWAYS						
	ROADWAYS IN VILLAGE						
	MAIN ROAD 34' WIDE	2,300	LF				ASPHALT PUMP
	SECONDARY ROADS 24' WIDE	19,600	LF				ASPHALT PUMP
	CONNECTION TO ACCESS RD 34'	4,000	LF				VIL LMT-MN ACC A/C P
	DRAINAGE						
	DITCHING	51,600	LF				RDWY TOT's (2) 2
	CULVERTS - 320 LOTS	7,440	LF				@ 20' & 40' XING (26
	PERIMETER FENCING						
	PERIMETER FENCING	9,100	LF				
	PARKING AREAS						
	PARKING AREAS	37,500	SF				GRANULAR SURFACE
.22 BUILDINGS							
	SINGLE FAM UNIT - 2 BDRM	72	EACH				14' x 60'
	SINGLE FAM UNIT - 3 BDRM	200	EACH				14' x 60'
	SINGLE FAM UNIT - 2 BDRM	16	EACH				24' x 50'
	SINGLE FAM UNIT - 3 BDRM	16	EACH				24' x 50'
	SINGLE FAM UNIT - 4 BDRM	16	EACH				28' x 50'
	SCHOOL (22,750 SF)	1	LS				(12 CLASSROOMS)
	GYMNASIUM	1	LS				100' x 100'
	SWIMMING POOL	1	LS				100' x 100'
	RECREATION CENTER	1	LS				80' x 100'
	STORE	1	LS				100' x 160'

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEERS3.DAT#61
 page: 30

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	FIRE STATION GAS STA [6 PUMP, 3-BAY]	1	LS				30' x 40' 2-10,000 GAL TANKS
23 UTILITIES							
WATER							
SUPPLY LINE 6"		4,900	FT				
RESERVOIR [850,000 GAL]		1	EACH				
PUMP STATION 4500 GPM		1	EACH				
DISTRIBUTION SYSTEM							
DISTRIBUT LINE-BURIED							
10" DI		850	LF				
8" DI		305	LF				
6" DI		260	LF				
DISTRIBUT LINE-UTLIR							
10"		7,650	LF				
8"		2,750	LF				
6"		2,350	LF				
HEAT TRACING							
10" PIPE		8,500	LF				
8" PIPE		3,050	LF				
6" PIPE		2,600	LF				
VALVES							
10", 8", & 6"		1	LS				
HYDRANTS							@ APPROX 400° F
VALVES & STUBS INC - 1 EA		21	EACH				
SEWAGE							
COLLECTION SYSTEM							
6" PIPE		5,450	LF				
8" PIPE		3,000	LF				
10" PIPE		2,350	LF				
12" PIPE		100	LF				
HEAT TRACING							
6" PIPE		5,450	LF				[INCL FORCE MAIN FROM VIL TO MAIN CAMP WATER TREAT- MENT PLANT]
8" PIPE		3,000	LF				
10" PIPE		2,350	LF				
12" PIPE		100	LF				
PUMPING SYSTEM							
PUMP STATION		1	LS				VILLAGE TO MAIN CAMP TREATMENT PLANT
6" FORCE MAIN		11,000	LF				
ELECTRICAL							
GENERATING STATIONS							3/INCLUDES DRIVEWAYS
BUILDINGS		1	EACH				3
GENERATORS 650 KW		2	EACH				3
DAY TANKS		1	EACH				3
FUEL STORAGE TANKS		1	EACH				3
SUBSTATIONS		1	EACH				3

SUSITNA HYDROELECTRIC PROJECT
 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
 DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
 file: DEEBS3.DAT#61
 page: 31

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
	DISTRIBUTION						
	DISTRIBUTION	1	LS				
	FIRE ALARM SYSTEM	1	LS				
	FIRE ALARM SYSTEM	1	LS				
	TELEPHONE SYSTEM	1	LS				
	TELEPHONE SYSTEM	1	LS				
	UTILIDORS						
	MAIN RUNS IN VILLAGE	11,800	LF				
	STREET CROSSING 50 LF EA	1,200	LF				
	PUMP STA TO TREATMT PLANT	5,500	LF				
	STUBS TO HSE LOTS 320 @ 20'	6,400	LF				
	STUBS TO BLDGS - 6 @ 25'	150	LF				
	INTEGRATED DFC AREA						
	OWNER/MGRS OFFICE	1	LS				
	CONTRACTORS OFFICE	1	LS				
.3	CREDIT FOR CAMP						
	LUMP SUM CREDIT	1	LS				
.4	CATERING & SUPPORT						
	CATERING & SUPPORT	2,450,000	MANDAY				
.5	CONSTRUCTION POWER						
	CONSTRUCTION POWER	1	LS				
64	LABOR EXPENSE						
	LABOR EXPENSE						
	(INCLUDED IN DIRECT COSTS)						
65	SUPERINTENDENCE						
	SUPERINTENDENCE						
	(INCLUDED IN DIRECT COSTS)						

SUSITNA HYDROELECTRIC PROJECT
FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN
DEVIL CANYON - "REVISION 3"

date: 1-FEB-82
file: DEEBS3.DAT#61
page: 32

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	TOTAL	REMARKS
				\$	\$ 000	\$ 000	
66	INSURANCE INSURANCE (INCLUDED IN DIRECT COSTS)						
69	FEES FEES (INCLUDED IN DIRECT COSTS)						