SUSITNA HYDROELECTRIC PROJECT

EBASCO ESTIMATING PACKAGE
REVISION 4

FEBRUARY 12, 1982

Prepared by:



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT EBASCO Estimating Package

February 12, 1982

	PAGE
L - GENERAL	
1.1 - Revision Four Discussion	1
1.2 - Form Ratios	2
1.3 - Notes of Meeting	3
1.4 - Description of Electrical and Mechanical Systems	7
2 - WATANA	
2.1 - Gate Equipment Weights	38
2.2 - Permanent Town Listing	40
2.3 - Revised Computer Listing	Enclosed
3 - <u>DEVIL CANYON</u>	
3.1 - Gate Equipment Weights	41
3.2 - Revised Computer Listing	Enclosed

SUSITNA HYDROELECTRIC PROJECT EBASCO Estimating Package Revision Four Discussion

February 12, 1982

1.1

The computer listing has revised item listings and quantities to reflect updated design and quantity review. Revised quantities are indicated by a "4" in the remarks column.

SUSITNA HYDROELECTRIC PROJECT Form Ratios

February 12, 1982

1.2

Devil Canyon Concrete Arch Dam:

Curved Forms	951,500 ST
Flat Forms	722,900 sf
Total	1,674,400 sf

Form Ratio = 1,674,400 sf/1,676,000 cy = .999 1 sf/cy

Description	sf/cy	
Powerhouse	5.43	
Transformer Gallery	25.86	
Spillway	2.64	
Auxiliary Spillway Chute	2.78	
Emergency Spillway	0.90	
Surge Chamber	1.00	(assumed)
Intake	4.00	
Portals	4.00	
Plugs	0.33	

February 11, 1982 P5700.09

NOTES OF MEETING Held at the offices of Acres American Inc. Friday, February 5, 1982

1.3

SUSITNA HYDROELECTRIC PROJECT Task 09 Cost Estimate

PRESENT:

Mr. J. DeFeis Mr. J. Ehasz Mr. J. Mulvanertou Mr. R. Zylman	EBASCO	Mr. J. Lawrence) Mr. D. Meilhede) ACRES Mr. J. Plummer) Mr. R. Tilghman)
Mr. R. Williams) APA	

1 - ESTIMATING PACKAGE-REVISION 4

Acres advised that Revision 4 would be issued February 12. The package should generally reflect final quantities. EBASCO requested an Acres marked up, current computer printout to indicate quantities that had already been checked. These marked up sheets were handed to EBASCO.

2 - ROADS

Drawings showing camp layouts and site roads were handed to EBASCO and APA. Acres clarified the following points with regard to roads:

- o The transdam crossing was the road crossing the Devil Canyon dam and joining the permanent access road constructed for Watana.
- o Site roads will be broken down into construction roads and permanent roads.
- o Construction roads' widths were 65 feet for Watana and 40 feet for Devil Canyon.
- o The six miles of permanent roads at Watana are assumed to be built on top of existing construction roads or a granular surface.
- o Acres has assumed that camp roads are not paved.
- o It was noted that the paving item for access roads should be kept in the estimate.

3 - AIRSTRIP

Acres confirmed the estimate included two airstrips as follows:

- o Temporary Airstrip 2,500' X 100'
- o Permanent Airstrip 6,000' X 100'

NOTES OF MEETING Page Two February 11, 1982

3 - AIRSTRIP (continued)

At present the permanent airstrip is not shown on any drawings. Acres confirmed that no quantities had been developed for either airstrip.

4 - CAMPS

With regard to Account 63, Camps, Acres made the following clarifications:

- o A 25 percent salvage value has been credited for the buildings in the Watana camp.
- o For buildings used at Devil Canyon, Acres assumed the 25 percent salvage value at Watana plus dismantling, transportation, rehabilitation, and erection.
- o Subaccount 63.6 covers the cost of operation and maintenance for the main camps including the costs for feeding and housekeeping but not for buildings.
- o Subaccount 63.3 covers the cost of operation and maintenance for access road and railhead camps including the cost of buildings, feeding, and housekeeping.
- o Subaccount 63.5 covers the cost for a permanent town. EBASCO was referred to information on Plate 36. Acres agreed to provide EBASCO with a breakdown of the facilities included in their estimate for a permanent town.
- o Construction management facilities have been included in camps.
- o Acres noted that they expect to revise the camp sizing downwards following the completion of a revised cash flow.

5 - CONSTRUCTION POWER

Acres has assumed that permanent power will be available at Watana by mid-1987. Prior to that time, power will have to be generated at site and any construction operations will have to include the costs of that power. After mid-1987, power will be available from a 34.5 kV distribution system and supplied to construction operations without cost.

At Devil Canyon permanent power is assumed to be available from the start of construction. Acres advised the following power costs have been assumed:

- o Watana 10¢/kilowatt hour
- o Devil Canyon 7¢/kilowatt hour

NOTES OF MEETING Page Three February 11, 1982

5 - CONSTRUCTION POWER (continued)

The cost of construction power supplied through the connection intertie has been included in Account 63.7. The breakdown of this will be given in Revision 4. It has been assumed that a 34.5 kV distribution system will be constructed and maintained under this account. The costs of taking power off this system have been included in construction items.

6 - CONSTRUCTION HEATING AND VENTILATING

Acres advised that the costs for construction heating and ventilating for underground work have been included in Subaccount 63.8. This will be shown in Revision 4.

7 - ELECTRICAL SYSTEMS

Acres agreed to provide more information on the electrical systems and, in particular, the 480 volt system with Revision 4.

8 - OUTLET FACILITIES

Drawing No. 523, General Arrangement, Plan and Profile for Watana, was handed to EBASCO. This drawing had been omitted from previous distribution.

9 - MECHANICAL SYSTEMS

Acres confirmed that no piping flow diagrams would be issued.

10 - CONCRETE WORK

Acres agreed to provide whatever formwork quantities or formwork ratios that have been developed to EBASCO.

Acres confirmed the following assumptions for concrete strengths:

- o 5,000 psi at 365 days for arch dam
- o 4,000 psi at 28 days average for other structures.

EBASCO requested clarification on the assumptions for cooling of concrete.

11 - LAND COSTS

The following land costs were given:

		- Watana	51 X 10 ⁶
	Account 330	#^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^	22 x 10 ⁶
0	Account 330	Devil Canyon	8.26×10^6
0	Account 350	Transmission Lines & Substations	0.20 X 10

NOTES OF MEETING Page Four February 11, 1982

11 - LAND COSTS (continued)

Land costs given above in Account 330 include the reservoir flood area and the area affected by construction activities including camps. EBASCO questioned if land costs for access roads had been included. Acres agreed to check and confirm. (Land costs for access main road are included in Account 330 for Watana.)

12 - INDIRECT ACCOUNTS

Acres advised that no entries would be made under Accounts 61, 62, 64, 65, 66, and 69. These costs have been included in the unit prices developed for the various types of work.

13 - CONTINGENCY

APA clarified that Acres and EBASCO should independently estimate project contingencies.

14 - CONSTRUCTION OVERHEADS

Acres advised that engineering and administration costs were being carried as a percentage of construction costs in Account 71. The remaining accounts, 72, 75, 76, 77, and 80, do not have entries.

15 - GROUTING ASSUMPTIONS

Acres clarified grouting assumptions as follows:

- o 0.4 cf of cement/If for curtain grouting
- o 1 cf of cement/lf for consolidation grouting

16 - GATES AND HOISTS

Acres agreed to provide a breakdown of the weights for gates and hoists equipment in Revision 4.

17 - RELICT CHANNEL

Acres advised that costs should be developed on the basis that the units of work listed on the computer sheets would be done.

18 - LABOR RATES

Acres provided EBASCO with a copy of the labor rates being used for estimating.

Reported by

JRP:dmb

Jámes R. Plummer

THE FOLLOWING PAGES
7 THROUGH 37
ARE FROM THE FIRST DRAFT
OF THE FEASIBILITY REPORT

WATANA

1.4 - Description of Electrical and Mechanical Systems

12.15 - Tailrace

Two tailrace pressure tunnels will be provided at Watana to carry water from the surge chamber to the river. The tunnels will have a modified diameter of horse-shoe cross-section with a major internal dimension of 35 feet. For preliminary design they are assumed to be fully concrete-lined throughout, with a minimum concrete thickness of 12 inches and a length of 1,800 feet.

The tailrace tunnels will be arranged to discharge into the river between the main dam and the main spillway. In view of the severe limitations on space in this area, one tailrace tunnel will be designed to discharge through one of the diversion tunnel portals. The cross section of the tailrace tunnel will be modified over the common length of 300 feet to the shape of the diversion tunnel in order not to impair the hydraulic performance of the tailrace tunnel. After commissioning, the diversion tunnel upstream section will be plugged with concrete.

The size of the two tailrace tunnels was selected after an economic study of the cost of construction and the capitalized value of average annual energy losses caused by friction, bends, and changes of section. In an emergency, however, the station can be operated using one tailrace tunnel, with increased head losses. For such an emergency condition, tailrace intake stoplog guides will be provided in the surge chamber. The surge chamber will be designed for full load rejection with either one or two tailrace tunnels in operation.

The tailrace portals will be reinforced concrete structures designed to reduce the outlet flow velocity, and hence the velocity head loss at the exit to the river. The minimum rock cover required above the tunnels will be 1.5 times the major excavated dimension (about 54 feet), and the portals will also provide the necessary transition length to the river where the rock cover would be less than 54 feet.

12.16 - <u>Turbines and Generators</u>

(a) Unit Capacity

The Watana powerhouse will have six generating units with a nominal capacity of 170 MW. This is the available capacity with minimum December reservoir level (El. 2112) and a corresponding gross head of 662 feet on the station.

The head on the plant will vary from 735 feet maximum (724 feet net head) to 595 feet minimum (584 feet net level). Because maximum turbine output varies approximately with the 3/2 power of head, the maximum unit output will change with head, as shown on Figure 12.21.

The rated head for the turbine has been established at 680 feet, which is the weighted average operating head on the station. Allowing for generator losses, the rated turbine output is 250,000 hp (186.5 MW).

The generator rating has been selected as 190 MVA with a 90 percent power factor, which corresponds to a power output of 170 MW. The generators will be capable of a continuous 15 percent overload; this will allow a unit output of 196 MW. At maximum reservoir water level, the turbines will be operated below maximum (full gate) output to avoid overloading of the generators.

(b) <u>Turbines</u>

The turbines will be of the vertical shaft Francis type with steel spiral casing and a concrete elbow-type draft tube. The draft tube will comprise a single water passage without z no center pier.

The rated output of the turbines will be 250,000 hp at 680 feet rated net head. Maximum and minimum heads on the units will be 724 feet and 584 feet respectively. The full gate output of the turbines will be about 275,000 hp at 724 feet net head and 200,000 hp at 584 feet net head. Overgating of the turbines may be possible, providing approximately 5 percent additional power; however, at high heads the turbine output will be restricted to avoid overloading the generators. The best efficiency point of the turbines will be established at the time of preparation of bid documents for the generating equipment and will be based on a detailed analysis of the anticipated operating range of the turbines. For preliminary design purposes, the best efficiency (best gate) output of the units has been assumed as 85 percent of the full gate turbine output. This percentage may vary from about 80 percent to 90 percent; in general, a lower percentage reduces turbine cost.

The full gate and best gate efficiencies of the turbines will be about 91 percent and 94 percent respectively at rated head. The efficiency will be about 0.5 percent lower at maximum head and 1 percent lower at minimum head. The preliminary performance curve for the turbine is shown on Figure 12.22.

A speed of 225 rpm has been selected for the unit for preliminary design purposes. The resulting turbine specific speed (N_S) is 32.4. As shown on Figure 12.23, this is within present day practice for turbines operating under a head of 670 feet. In general, a lower speed machine will increase the cost of the turbines and generators as well as the powerhouse civil cost because of the increased physical size of the generating equipment. A higher speed unit, on the other hand, requires a deeper unit setting and is generally considered to be a less conservative design with increased risk of vibration and rough operation. The difference in efficiency between the higher and lower speed machines at this head range is very small, with the increase in efficiency which is associated with a physically larger (lower speed) runner offset by higher disc friction and seal leakage losses. For an underground powerhouse, the incremental cost of increasing the unit setting is usually relatively inexpensive; therefore, assuming no change in efficiency, the trend in unit selection is to choose as high a speed as possible consistent with satisfactory precedent and good operating experience with similar specific speed turbines. Draft tube vortex and surge

phenomena may also have an influence on the selection of unit speed as discussed below. The turbine data is summarized in Table 12.7.

On the basis of information from turbine manufacturers and the studies on the power plant layout, the centerline of the turbine distributor has been set at 30 feet below minimum tailwater level. The final setting of the unit will be established in conjunction with the turbine manufacturer when the contract for the supply of the turbine equipment has been awarded.

The turbines will be of conventional design, generally of welded or cast steel construction with forged steel shafts and pins. Because of the remote location of the project and the desired high reliability/availability of the equipment, special consideration should be given to reducing cavitation pitting on the turbines. This will include:

- Provision of weldable stainless steel runners;

- Careful profiling and finishing of the water passage surfaces of the runner wicket gates and stay ring;

- A conservative unit setting; and

- Extensive cavitation tests on the turbine model.

Bulkhead domes will be provided with two of the turbines (Units 3 and 4) to be installed at the bottom of the draft tube liner at the time of turbine installation. The domes permit work to continue on turbine installation after the tailrace, surge chamber, and draft tubes are flooded (prior to startup of Unit 1), without installing draft tube gates.

Because of the relatively short length of the intake penstock and a surge tank location immediately downstream of the powerhouse, the hydraulic transient characteristics of the turbines are favorable. Assuming normal generator inertia (H = 3.5 MW-Sec/MVA), a preliminary analysis has indicated the following:

The regulating ratio is above the minimum recommended by the USBR for good regulating capacity. Also, unit speed rise and penstock pressure rise are all well within normal accepted values. Because of the deep unit setting and the relatively short distance between the turbine and the tailrace surge tank, there will be no problems with draft tube water column separation.

The Watana project will form a large portion of the overall system generating capacity in Alaska; therefore, satisfactory operation of the units over a very wide range of loads will be important. Although there are Francis turbine installations which operate for considerable periods at very small gate openings, operation below about 50 percent load generally becomes increasingly rough because of reduced efficiency of the turbines.

The ability to operate at part load will also depend on the draft tube surge phenomena and associated generator power swings. The surging occurs on many turbines, particularly the Francis type, and normally has a frequency of about 1/3 to 1/5 of the turbine rotational speed. These surges, which may occur from about 30 percent to sometimes as high as 80 percent wicket gate opening, result in pulsating torque on the turbine runner and corresponding generator power fluctuations. The condition becomes more severe when the surge frequency closely corresponds to the natural frequency of the generator. To reduce the possibility of unacceptable power swings and unit vibration, it is desirable to have the surge frequency different from the penstock pressure wave frequency and the generator natural frequency.

The estimated natural frequency of the generators will be about 1.3 cycles/s, which is undesirable when considering a possible surge frequency of about 0.75 to 1.25 cycles/s.

The selection of a lower unit speed would separate the draft tube surge frequency from the generator natural frequency; however, this will increase the generating equipment as well as powerhouse cost. It may be possible to increase the natural frequency of the generator by reducing the generator inertia (WR²) as much as possible; however, the lower WR² has an adverse effect on the transient characteristics of the unit and may affect electrical system stability.

Other measures which may be employed are:

- Careful model studies of the turbine to accurately predict draft tube vortex/surge phenomena. Altering the shape of the draft tube can reduce surge problems; however, a reduction of part-load efficiency may result.
- Provision for air admission to the draft tube. This is done on more or less a trial and error basis and may include injection of air from the station 100 psi compressed air system, special low pressure compressors provided specifically for draft tube air admission, and/or provision of an "air-head" which allows atmospheric air to be drawn down the generator and turbine shaft and through the runner cone.
- Additions of fins to the draft tube cone immediately below the runner. While this has been used on many installations, there have been instances of structural failure of the fins.

Another approach currently under study by the USBR is to damp the power oscillations resulting from the draft tube surges by varying the generator excitation. Computer simulation indicates that is feasible to dampen the large oscillations; however, this has yet to be tested in a prototype unit.

Employing one or more of the above approaches, a design may be achieved that operates satisfactorily without serious generator power swings. The potential problem, however, must be given serious consideration in the design stages.

(c) Generators

(i) Type and Rating

The six generators in the Watana powerhouse will be of the vertical shaft, overhung type directly connected to the vertical Francis turbines. The arrangement of the units is shown in Plates ___ and the single line diagram is shown in Plate .

The optimum arrangement at Watana will consist of two generators per transformer bank, with each transformer bank comprising three single-phase transformers. (Development of this scheme is described in Section 12.18). The generators will be connected to the transformers by isolated phase bus through generator circuit breakers directly connected to the isolated phase bus ducts.

Each generator will be provided with a high initial response static excitation system. The units will be controlled from the Watana surface control room, with local control facility also provided at the powerhouse floor. The units will be designed for black start operation.

The generators are rated as follows:

Rated Capacity: 190 MVA, 0.9 power factor

Rated Power: 170 MW

Rated Voltage: Synchrone 15 kV, 3 phase, 60 Hertz 225 rpm Rated Voltage: Synchronous Speed: Inertia Constant:

Inertia Constant:

Transient Reactance:

Short Circuit Ratio:

Efficiency at Full Load:

3.5 kW-sec/kVA

28 percent (maximum)

1.1 (minimum)

98 percent (minimum)

The generators will be of the air-cooled type, with water-cooled heat exchangers located on the stator periphery. The ratings given above are for a temperature rise of the stator and rotor windings not exceeding 60°C with cooling air at 40°C.

The generators will be capable of delivery 115 percent of rated MVA continuously (195.5 MW) at a voltage of +5 percent without exceeding 80°C temperature rise in accordance with ANSI Standard C50.10.

The generators will be capable of continuous operation as synchronous condensers when the turbine is unwatered, with an underexcited reactive power rating of 140 MVAR and an overexcited rating of 110 MVAR. Each generator will be capable of energizing the transmission system without risk of self-enditation.

The design data of the generators stated above should be reviewed during the detailed design stage for overall economic and technical design and performance requirements of the power plant and the power system.

(ii) Generator Construction

The generator will be of a modified umbrella type overhung construction, with a combined thrust and guide bearing below the rotor and a guide bearing above the rotor. The lower bearing bracket will support the rotor and turbine runner weights and the unbalanced hydraulic thrust of the runner. All removable parts, including turbine parts, will be designed for removal through the generator stator.

Approximate dimensions and weights of the principal parts of the generator are given below:

Stato	pit diameter		36 f	eet
Rotor	diameter		22 f	
Rotor	length (without	shaft)	7 f	
	weight			tons
Total	weight			tons

It should be noted that these are approximate figures and they will vary between manufacturers, sometimes considerably. However, at this stage of design feasibility and planning, the dimensions and weights are considered appropriate and representative.

The generator stator windings will be insulated with Class B insulation as defined by ANSI Standard C50.10, of epoxy resin bonded type. The stator windings will be wye-connected for grounded operation through a neutral grounding transformer located in the generator neutral cubicle. The stator windings and laminated core will be shop-assembled in three or four sections for facility of transport and erection in the powerhouse.

The rotor will be designed to safely withstand the maximum runaway speed of the turbine. The rotor hub, yoke, and laminated rim will be designed for assembly at the powerhouse. The assembled rotor will be erected in the generator pit without the shaft, thereby requiring minimum crane lift and a considerable reduction of the powerhouse cavern height.

The rotating parts of the generator and turbine will be designed so that the critical speed exceeds the runaway speed of the unit by at least 20 percent. The design of the plant and power system will not require additional inertia in the rotating parts; the inertia constant specified thus will correspond to the "natural" inertia of the machine. Damper windings of low resistance and rugged construction will be provided on the pole shoes and designed to provide adequate damping currents for stabilized operation.

The thrust bearing will be of the adjustable shoe (Kingsbury) or precompressed spring (General Electric) type, oil-cooled, with high pressure oil injection during starting and stopping.

(iii) Generator Excitation System

The generator will be provided with a high initial response type static excitation system supplied with rectified excitation power from transformers connected directly to the generator terminals. The excitation system will be capable of supplying 200 percent of rated excitation field (ceiling voltage) with a generator terminal voltage of 70 percent. The power rectifiers will have a one-third spare capacity to maintain generation even during failure of a complete rectifier module.

The excitation system will be equipped with a fully static voltage regulating system maintaining output from 30 percent to 115 percent, within +0.5 percent accuracy of the voltage setting. Manual control will be possible at the excitation board located on the powerhouse floor, although the unit will normally be under remote control, as described in Section 12.18 covering the control systems of the plant.

The static excitation system will also include maximum and minimum limiters and reactive current compensator, and will be suitable for parallel joint control of the units. Field flashing during startup will be from the 125 volt dc station battery.

(iv) <u>Erection and Tests</u>

As is normal for large hydroelectric generators, the machines will not be assembled completely and tested in the factory. The erection and tests of the generators at the powerhouse, therefore, will assume greater importance in the successful commissioning of the station and should be carefully coordinated with that of the turbines and civil works.

The assembly of the stator sections will be done in the pit. The rotor will be assembled in the erection bay. The powerhouse crane will be capable of lifting the completed rotor assembly and lowering it into the stator, and onto the thrust bearing and shaft assembly on the bracket supports. Alignment and tests of the rotor, turbine runner, and shaft will be done to tolerances specified in NEMA/ANSI Standards.

The generators will be fully tested after assembly and mechanical run tests, including dielectric tests, saturation tests, heat run, efficiency, and full-load rejection tests. Ceiling voltage and response of the excitation system will be tested. Operation of the unit within specified vibration limits will be checked.

(d) Governor System

The governor system which control the generating unit will include a governor actuator and a governor pumping unit. A single system will be provided

for each unit. The governor system operating pressure will be 600 to 1000 psi, as recommended by the governor system manufacturer.

The governor actuator will be the electric hydraulic type and will be connected to the computerized station control system. The governor pumping unit will include governor pumps, an accumulator tank, and a sump tank. Each unit will have three governor pumps: two main pumps which operate intermittently, and one jockey pump which operates continuously while the turbine wicket gates are open and intermittently when the gates are fully closed.

12.17 - Miscellaneous Mechanical Equipment

(a) Powerhouse Cranes

Two overhead traveling 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 reassembly of equipment during maintenance overhauls.

The cranes may also be used by the civil construction contractor for power-house construction. Alternatively, the civil contractor will provide a separate crane which will use the same runway as for 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 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, 20 feet by 20 feet.

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.

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, a hydraulic press, power hacksaw, shaper, and grinders.

12.18 - Accessory Electrical Equipment

The accessory electrical equipment described in this section includes the following:

- . Main generator step-up 15/345 kV transformers;
- . Isolated phase bus connecting the generator and transformers:
- . Generator circuit breakers:
- . 345 kV oil-filled cables from the transformer terminals to the switchyard;
- . Control systems of the entire hydro plant complex; and
- . Station service auxiliary AC and DC systems.

Other equipment and systems described include grounding, lighting system, and communications.

The main equipment and connections in the power plant are shown in the single line diagram, Plate 60A. The arrangement of equipment in the powerhouse, transformer gallery, and cable shafts is shown on Plates 57 through 59.

(a) <u>Selection of Transformers and H.V. Connections</u>

(i) General

Nine single-phase transformers and one spare transformer will be located in the transformer gallery. Each bank of three single-phase

transformers will be connected to two generators through generator circuit breakers by isolated phase bus located in individual bus tunnels. The HV terminals of the transformer will be connected to the 345 kV switchyard by 345 kV single-phase oil-filled cable installed in 700-foot-long vertical shafts. There will be two seats of three single-phase 345 kV oil-filled cables installed in each cable shaft. One set will be maintained as a spare three phase cable circuit in the second cable shaft. These cable shafts will also contain the control and power cables between the powerhouse and the surface control room, as well as emergency power cables from the diesel generators at the surface to the underground facilities.

A number of considerations led to the choice of the above optimum system of transformation and connections. Different alternative methods and equipment designs were also considered. In summary, these are:

- One transformer per generator vs one transformer for two generators:
- Underground transformers vs surface transformers;
- Direct transformation from generator voltage to 345 kV vs intermediate step transformation to 230 kV or 161 kV, and then to 345 kV;
- Single-phase vs three-phase transformers for each alternative method considered; and
- Oil-filled cable vs solid dielectric cable for SF6 gas-insulated bus.

(ii) Reliability Considerations

Reliability considerations will be based on the general reliability requirements for generation and transmission described in Section 15 regarding the forced outage of a single generator, transformer, bus or cable in addition to planned or scheduled outages in a single contingency situation, or a subsequent outage of equipment in the double contingency situation. The system should be capable of readjustment after the outage for loading within normal ratings and for loading within emergency ratings.

The generators will be rated with a 115 percent continuous overload capability. All main connections and equipment including the transformers, circuit breakers, isolated phase bus, and 345 kV cables will be rated for continuous operation at the 115 percent overload rating of the generators.

Emergency ratings are different for different items of equipment and emergency periods. It generally varies between 110 to 130 percent

in summer to 120 to 140 percent in winter for a 4 to 12 hour period, with somewhat higher values for very short (1 hour) emergency periods.

(iii) Technical and Economic Considerations

The use of surface transformers connected directly to the underground generators by isolated phase bus was ruled out at the outset due to significantly higher costs and higher losses associated with generator isolated phase buses. The incremental cost could be decreased if three units were connected to one transformer, but such a compromise is not acceptable due to reliability considerations.

In general, 3-phase transformers are preferred to single-phase transformers because of their lower overall costs, smaller overall dimensions and smaller underground gallery dimensions. However, transport limitations seriously affect the use of the larger size 3-phase transformers, both in dimensions and weight. The following are the road and rail data available:

- Parks and Denali Highways

Maximum load - 150,000 lb Overweights require special permits.

- Railway

Maximum Weight - 263,000 lb Dimension Limits - 16 feet high, 10 feet wide

A further check of these design limitations for the selected sizes of transformers is recommended during the detailed design stage. A careful route reconnaissance study is also required.

Single-phase transformers are therefore recommended for the 6-unit power plant. The grouped unit arrangement with two generators per transformer will allow a smaller gallery length, with center-to-center spacing comparable to the generator spacing. The grouped unit arrangement is the recommended arrangement. The alternative with one transformer per generator will requie a gallery about 300 feet longer.

One distinct advantage of single-phase transformers is that a spare transformer can be provided at a fairly low incremental cost.

The double-step transformation scheme (15/161 KV generator-transformer, 161 KV cable and 161/345 KV auto-transformer at the switchyard) is economicallly competitive with the direct transformation scheme (15/345 KV), resulting from a number of tradeoffs: cost/MVA per transformer is lower; also dimensions, weights and cavern dimensions are lower; but the intermediate-voltage transformer costs are additional.

Direct transformation (15/345 KV) is better from system transient stability viewpoint since the overall impedance of the generator unit to the 345 KV bus is lower. Furthermore, it has a better overall reliability since there is no one less voltage level and, therefore, less equipment in the generating "chain" of equipment. This scheme costs about \$2 million less in overall costs compared to the double-step transformation scheme.

The comparison between 345 KV oil-filled cables and other 345 KV cable and bus system is made in Section 12.18. The SF6 bus is about 5 to 6 times the cost of the oil-filled cables. It also requires a larger diameter cable shaft. The oil-filled cable is well proven at a number of underground power installations and was therefore selected for both technical and economic considerations.

(c) Main Transformers

(i) Rating and Characteristics

The nine single-phase transformers (three transformers per group of two generators) and one spare transformer, will be of the two winding, oil-immersed, forced-oil water-cooled (FOW) type, with rating and electric characteristics as follows:

Rated capacity:
High voltage winding:
Basin insulation level (BIL)
of H.V. winding:
Low voltage winding:
Transformer impedance:

345 / 3 kV, Grounded Y

1300 kV 15 kV, Delta 15 percent

The temperature rise above air ambient temperature of 40°C is 55°C for the windings for continuous operation at the rated kVA.

(ii) Construction

The transformers will be of the FOW type with water-cooled heat exchangers which remove the heat from the oil circulating through the windings. A one-third spare cooler capacity will be provided. The transformer will be of the forced oil directed type with a design aimed to achieve minimum dimensions and weight for shipping purposes. The low voltage terminals will be connected to the isolated phase bus, and the high voltage terminals to the 345 kV oil-filled cable box termination at the transformer.

Lightning arresters will be connected directly to the high voltage terminals. The transformer installation in the gallery will be designed to provide the necessary ground and safety clearances from the live 345 kV terminals to all nearby equipment and structures.

The tank underbase will be provided with flanged wheels for transport on rails. The spare single-phase transformer will be exactly identical to the remaining nine single-phase transformers. It will be maintained in a state of maximum readiness, for connection in the shortest practical time to replace any of the main transformers.

The transformers will be fully tested and inspected in the factory according to ANSI/NEMA Standards. They will be shipped without oil and filled with inert gas for protection. At the site, erection would be mainly for external fittings such as bushings, lightning arresters, heat exchangers, piping, and electrical connections.

(iii) Fire Protection

Fire walls will separate each single-phase transformer. Each transformer will be provided with fog-spray water fire protection equipment, automatically operated from heat detectors located on the transformer.

(d) Generator Isolated Phase Bus

(i) Ratings and Characteristics

The isolated phase bus main connections will be located between the generator, generator circuit breaker, and the transformer.

Tap-off connections will be made to the surge protection and potential transformer cubicle, excitation transformers, and station service transformers. Bus duct ratings are as follows:

			Generator Connection	Transformer Connection
Short Short	current, amps circuit current circuit current insulation leve	momentary, amps , symmetrical, amps 1, kV (BIL)	9,000 240,000 150,000 150	18,000 240,000 150,000 150

The bus conductors will be designed for a temperature rise of 65°C above 40°C ambient temperature.

(ii) Construction

The bus will be of standard self-cooled design with conductor and tubular enclosure of aluminum. The current rating is such that either a self-cooled or forced cooled design will be possible. With a forced cooled design, the size and costs will be lower; however, if the forced-cooling plant fails, the bus would be severely derated to a rating less than 50 percent of the forced cooling rating. The self-cooled designs are used up to 30,000 amps rated current and are therefore recommended for this installation where the ratings will not exceed 18,000 amps.

The enclosure will be of welded construction and each bus will be grounded. The construction is highly reliable; will eliminate phase-to-phase faults, neutralize the magnetic field outside the enclosure, and provide protection against contamination and moisture, with consequent minimum maintenance requirements.

(e) Generator Circuit Breakers

The generator circuit breakers will be of the enclosed air circuit breaker design suitable for mounting in line with the generator isolated phase bus ducts. They are rated as follows:

Rated Current:

9,000 Amps

Voltage:

23 kV class, 3-phase, 60 Hertz

Breaking capacity,

symmetrical, amps

150,000

The short circuit rating is tentative and will depend on detailed analysis in the design stage.

The breakers will be designed and constructed with a high degree of reliability. The phase spacing of the breakers will be generally the same as the isolated phase bus duct. The breakers will be mounted on strong foundations on the generator floor designed to absorb the reaction forces when the breaker operates. A separate compressed air plant will be provided for the high reliability compressed air system requirements of the air circuit breakers.

(f) 345 kV Oil-Filled Cable

(i) General

The recommended 345 kV connection is a 345 kV oil-filled cable system between the high voltage terminals of the transformer and the surface switchyard. The cable will be installed in a vertical cable shaft. Cables from two transformers will be installed in a single cable shaft.

This system of 345 kV connection was chosen after a technical and economic analysis of alternative methods of connection, including:

- SF6 isolated bus system;
- High pressure oil pipe cable system; and
- Solid dielectric cable system.

The SF6 bus system is considered to be the best alternative to the oil-filled cable system. Its advantages are a generally better overall reliability, including a low fire hazard. However, it costs approximately 5 to 6 times that of the oil-filled cable installation, and requires almost twice the diameter cable shaft of the cable installation. The overall cost difference is approximately \$7,000,000 in direct costs.

The oil pipe cable will consist of three conductors contained within an oil-filled steel pipe. This system has the highest potential fire hazard of all the cable systems and is not recommended for high head vertical cable installations. The solid dielectric (polymeric) cables are still under development at the 345 kV to 500 kV voltage class.

It is recommended that further detailed study of the oil-filled cable in comparison with the SF6 bus and other more recent SF6 cable designs under development be undertaken at the design stage.

By far the greatest number of high voltage, high capacity installations utilize oil-filled cables. A formidable experience record is evident for the oil-filled cable installations associated with large power plants all over the world. Typical installations include the 525 kV/650 MVA units at Grand Coulee III, the 345 kV/550 MVA units at Churchill Falls in Canada, the 400 kV/2640 MVA cables at Severn River crossing in Great Britain, and the 400 kV/2340 MVA cables at Uinorwic pumped storage plant in Great Britain.

(ii) Rating and Characteristics

The cable will be rated for a continuous maximum current of 800 amps at 345 kV ± 5 percent. The maximum conductor temperature at the maximum rating will be 70°C over a maximum ambient of 35°C. This rating will correspond to 115 percent of the generator overload rating. The normal operating rating of the cable will be 87 percent, with a corresponding lower conductor temperature which will improve the overall performance and lower cable aging over its project operating life. Depending on the ambient air temperature, a further overload emergency rating of about 10 to 20 percent will be available during winter conditions.

The cables will be of single-core construction with oit flow through a central oil duct within the copper conductor. Cables will have an aluminum sheath and PVC oversheath. No cable jointing will be required for the 700 to 800 feet length cable installation.

(g) <u>Control Systems</u>

(i) <u>General</u>

A Susitna Area Control Center will be located at Watana to control both the Watana and the Devil Canyon power plants as shown in Plate

The control center will be linked through the supervisory system to the Central Dispatch Control Center at Willow as described in Section 14.

The supervisory control of the entire Alaska Railbelt system will be done at the Central Dispatch Center at Willow. A high level of control automation with the aid of digital computers will be sought,

but not a complete computerized direct digital control of the Watana and Devil Canyon power plants. Independent operator controlled local-manual and local-auto operations will still be possible at Watana and Devil Canyon power plants for testing/commissioning or during emergencies. The control system will be designed to perform the following functions at both power plants:

- Start/stop and loading of units by operator;
- Load-frequency control of units;
- Reservoir/water flow control;
- Continuous monitoring and data logging;
- Alarm annunciation; and
- Man-machine communication through visual display units (VDU) and console.

In addition, the computer system will be capable of retrieval of technical data, design criteria, equipment characteristics and operating limitations, schematic diagrams, and operating/maintenance records of the unit.

The Susitna Area Control Center will be capable of completely independent control of the Central Dispatch Center in case of system emergencies. Similarly it will be possible to operate the Susitna units in an emergency situation from the Central Dispatch Center, although this should be an unlikely operation considering the size, complexity, and impact of the Susitna generating plants on the system.

The Watana and Devil Canyon plants will be capable of "black start" operation in the event of a complete black out or collapse of the power system. The control systems of the two plants and the Susitna Area Control Center complex will be supplied by a non-interruptible power supply.

(ii) Unit Control System

The unit control system will permit the operator to initiate an entire sequence of actions by pushing one button at the control console, provided all preliminary plant conditions have been first checked by the operator, and system security and unit commitment have been cleared through the central dispatch control supervisor. Unit control will be designed to:

- Start a unit and synchronize it with the system;
- Load the unit;
- Stop a unit:
- Operate a unit as running spare (runner in air with water blown down in turbine and draft tube); and Operate as a synchronous condenser (runner in air as above).

Unit control will be essentially possible at four different levels in a hierarchical organization of the control system:

- Local control at the machine floor at individual turbine-generator control boards (primarily designed for commissioning and recommissioning of units). It will be the responsibility of the operator for performing individual control operations in the correct sequence, and monitoring instrumentation during local control operations.
- Automatic or semi-automatic system for start-up and shut-down of generating unit at the local board at the machine floor.
- Fully automatic system at Susitna Area Control (at Watana) for Watana and Devil Canyon power plants. (This will be the normal Susitna operation.)
- Fully automatic system through supervisory control from Central Dispatch Center at Willow. (Abnormal or emergency situations only).

(iii) Computer-Aided Control System

Traditionally, control systems for power plants in general, and hydro plants in particular, have utilized hard-wired switchboard type equipment (such as electro-mechanical relays, instruments, alarm annunciators, signal lamps, mimic diagram and control switches) for the operation, indication, alarm and control of the power plant. Such equipment was installed both at the plant local control area on the machine floor as well as in the control room, with a limited degree of miniaturization of equipment at the control desks in the control room.

While traditional switchboard type equipment is still utilized at the local control level, supplemented with programmable control systems at many plants, the design of control and display equipment at modern central control rooms has been rapidly moving towards computer-aided or fully computer-controlled systems, especially where remote control operations are contemplated. One of the problems encountered by utilities is the necessity for operating personnel familiar with the conventional control systems to adapt to the new computer-aided control systems. In this contect, establishing a modern computer-aided control system in the Alaska Power Authority electrical system for the Susitna Project complex should not pose any special problems for the adaption and training of operators.

The computer-aided control system at the Susitna Area Control Center at Watana will provide for the following:

- Data acquisition and monitoring of unit (MW, MVAR, speed, gate position, temperatures, etc.);
- Data acquisition and monitoring of reservoir headwater and tailwater levels;

- Data acquisition and monitoring of electrical system voltage and frequency;
- Load-frequency control;
- Unit start/stop control;
- Unit loading;
- Plant operation alarm and trip conditions (audible and visual alarm on control board, full alarm details on VDU on demand);
- General visual plant operation status on VDU and on giant wall mimic diagram;
- Data logging, plant operation records;
- Plant abnormal operation or disturbance automatic recording; and
- Water management (reservoir control).

The block diagram of the computer-aided control system is shown in Plate . The supervisory control and telemetering system and central dispatch center system details are described in Section 1.4.

(iv) Local Control and Relay Boards

Local boards will be provided at the powerhouse floor equipped with local controls, alarms, and indications for all unit control functions. These boards will be located near each unit and will be utilized mainly during testing, commissioning, and maintenance of the turbines and generators. It will also be utilized as needed during emergencies if there is a total failure of the remote or computer-aided control systems.

The unit electrical protective relays will be mounted on relay boards, with one board for each generator located near the unit. Differential protection will be provided for each generator and transformer. The differential zones of protection overlap will include all electrical equipment and connections. The 345 kV oil-filled cable to the surface switchyard will be protected by a pilotwire differential protection relay. The overall differential relay protects the generators, transformers, and 345 kV cable. Sensitive ground fault stator protection will be provided for the generator. Protection will also be provided for negative phase sequence operation, loss of excitation, overvoltage, and under frequency. A phase impedance relay will provide backup protection for the generator. Other protective relays are shown in Plate

(v) Load-Frequency Control (Automatic Generation Control)

The load frequency control system will provide remote control of the output of the generator at Watana and Devil Canyon from the central dispatch control center through the supervisory and computer-aided control system at Watana. The basic method of automatic generation control (AGC) will use the plant error (differential) signals from the load dispatch center and will allocate these errors to the power plant generators automatically through speed-level motors. Provision will be made in the control system for the more advanced scheme of a closed-loop control system with digital control to control generator power.

The control system will be designed to take into account the digital nature of the controller-timed pulses as well as the inherent time delays caused by the speed-level motor run-up and turbine-generator time-constants.

The load set-point for the Susitna area generation will be set at the Central Dispatch Center. The summated power will be telemetered from the Susitna Area Control center to the Central Dispatch Center, from which the required differential plant generation ("error") will be determined and transmitted by the supervisory system to Susitna Area Control Center. From this point, the remaining functions for the automatic generation control will be carried out by the plant supervisory control systems to load the individual generating units at Watana and Devil Canyon.

The unit will be automatically removed from load-frequency control for various conditions including failure of supervisory system, unit controller or computer system, abnormally high plant frequency, unit shut-down, and dc power failure. When the unit is taken off automatic load-frequency control, it will be returned to manual load and frequency control by the operator at Watana Control room.

(h) Station Service Auxiliary AC and DC Systems

(i) Auxiliary AC System

The station service system will be designed to achieve a reliable and economic distribution system for the power plant and switchyard, in order to satisfy the following requirments:

- Station service power at 480 volts will be obtained from two 2,000 kVA auxiliary transformers connected directly to the generator circuit breaker outgoing leads of Units 1 and 3;
- Surface auxiliary power at 34.5 kV will be supplied by two separate 7.5/10 MVA transformers connected to the generator leads of Units 1 and 3;

- Station service power will be maintained even when all the units are shut down and the generator circuit breakers are open;
- 100 percent standby transformer capacity will be available;
- A spare auxiliary transformer will be maintained, connected to Unit 5; and
- "Black start" capability will be provided for the power plant in the event of total failure of the auxiliary supply system, 500 kW emergency diesel generators will be automatically started up to supply the power plant and switchyard with auxiliary power to the essential services to enable startup of the generators.

The main ac auxiliary switchboard will be provided with two bus sections separated by bus-tie circuit breakers. Under normal operating conditions, the station-service load is divided and connected to each of the two end incoming transformers. In the event of failure of one end supply, the tie breakers will close automatically. If both end supplies fail, the emergency diesel generator will be automatically connected to the station service bus.

Each unit will be provided with a unit auxiliary board supplied by separate feeders from the two bus sections of the main switchboard interlocked to prevent parallel operation. Separate ac switchboards will furnish the auxiliary power to essential and general services in the power plant.

The unit auxiliary board will supply the auxiliaries necessary for starting, running, and stopping the generator-turbine unit. These supplies will include those to the governor and oil pressure system, bearing oil pumps, cooling pumps and fans, generator circuit breaker, excitation system, and miscellaneous pumps and devices connected with unit operation.

The station essential service supplies will include powerhouse sump pumps, drainage pumps, compressors for circuit breakers, station air and generator brakes, dc battery chargers, control and metering devices, communications, fire protection pumps, and other miscellaneous essential power requirements.

The station general supplies will include powerhouse lighting, heating, ventilating and air-conditioning, elevators, cranes, machine shop and tools, and other miscellaneous pumps and general requirements.

The 34.5 kV supply to the surface facilities will be distributed from a 34.5 kV switchboard located in the surface control and administration building. Power supplies to the switchyard power intake, and spillway as well as the lighting systems for the access roads and tunnels will be obtained from the 34.5 kV switchboard.

The unit auxiliary board will supply the auxiliaries necessary for starting, running, and stopping the generator-turbine unit. These supplies will include those to the governor and oil pressure system, bearing oil pumps, cooling water pumps and fans, generator circuit breaker, excitation system, and miscellaneous pumps and devices connected with unit operation.

The station essential service supplies will include powerhouse sump pumps, drainage pumps, compressors for circuit breaker, air and generator brakes, dc battery chargers, control and metering devices, communications, fire protection pumps, and other miscellaneous essential power requirements.

The station general supplies will include powerhouse lighting, heating, ventilating and air-conditioning, elevators, cranes, machine shop and tools, and other miscellaneous pumps and general requirements.

The 34.5 kV supply to the surface facilities will be distributed from a 34.5 kV switchboard located in the surface control and administration building. Power supplies to the switchyard power intake, and spillway as well as the lighting systems for the access roads and tunnels will be obtained from the 34.5 kV switchboard.

The two 2000 kVA, 15000/480 volt stations service transformers and the spare transformer will be of the 3-phase, dry-type, sealed gas-filled design. The two 7.5/10 MVA, 15/34.5 kV transformers will be of the 3-phase oil-immersed OA/FA type.

Emergency diesel generators, each rated 500 kW, will separately supply the 480 volt and 34.5 kV auxiliary switchboards during emergencies. Both diesel generators will be located in the surface control building.

An uninteruptible high security power supply will be provided for the computer control system.

(ii) DC Auxiliary Station Service System

The dc auxiliary system will supply the protective relaying, supervisory, alarm, control, tripping and indication circuit in the power plant. The generator static excitation system will be started with "flashing" power from the dc battery. It will also supply the emergency lighting system at critical plant locations.

Separate duplicate lead-acid batteries for 125 volt dc will be provided in the powerhouse. The 48 volt battery supply for the supervisory and computer aided control system and microwave communications will be located in the surface control building.

The main battery system will be supplied by double charging equipment consisting of a full wave rectifier system with regulated output voltage which normally will supply the continuous do load in the system. The battery capacity will be suitable for an emergency loading based on a failure of ac station service lasting 5 hours.

(iii) "Black Start" Capability

The Watana power plant will have a built-in capability of starting up a completely blacked-out power system in a very short time. Only a few basic requirements will have to be satisfied:

- Sufficient water will be available in the reservoir for the minimum generation required for "black start" operation;
- The governor oil system will have sufficient stored energy capable of operating the turbine wicket gates to full open position;
- The generators wille be equipped with static exciters capable of being flash-started from the station battery system
- Dc control power will be available for the startup circuits.

The above described emergency power requirements will not exceed about 200 kW for one unit and will be easily supplied from the emergency diesel generator. With the startup of a single unit, the complete power plant and switchyard auxiliary power will be immediately available, enabling all the units in the power plant to be started up sequentially within the hour.

(i) Grounding System

The power plant grounding system will consit of one mat under the power plant, one mat under the transformer gallery, risers, and connection ground wires. Grounding grids will also be included in each powerhouse floor. The power plant grounding system will be connected to the switchyard grounding system by three 500 MCM copper ground conductors to minimize the overall resistance to ground. The grounding system will be designed to provide a ground resistance of 1 ohm or lower. All exposed metal part and neutral connections of generators and transformers will be connected to the grounding system for the purpose of protecting personnel and equipment from injury or damage.

(j) Lighting System

The lighting system in the powerhouse will be supplied from 480/208-120 volts lighting transformers connected to the general ac auxiliary station service system. The lighting system will be all fluorescent and incandescent fixtures operating on 120 volts and all outdoor type high pressure sodium fixtures operating on 208 volts. The lighting level varies generally from 20 to 50 foot candles depending upon the powerhouse area; the

higher levels will be at control areas. Adequate illumination will be provided on vertical switchboards with local lighting canopies.

An emergency lighting system will be provided at the power plant and at the control room at all critical operating locations with an illumination level of 2 foot candles. The emergency lighting system will operate from a separate 120 volt ac circuit which, by means of automatic transfer switches, will be automatically connected to the 125 volt dc system upon failure of the ac system.

(k) Communications

The power plant will be furnished with an internal communications system, including an automatic telephone switchboard system. A communication system will be provided at all powerhouse floors and galleries, transformer gallery, access tunnels and cable shafts, and structures at the intake, draft tube chamber, spillway, and dam.

The communications system for the central dispatch control system, telemetering, supervisory and protective relaying system is described in Section 15.

(1) Insulation Coordination and Lightning and Switching Surge Protection

The electrical insulation and protective devices will be selected and coordinated to provide a safe margin of insulation strength above the maximum abnormal voltages permitted during lightning, switching, and short-circuit surges. The 1300 kV basic insulation level (BIL) specified for the transformer and other BIL values stated for the electrical equipment and connections are tentative and are subject to detailed study in the design stage of the project.

In principle, lightning arresters will be mounted on or adjacent to all major electrical equipment having wound-type internal construction, and will be provided at the generator 15 kV terminals and the main transformer 345 kV terminals.

12.19 - Switchyard Structures and Equipment

TO FOLLOW

12.20 - Project Lands

Project lands acquired for the project will be the minimum necessary to construct access and site facilities, construct permanent facilities, to clear the reservoir, and to operate the project.

DEVIL CANYON

The tailrace portal site has been located at a prominent steep rock face on the right bank of the river to provide the required tunnel cover (about 60 feet) in as short a distance as possible. The portal provides a gradual transition from the tunnel modified horseshoe shape to a rectangular cross-section at the outlet; it also reduces the maximum outlet velocity to 8 ft/sec, to reduce the velocity head loss at exit. Vertical stoplog guides are provided for closure of the tunnel if required for tunnel inspection and/or maintenance.

13.15 - Turbines and Generators

(a) Unit Capacity

The Devil Canyon powerhouse will have four generating units with a nominal capacity of 150 MW. This is the available capacity with minimum December reservoir level (El. 1393) and a corresponding gross head of 553 feet in the station.

The head on the plant will vary from 605 feet maximum (597 feet net head) to 550 feet minimum (538 feet net head). Because maximum turbine output varies approximately with the 3/2 power of head, the maximum unit output will change with head as shown in Figure 13.2.

The rated head for the turbine has been established at 575 feet, which is the weighted average operating head on the station. Allowing for generator losses, this results in a rated turbine output of 225,000 hp (168 MW).

The generator rating has been selected as 180 MVA with a 90 percent power factor, which corresponds to a power output of 162 MW. The generators will be capable of continuous operation at 115 percent rated power. Because of the high capacity factor for the Devil Canyon station, the units will be operated at or near full load a large percentage of the time. The generators have therefore been sized on the basis of maximum turbine output at maximum head, allowing for a possible 5 percent addition in power from the turbine. This maximum turbine output (250,000 hp) is within the continuous overload rating of the generator.

(b) Turbines

The turbines will be of the vertical shaft Francis type with steel spiral casing and a concrete elbow type draft tube. The draft tube will have a single water passage (no center pier).

The rated output of the turbines will be 225,000 hp at 575 feet rated net head. Maximum and minimum heads on the units will be 597 feet and 538 feet, respectively. The full gate output of the turbines will be about 240,000 hp at 597 feet net head and 205,000 hp at 584 feet net head. Overgating of the turbines may be possible, providing approximately 5 percent additional power. For preliminary design purposes, the best efficiency (best gate) output of the units has been assumed at 85 percent of the full gate turbine output. This will be reviewed at the time of preparation of bid documents for the turbines.

The full gate and best gate efficiencies of the turbines will be about 91 percent and 94 percent, respectively, at rated head. The efficiency will be about 0.2 percent lower at maximum head and 0.5 percent lower at minimum head. The preliminary performance curve for the turbine is shown in Figure 13.3.

A speed of 225 rpm has been selected for the unit for preliminary design purposes. The resulting turbine specific speed ($N_{\rm S}$) is 37.9. As shown in Figure 12.23, this is within present day practice for turbines operating under 575 feet head. The considerations for selection of turbine speed are briefly discussed in Section 12.16.

On the basis of information from turbine manufacturers and the studies on the power plant layout, the centerline of the turbine distributor has been set at 30 feet below minimum tailwater level. The final setting of the unit will be established in conjunction with the turbine manufacturer after the contract for the supply of the turbine equipment has been awarded.

The mechanical/structural designs of the turbines will be basically the same as for Watana. Because of the relatively short penstocks and the surge tank location immediately downstream from the powerhouse, the hydraulic transient characteristics of the turbines are favorable. Assuming normal generator inertia (H = 3.5 MW-Sec/MVA), a preliminary analysis has indicated the following:

- Water starting time (Tw)	1.2 sec.
- Mechanical starting time (Tm)	7.6 sec.
- Regulating ratio (Tm/Tw)	6.3
- Governor time	
- Speed rise on full load rejection	35 percent
- Penstock pressure use on full load rejection	20 percent

The regulating ratio is above the minimum recommended by the USBR for good regulating. Also, unit speed rise and penstock capacity pressure rise are within normal accepted values. Because of the relatively short distance between the turbine and the tailrace surge tank and the deep unit setting, there should not be any problems with draft tube column separation.

As discussed in Section 12.16 for Watana, the units will be capable of operation from about 50 to 100 percent load. Considerations for draft tube surges and corresponding power swings as mentioned for Watana also will apply to Devil Canyon.

As with Watana, the relationship between generator natural frequency and the possible draft tube surge frequency is desirable and will require study in later design stages. Because of the high capacity factor for the Devil Canyon units, part load operation for these turbines is not as critical as at Watana; therefore, the possibility of problems with power swings is somewhat less of a concern than at Watana.

(c) Generators

The four generators in the Devil Canyon powerhouse will be of the vertical shaft, overhung type directly connected to the vertical Francis turbines.

The generators will be similar in construction and design to the Watana generators and the general features described in Section 12.16 for the stator, rotor, excitation system, and other details which apply for the Devil Canyon generators.

The rating and characteristics of the generators are as follows:

Rated Capacity:

180 MVA, 0.9 power factor with overload rating

of 115 percent.

Rated Power:

162 MW

Rated Voltage:

15 kV, 3 phase, 60 Hertz

Synchronous Speed:

225 rpm

Inertia Constant:

3.5 kW - Sec/kVA

Short Circuit Ratio:

1.1 (minimum)

Efficiency at Full Load: 98 percent (minimum)

(d) Governor System

A governor system with electric hydraulic governor actuators will be provided for each of the Devil Canyon units. The system will be the same as for Watana.

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 87. 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 in Table 13.3.

A single pump intake will be located in the surge chamber with an 8-footdiameter 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

- 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 governor 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.

13.17 - Accessory Electrical Equipment

(a) General

The accessory electrical equipment described in this section includes the following main electrical equipment:

- Main generator step-up 15/345 kV transformers;

- Isolated phase bus connecting the generator and transformers;

- 345 kV oil-filled cables from the transformer terminals to the switchyard;

- Control systems; and

- Station service auxiliary ac and dc systems.

Other equipment and systems described include grounding, lighting system and communications.

The main equipment and connections in the power plant are shown in the Single Line Diagram, (Plate 88). The arrangement of equipment in the powerhouse, transformer gallery, and cable shafts is shown in Plates 85 to 88.

(b) General Design Considerations for Transformers and HV Connections

(i) General

Twelve single-phase transformers and one spare transformer will be located in the transformer gallery. Each bank of the three single-phase transformers will be connected to one generator by isolated phase bus located in bus tunnels. The HV terminals of the transformer will be connected to the 345 kV switchyard by 345 kV single-phase oil-filled cables installed in 800-foot long vertical shafts. There will be two sets of three single-phase 345 kV oil-filled cables installed in each cable shaft. One additional set will be maintained as a spare three-phase cable circuit in the second cable shaft. These cable shafts will also contain the control and power cables between the powerhouse and the surface control room, as well as emergency power cables from the diesel generators at the surface to the underground facilities.

As described in Section 12.18 for the Watana power plant, a number of considerations led to the choice of the above optimum system of transformation and connections. Different alternative methods and equipment designs were also considered. In summary, these are:

- One transformer per generator versus one transformer for two generators;

- Underground transformers versus surface transformers;

- Direct transformation from generator voltage to 345 kV versus intermediate step transformation to 230 kV or 161 kV, and thence to 345 kV;
- Single phase versus three-phase transformers for each alternative method considered; and
- Oil-filled cable versus solid dielectric cable or SF₆ gas-insulated bus.

Reliability considerations are based on the general reliability . requirements for generation and transmission described in Section 15 regarding the forced outage of a single generator, transformer, bus or cable in addition to planned or scheduled outages in a single

contingency situation, or a subsequent outage of equipment in the double contingency situation. In the first case, the system should be capable of readjustment after the outage for loading within normal ratings and, in the second case, within emergency ratings.

The one transformer per generator scheme was selected since the operation of the Devil Canyon power plant will essentially be a continuous base-load type operation; also the smaller number of units at Devil Canyon compared to Watana will allow a transformer gallery of reasonable length for a unit generator-transformer scheme.

As at Watana, transport limitations for both dimensions and weight will preclude the use of the larger size three-phase transformers; hence, single-phase transformers will be used. One distinct advantage of single-phase transformers is that a spare transformer can be provided at a fairly low incremental cost.

For the same reasons as given in Section 12.18 for Watana, surface transformers and the double-step transformation scheme (15/161 kV generator-transformer, 161 kV cable and 161/345 kV auto-transformer at the switchyard) were ruled out. The direct transformation (15/345 kV) scheme with 345 kV oil-filled cables is considered a better overall scheme.

(c) Main Transformers

The transformers will be of the single phase, two-winding, oil-immersed, forced-oil water-cooled (FOW) type. A total of twelve single-phase transformers and one spare transformer will be provided, with rating and characteristics as follows:

Rated capacity: 70 MVA
High Voltage Winding: 345/ 3 kV, grounded Y
Basic Insulation Level
(BIL) of HV Winding: 1300 kV
Low Voltage Winding: 15 kV, Delta
Transformer Impedance: 15 percent

The design and construction details are identical to the transformers at Watana as described in Section 12.18.

(d) Generator Isolated Phase Bus

Isolated phase bus connections will be located between the generator and the main transformer. The bus will be of the self-cooled, welded aluminum tubular type with design and construction details generally similar to the bus at the Watana power plant. The rating of the main bus is as follows:

Rated current: 9,000 amps
Short circuit current
momentary: 240,000 amps
Short circuit current
symmetrical: 150,000 amps
Basic Insulation Level
(BIL): 150 kV

(e) 345 kV Oil-Filled Cable

The general design considerations leading to the choice of the 345 kV oil-filled cable for the connections between the transformer HV terminals and the 345 kV switchyard at the surface are the same as described in Section 12.18 for the Watana plant.

The cables will be rated for a continuous maximum current of 400 amps at 345 kV + 5 percent. The cables will be of single-core construction with oil flowing through a central oil duct within the copper conductor. The cables will be installed in the 800-foot cable shafts from the transformer gallery to the surface. No cable jointing will be necessary for this installation length.

(f) Control Systems

(i) General

The Devil Canyon power plant will be designed to be operated as an unattended plant. The plant will be normally controlled through supervisory control from the Susitna Area Control Center at Watana. The plant will, however, be provided with a control room with sufficient control, indication, and annunciation equipment to enable the plant to be operated during emergencies by one operator in the control room. In addition, for the purpose of testing and commissioning and maintenance of the plant, local control boards will be mounted on the powerhouse floor near each unit.

Automatic load-frequency control of the four units at Devil Canyon will be accomplished through the central computer-aided control system located at the Watana Area Control Center.

The power plant will be provided with "black start" capability similar to that provided at Watana, to enable the start of one unit without any power in the powerhouse or at the switchyard, except that provided by one emergency diesel generator. After the start-up of one unit, auxiliary station service power will be established in the power plant and the switchyard; the remaining generators can then be started one after the other to bring the plant into full output within the hour.

As at the Watana power plant, the control system will be designed to permit local-manual or local-automatic starting, voltage adjusting, synchronizing, and loading of the unit from the powerhouse control room at Devil Canyon.

The protective relaying system is shown in the main single line diagram, Plate 88, and is generally similar to that provided for the Watana power plant.

(g) Station Service Auxiliary AC and DC Systems

(i) AC Auxiliary System

The station service system will be designed to achieve a reliable and economic distribution system for the power plant and the switch-yard and surface facilities. The auxiliary system will be similar to that in the Watana power plant except that the switchyard and surface facilities power will be obtained from a 4.16 kV system supplied by two 5/7.5 MVA, OA/FA, oil-immersed transformers connected to generators Nos. 1 and 4, respectively. The 4.16 kV double-ended switchgear will be located in the powerhouse. It will have a normally-open tie breaker which will prevent parallel operation of the two sections. The tie breaker will close on failure of one or the other of the incoming supplies. The 1400 hp compensation flow pumps will be supplied with power directly from the 4.16 kV system. Two 4.16 cables installed in the cable shafts will supply power to the surface facilities.

The 480 V station service system will be exactly similar to the Watana system described in Section 12.18, and will consist of a main 480 V switchgear, separate auxiliary boards for each unit, an essential auxiliaries board, and a general auxiliaries board. The main 480 V switchgear will be supplied by two 2000 kVA, 15,000/480 V grounded wye sealed gas dry-type transformers. A third 2000 kVA transformer will be maintained as a spare.

Two emergency diesel generators, each rated 500 kW, will be connected to the 480 V powerhouse main switchgear and 4.16 kV surface switchboard, respectively. Both diesel generators will be located at the surface.

An uninterruptible high-security power supply will be provided for the supervisory computer-aided plant control systems.

(ii) DC Auxiliary Station Service System

The dc auxiliary system will be similar to that provided at the Watana plant and will consist of two 125 V dc lead-acid batteries. Each battery system will be supplied by a double rectifier charging system. A 48 V dc battery system will be provided for supplying the supervisory and communications systems.

(iii) Black Start Capability

As at the Watana power plant, the Devil Canyon power plant will be provided with "black start" capability which will enable the plant to start up in a completely "blacked out" condition of the power plant and/or the power system.

(h) Other Accessory Electrical Systems

The other accessory electrical systems including the grounding system, lighting system, and powerhouse communications system will be similar in general design and construction aspects to the systems described in Section 12.18 for the Watana power plant.

SUSITNA HYDROELECTRIC PROJECT Watana Gate Equipment Weights

February	12,	1982
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2.1	No.	Total Wt. (lb.)
ACCOUNT 331 - POWER PLANT STRUCTURE		
.1 Powerhouse		
.11C Mechanical		
Draft Tube Gates Draft Tube Guides	4 6	280,000 168,000
ACCOUNT 332 - RESERVOIRS, DAMS & WATERWAYS		
.2 Diversion		
.21C Mechanical		
Upstream Lower Gates Gate Equipment Upstream Upper Gates	2	1,050,000
Gate Equipment Trashracks	2 1	592,000 306,000
Downstream Lower Outlet Stoplog Guides Stoplogs Including Follower	1 1	11,000 297,000
Downstream Upper Outlet Stoplog Guides Low Level Release	1	18,000
Slide Gates Including Steel Liner	9	3,300,000
.5 Tunnel Spillway		
.51C Mechanical		
Inlet Trashracks/Guides Gate Equipment Stoplog Guides	1 2 2	250,000 690,000 60,000
Outlet Fixed Cone Valves (6 plus 1 spare) Ring Follower Gates Steel Manifold Liner Miscellaneous Mechanical Equipment Miscellaneous Electrical Systems	1 6	330,000 960,000
.52 Main (Chute) Spillway		
.52C Mechanical Gate Equipment Stoplog Guides Stoplogs Including Follower Miscellaneous Electrical	3 3 1	1,320,000 13,000 147,000

SUSITNA HYDROELECTRIC PROJECT Watana Gate Equipment Weights

Febr		12,	71.6	982
P CITY	124.	1 /		45.
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	No.	Total Wt. (1b.)
ACCOUNT 332 - RESERVOIRS, DAMS & WATERWAYS		
"6 Power Intake		
.61C Mechanical		
Trashracks/Guides Gate Equipment Bulkhead Gate Guides Bulkhead Gates Including Follower Shutter with Guides Ice Bulkhead with Hoist Ice Bulkhead Guides Intake Service Crane	24/6 6 6 1 18/6 6	1,126,000 1,254,000 186,000 105,000 658,000 540,000 360,000
.7 Surge Chamber		
.71C Mechanical		
Stoplog Guides Stoplog Including Follower	2 1	200,000 564,000
.9 Tailrace Works		
.91C Mechanical		
Stoplog Guides Stoplog Including Follower	1	16,000 235,000

SUSITNA HYDROELECTRIC PROJECT Watana Permanent Town Listing

February 12, 1982

2.2			QUANTIT	Y
ITEM	UNIT	SIZE & DESCRIPTION	WATANA	DC
Buildings				
Single Family Home 3 BR Single Family Home 4 BR Family Condominium 2 BR Family Condominium 3 BR Family Condominium 4 BR Apartments 1 BR Apartments 2 BR School Gymnasium Swimming Pool Recreation Center Store Fire Station Communication Building Generating Station (Emergency) Dispensary Gas Station	ea ea ea ea ea ea ea ea	1,600 sf 1,900 sf 1,200 sf 1,400 sf 1,600 sf 720 sf 1,000 sf 12,000 sf 10,000 sf 8,000 sf 6,000 sf 1,200 sf 600 sf 600 sf	5 5 15 40 5 12 11 1 1 1 1 1 1	1 1 4 9 2 3 2
Site Work				
Roadway-34' W/ Gravel	1f	Gravel surface	5,000	
Surface Parking Area-Town Center	sf	Gravel surface	90,000	ing the same
Parking Area-Dwellings	sf	Gravel surface	130,000	
<u>Utilities</u>				
Water Main Water Main, Return Water, Service	lf lf lf	6-inch diameter 6-inch diameter Loop connections	4,200 4,200 6,000	 1,400
Connections Sewer Main Sewer, Service Connections	lf. If	12-inch diameter	4,200 3,000	700
Electric Service Transformers Telephone Service Water Intake, Pump House & Pump	lf ea lf ls	Buried In Tsusena Creek	7,000 20 7,000 1	1,700 5
Electric Service to Pump House	lf		2,000	
Transformer at Pump House	ea			
Sewage/Water Treat- ment Building	ea		1	
Sewage Treatment Plant Water Treatment Plant Sewage Outfall Line Water Supply Line	Is Is If If	50,000 gpd 50,000 gpd 6-inch diameter 4-inch diameter	2,000 2,000	

-40-

			and the state of t
	SUSITNA HYDROELECTRIC PROJECT Devil Canyon Gate Equipment Weights		
	February 12, 1982		
		No.	Total Wt. (16.)
	ACCOUNT 331 - POWER PLANT STRUCTURE		
•	.1 Powerhouse		
	.11C Mechanical		
	Draft Tube Gates Draft Tube Gate Guides Draft Tube Crane Pump Intake Trashracks & Guides	2 4	206,000 140,000 54,000
	Pump Outlet Stoplogs/Guides	1	20,000
	ACCOUNT 332 - RESERVOIRS, DAMS & WATERWAYS		
	.2 Diversion Tunnels/Cofferdams .21C Mechanical		
	Upstream Gate Gate Equipment Downstream Outlet Stoplog Guides	2	570,000
	Stoplogs Including Followers	_	11,000 as Permanent Spillway)
	.5 Spillway Valves (In Dam)		
	.51C Mechanical		
	Trashracks/Guides Bulkhead Gate Guides Bulkhead Gates & FollowersGantry Crane	1 1 2	654,000 386,000 142,000
	Fixed Cone Valves (7 plus 2 spare) Ring Follower Gates (7) Miscellaneous Mechanical Equipment	1 1	1,175,000
	.52 Main (Chute) Spillway		
	.52C Mechanical		
	Gate Equipment Stoplog Guides Stoplogs Including Followers	3 3 1	1,248,000 42,000 167,500
	.6 Power Intakes		
	.61C Mechanical		
	Trashracks & Guides Bulkhead Gate Guides Bulkhead Gates & Followers Intake Gantry Crane	4 4 1	258,000 92,000 94,000
	Intake Gate Equipment Miscellaneous Electrical	4	784,7000
	.9 Tailrace Works		
	.91C Mechanical		
	Stoplog Guides Stoplogs Including Follower	1	13,000 (As per Watana)
4.1	- 트립워 경기를 하는 말이 되었다. 사람이 있습니다. 그는 일이 말이 되었다는 사람이 있는 것이다는 것이다.		

SUBÎTNA HYDRÛELECTRIC PROJECT FEASIBILÎTY BTÛDY EBJIHATE — ACRÉS AHEI WATANA — "REVISION 4"	RICAN	A STATE OF THE STA		Later two two pages of the special distriction is within	date: 12-FE file: WAEBS page: 2	
	QUANTITY	UNITS	UNIT_PRICE_	AMOUNT	TOTAL	REHARKS
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ROCKBOLTS 1° 0 12'	390 190	EACH_				3/4
STEEL HESH	19:700	8F	بالزندست والواجه ويهوجه والمراجع ويستنيسنا للمستحدث والمستحدد والمراجع مهينا المحاور			3/4
.117 DRAINAGE						
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HOLES (POWERHOUSE CROWN) .118 STRUCTURAL - HISC STEELWORK	28,500	LF				w pier rate y i john s
POWERHOUSE & DRAFT TUBE STRUCTURAL STEEL/CRANE RAILS		LB		-		
ARCHITECTURAL		4.0				
POWERHOUSE		***	o a dominio de describir de destrucción () . A degli de successión () . A decembración ()	ngay 4 to 4 days and graph and a second		
ARCHITECTURAL	4	Ls				
.11C HECHANICAL			**************************************			
DRAFT TUBE GATES DRAFT TUBE GATE GUIDES		SETS BETS	-	-		3
DRAFT TUBE CRANE		82.18 L8				
12 ACCESS TUNNELS & PORTALS						
.121 EXCAVATION						
TUNNELS - ROCK	TA 656	***				
MAIN TUNNEL TRANSFORMER DALLERY TUNNEL	30,250 17,750	CY CY	· · · · · · · · · · · · · · · · · · ·	-		•
GROUTING GALLERY TUNNEL	1,900	CY				
SURGE CHAMBER ACCESS TUN	7,250	ĊŸ				3
PENSTOCK ACCESS TUNNEL	61,500	CY				3
PENSTOCK ELBOW ACCESS TUN	15,000	£,				3
ACCESS SHAFT TUNNEL	1,300			<u> </u>		3/4
CONNECTOR TUNNEL PORTALS	1,900	CY				
OVERBURDEN	6,000_	ĊY				
HOROTE HE TO THE ROCK OF THE PROPERTY OF THE	3,000	CY	managanagan kaphamanaja i - a i dahanaga di karan da ang ia sa i i i injanta an	in confidence of the state of t	tan a version and general territories and the second secon	mer yez i mantik kali di salah di di di kali kali di di di
.123 SURFACE PREPARATION						
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PENSTOCK TUNNEL SLAB	53,100 65,200	SF SF				3
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INCLINED	2,100	SF				3/4
.124CONCRETE & SHOTCRETE	maii polanda mark jiha tereji e konade je bi skrjidajih slov elje njim se sloven	وريانية لورث الإشهابية والمتعادلة والمتعادلة المتعادلة ا	المرابع المعادر والمجاد المرابع المعادرة المعادرة المعادرة المعادرة المعادرة المعادرة المعادرة المعادرة المعادرة	1444 · 4 · 44 · 44 · 44 · 44 · 44 · 44	and parameters and the state of	and the state of t
HAIN PORTAL		, AU				
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conc slab hain tunnel	1,750	CY				3

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SUBITHA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTINATE - ACRES AMERICAN. WATANA - "REVISION 4"

date: 12-FEB-82 __file: WAEBS4.DAT/70 __pade: 3

ITEM_DESCRIPTION	QUANTITY,	UNITS	UNIT_PRICE	AHOUNT	TOTAL	REHARKS
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CONC OVERBREAK HAIN TUN 6.	1,000	CY	N is a supplication of a supplication of the s	esterios, pajoro persona tido es as estas	and the second s	T
CONC PLUGS PENS ELBOW ACC	15,000	CY				3/4
REINFORCING STEEL	70	TON	record to the continuous continuous contraction of the contraction of	A. mark		3/4
MAIN TUNNEL 2' SHOTCRETE	20,100	8F				3
TRANSF GAL 2" SHOTCRETE	7:100	SF				3
BURGE CHAM ACC 2 SHOTCRETE	3,900	<u> </u>	B may may remaine biographic and plantage and plantage are a majority. May the com-	· w m · na · w www.memmer brogies wertestrates	name and a comment of and polytery desired and and and and and and and and and an	3
PENSTOCK ACC 2' SHOTCRETE	24+700	9F				
PENS ELROW ACC 2º SHOTCRETE	7,100	SF				3
ACCESS SHAFT 2 SHOTCRETE	300	SF_	angantan dalap 1904 1964, dapat di Sarani andara pinanananana di Sarani da da ana	and these improvincing the holds have a representable to the		
GROUTING GAL 2º SHOTCRETE	800	SF				3/4
CONNECTOR TUN 2º SHOTCRETE	800	8F				3/4
.125SUPPORT_& ANCHORS			na na adala, etteka, kiska, mainininininininin kisa sali paase eselen		 	
HAIN TUNNEL	4 505					
ROCKBOLTS 1° 2 12'	1,200	EACH				
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STEEL SUPPORT	66	TON				
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HAIN TÜNNEL PORTAL ROCKBOLTB 1° 9 15'	50	EACH	Capture States represent the second services of the second			and the state of t
TRANSFORMER GALLERY TUNNEL	30	CHLM				
ROCKBOLTS 1" 9 12'	410	EACH				
ROCKBOLTS 1. 6 5.	70	EACH	The second secon	فيستناه والمتاه ويتباه والمتناه والمتناه والمتاه والم		
STEEL SUPPORT	24	10H				3/4
STEEL NESH	22,500	SF.				3/ 7
GROUTING GALLERY TUNNEL			and a product in product on a contract of the	to a service of the second of		•
ROCKBOLTS, 3/4° 9 6'	160	EACH				3
STEEL BUPPGRT	2	TON				3
STEEL HESH	160	8F	And a second property of the second s	- Andrew - Market and Mark Mark Annual Labor 1: 28 Annual Labor		3/4
BURDE CHAMBER TUNNEL						
ROCKBOLTS 1º 9 12'	230	EACH				3
ROCKBOLTS 1º 9 9'	50	EACH				3
STEEL SUPPORT	14	TON				3
STEEL HESH	12,050	SF	ingang animan in handa pinangan pagan maga pa	r aliin ya ar angalaga i angalaganan katan jinan di sangalagan angalagan katan di sangalagan di sangalagan di s		3
PENSTOCK ACCESS TUNNEL						
ROCKBOLTS 1 8 12'	1,430	EACH				3
ROCKBOLTS 1: 9 9	240	EACH			gan sy. Bee de deue despendingsy sign	and Bangara services and the second
STEEL SUPPORT	58	TON				3
STEEL HESH	77,500	8F				3
PENSTOCK_ELBOW_ACCESS_TUN	······································	proposition of the property of	California a Patrick in America and America in the other financial in the state of			and the second s
ROCKBOLTS 1: 0 12'	420	EACH				
ROCKBOLTS 1º 0 9'	120	EACH				
STEEL SUPPORT	30_	TON			بالموجيدين والمشجور	<u></u>
STEEL MESH	22,500	8F				
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ROCKBOLTS 1º 0 12'	50	EACH		and the second s	and the last sensitiving of the out of	
a taran di binggi ti di binasa at ma ngungungung 18 mi g 7 mg 77 mga at mangunggan kalanggan kan menggan beranggan Mangunggan binasa di binasa dan menggan panggan panggan panggan panggan panggan panggan panggan panggan pangga	20	EACH				3

FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN

WATANA - "REVISION 4"

Badel 4 ITEH_DESCRIPTION QUANTITY UNITS UNIT PRICE ANOUNT TOTAL 9 000 TON STEEL SUPPORT STEEL MESH 930 SF CONNECTOR TUNNEL ROCKBOLTS 15 # 9' EACH 160 STEEL SUPPORT 2 TON STEEL HESH BF ARCHITECTURAL PORTAL DOORS (2 SETS) EACH _HECHANICAL_ VENTILATING BYSTEH (INCL IN 335,16) 13_ ACCESS SHAFT .131 EXCAVATION 3/4 ROCK 13,700 CY SURFACE PREPARATION 64,000 SF SHAFT CONCRETE & SHOTCRETE 3,350_ ... CONCRETE_LININO___ CONCRETE OVERBREAK 6" 1,220 CY SUPPORT & ANCHORS ROCKBOLTS 3/4" 8 6' STRUCTURAL - HISC STEELWORK EACH .139 HISC STEELWORK TON ARCHITECTURAL CONTROL BUILDING (INC IN 331.2 CONT BLDG) .13C HECHANICAL **ELEVATORS** 114 FIRE PROTECTION HEADTANK .141 EXCAVATION ROCK 1,150 CY .143 SURFACE PREPARATION HEADTANK. 2.800 CONCRETE & SHOTCRETE 250 CONCRETE CONC OVERBREAK_6' _CY_ 45 REINFORCING STEEL SUPPORT & ANCHORS ROCKBOLTS 1' @ 12' ROCKBOLTS 1' # 9' EACH 1,200 BF STEEL SUPPORT_ TON .148 STRUCTURAL - MISC STEELWORK 3 HISC STEELHORK TON

date: 12-FEB-82

SUSITNA HYDROELECTRIC PROJECT

14C___HECHANICAL

PIPING & VALVES-SEE 335.12

date: 12-FEB-82 file: WAEB84.DAT170 rase: 5

HDESCRI	PTION	QUANTITY	UNITB	UNIT PRICE	ANOUNT	TOTAL REHARKB
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	US TUNNELS	recorded by an experience of the state of th	- The second december and second seco	THE THE PART OF SERVICE STATES OF SERVICE AND SERVICE SERVICES.	* nationalistic No. 5 - 1204 (abit (project)	
.151	EXCAVATION		· · · · · · · · · · · · · · · · · · ·			
	ROCK HORIZONTAL	2,700	CY CY	arrannon arras gongistydigadi giyarranaganiya a mad dan 9 vo	-	<u> </u>
a Šnes	ROCK INCLINED	1,300	C)			
.153		7 100	8F			3/4
rened Silitating Salatinations for Annie sin.	TUNNELS CONCRETE & SHOTCRETE		iomici ci nt <mark>ol</mark> e e	THE REPORT THE WAY WAS A FOR A FOR	en e a si si se e mir si daza e benegenenicali sas .	
.154	CONCRETE SLAB	350	CY			3/4
	2* SHOTCRETE	2,200	9F			3/4
	CONCRETE OVERBREAK 12"	250	CY	The second secon		3/4
	REINFORCING STEEL	18	TON			3/4
	ROCKBOLTS 1º 8 25'	. 60	EACH		1	3
	ROCKBOLTS 1º # 12'	140	EACH			3/4
	ROCKBOLTS 1° Q 9'	50	EACH_		intina maganta taka mandali kanamana dari kanali kalaya da pagantak	3/4
	STEEL HESH	8 800	BF			.3/4
	STEEL SUPPORT		TON			
	RANSFORMER_GALLERY				the same of the sa	The second se
, 161	EXCAVATION	70.000				
4.24	ROCK	30,250	CY			
	BURFACE PREPARATION TRANSFORMER GALLERY	19,700	8F			3/4
.164	CONCRETE & SHOTCRETE	777700				
1207	CONCRETE BASE SLAB	21600	CY			3/4
niyakang ang manakanang ir filag ir sair ye nagana ni siya n	REINFORCING STEEL	145	TON	ninalistinina — na goriju knazvit strikimi jeji y ne nis - a gorindas - nis — 16 (20 stan	ge, aga affiliafir a Amir'artage, igi saterne (ig. 1. artain filiase); i a	3
	CONC OVERBREAK 12.H/6.V	700	CY			
.165	SUPPORT & ANCHORS	•				
	ROCKBOLTS 1' 8 25' HY	570	EACH			3
ar barita	ROCKBOLTS 1' @ 15'	280	EACH			그 그는 이 사람들이 되어 있었다.
	BIEET HERR	19,800	8£ .	Note this territorie is districtly supply or a large of the control of the contro	a men an mendikanan dipar salaman	a province i transcription de des principales de des principales de la constitución de la
· ·	STEEL SUPPORT	28	TON			
.167		6 76A				
4.75	HOLES (IN BALLERY CROWN)	8,300	LF .	minimum and the state of the st	tande disconnect and insurant consideration of the constraint of t	
1171	ABLE SHAFTS EXCAVATION					
	ROCK	3,400	£Y			
.173	SURFACE PREPARATION	L. C. S. V. T. V. Steel and Linear Section 1979.		and the second of the second o	im. prid di me i servenia i didappi digalaj imatinganja dan	arangangan at tanah at andan mengangan sa selahan - anda - an andan selahan sa mandah selah 1972. Nasa salam
	BHAFTS	41,400	8F			3/4
.174						
······································	CONCRETE LINING	1:040	. CY	er o designativa de la companya de la companya de participa de la companya de la companya de la companya de la	And the statement is the statement of th	3/4
	CONCRETE OVERBREAK 6°	800	ĆÝ			
	SUPPORT & ANCHORS	The state of the s	and an experience are an experience as a second	Sample of Sample	والمشاهدي ووسوانوا والوادانوو	n
	ROCKBOLTS 3/4° 8 6'	650	EACH			3/4
.178	STRUCTURAL - MISC STEELWORK					
	MISC STEELWORK	18	TON			

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SUBITHA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AN WATANA - "REVISION 4"	date: 12-FEB-82 11161 WAEBS4.DAT170 Pade: 6					
LIEM_DESCRIPTION	<u>QUANTITY</u>	UNITS	UNIT PRICE	TNUONA	TOTALF	EHARKS
				¥ 000	\$ 00b	
.179. ARCHITECTURAL		ng ip operation and the constant of the consta	e ko rres e ma sigo e de la desta atrosa e la digue de recede la la gr	å ech son instrume principale, sekuja blad djelag, s	Egypt v. N. 1984 ill givens Street, representation of the College	and any and a second s
ENCLOSURES	1	LB				
.17C HECHANICAL			and the state of t	r - Rate ammendation of all constructions and the State Stat		
MANHOIST	2	ÈACH				
110 DEWATERING (DURING CONSTRUCT)						
DEWATERING COMER PHOSE		L8	an a receiption this the train of the challenges as a second series	a area organic por Area place.	\$ 1000000000 100 1000 10000000 100000000	
.19 INSTRUMENTATION						
.i91 INSTRUMENTATION						
INSTRUMENTATION		1.8				
.2 Hisc. Buildings & STRUCTURES		olitika dia angalaga. Angalaga				
CONTROL BUILDING		LB_	المراجعة المستعدد المراجعة المراجعة المستعدد المستعدد المراجعة الم	eringenetische eringenetische	makundaga one for bear with the same and a second	nitring and an excited the second second
.3 PERHANENT VILLAGE (INCLUDED IN 63.5)		1				
332 KESERVOIR. DANS & WATERWAYS			Capacita de Capaci	****		
1 RESERVOIR						
.11 CLEARING		بدينين والمساوية	ends annet i me septet man dense transportation en arrivat			**************************************
CLEARING	37,500	ACRE				5
.2 DIVERSION TUNNELB/COFFERDAMS						
21 _ DIVERSION_TUNNELS/PORTALS =						
(INCL COMBINED TAILRACE/DIV- ERSION TUNNEL & PORTAL -						
SEE 332.9)						
.211 EXCAVATION			to ann agustus it mandrigh it played frits common viges; addressibed t			
UPPER TUNKEL						
ROCK	221,000	CY				<u> </u>
LOWER TUNNEL	### ####					•
ROCK	208,000	CY CY				3 3
UPSTREAM UPPER PORTAL	700		e, auch impelingunts og skille des skillerjærdes for 100 graft og de er og			J en market characteristic spices
ROCK USEABLE (FACE ONLY)	11,200	CY				3
UPSTREAM LOWER PORTAL (INCL						-
HOST EXC FOR UPPER PORTAL)	and the state of t		na na naprojina menginingki di napiti kang manadari na sianda tang manadari na sianda saga ang manada na siand M	the same and the same of the s		Character principles and property stated lifetimes
ROCK USEABLE	96,300	CY				3
ROCK WASTE	21,200		en de la companya de La companya de la co	na anas e sa sesence de la	t , taloguas taujo d'aparis provinciamentes, e	3
DOWNSTREAM PORTALS						
OVERBURDEN-DRY	17,000	CY				3/4
ROCK USEABLE	120,000	CY.	# in the second section is a second s	de grant de la martina de la m		3/4
ROCK WASTE EHERGENCY RELEASE CHAMBERS	28,000	· ·				9/9
EXC CONC FOR PLUGS	1,800	ĆŸ_				4
DATE CHAMBER	4,700	CY	STATEMENT STATEMENT OF THE STATEMENT	e an included and in	naka ang ang ang ang ang ang ang ang ang an	3/4
ACCESS TUN TO BATE CHAMBER						- ·
ROCK	19,100					1

SUSITNA HYDROELECTRIC PROJECT | FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN | WATANA - "REVISION 4"

date: 12-FEB-82 file: WAE884.DAT:70 rage: 7

1_DESCRIPTION	QUANT'ETY	UNITE	_UNIT_PRICE	AHOUNT		REMARKS
				♦ 000	. 4 000	
.212 FILL	ه - اهم مغند تا پروانځ په بنده معند د پر په در مستسبه د وس	n miritas , yazit da ita da akaminingan kumit 💎 n 😘 aya 📡 a	and made in the second supplier of 100 the 164 colors to the	n nga sa salah sanga nanga	nyika dang distrika dili sating in umbumpa	ari _{de} ngan mengangan pelaban da <u>n kemangan pelaban mengan pengangan pelaban pelaban pelaban pelaban pelaban pe</u>
TEHPOPARY COFFERAN TO CON-						
STRUCT_UPSTREAM_PORTALS	23,000	CY_	and the state of t	aria a, aigi a, se ser ser alianas paralamentaria del a secución ser		
.213 SURFACE PREP/GROUTING						
UPSTREAM UPPER FORTAL	+ AAA	ВF				
HORIZONTAL	3;200 8;600	BF	ekan mengalapagan palawa nabahan dan menantan salawa tahun m	The transfer of the state of th	لر حوث المراجع والإرافة للوسوسة بين المحمود الإستان والمحمود والإرافة المحمود والإرافة المحمود المحمود المحمود	
" INCLINED	87800	or.				
UPSTREAN LOWER PORTAL HORIZONTAL	1,300	8F				되겠다.
INCLINED	14,700	8F	and the second s			3
DOWNSTREAM UPPER PHRIAL	1777VV	91				
HORIZONTAL	6,100	SF.				
INCLINED	20,500	8F		با دری بغویه - آلفنده شمیمسیون استنصب کمیلاودی برس	سخطيماني منينسينين ومنينسينين ج	
DOWNSTREAM LOWER FORTAL	207000					
HORIZONTAL S	600	SF_				
INCLINED	5,800	8F				3
GROUT UPPER TUNNEL PLUES						
DRILL HOLE8	4,100	LE.				3
CEHENT	820	CF				3
GROUT LOWER TUN PERH PLUG						
DRILL HOLES	2,050	LE_				3
CEMENT	410	CF				
214 CONCRETE & SHOTCRETE						
UPPER TUNNEL			man, del firmano de la della della del segmenta del constitución de la	S.A Silvano della manifesi simplesima e apparata	بالمستريس والمستريد والمست	Control of the Contro
CONCRETE LINING	42,400	CY				
CONC LINING OVERBREAK 6°	10,200	CY				
. 2º SHOTCRETE	56,000	SF	and the second s	offe falls (Epithology) and tamper pleased union; — Landay — Neighborn at		
REINFORCING BTEEL	24	TON				
LOWER TUNNEL	37,600	ĊY				
CONCRETE LINING	10.000	CY	and the second s	the second contract the second		and the state of t
CONC LINING OVERBREAK 6" 2" SHOTCRETE	57,900	SF				
CONCRETE FOR PLUB	6,200_	EY.				
REINFORCING STEEL	24	TON	anne somette ann an deuts de chi que proper apareigé en la	a salama A. S. marak at rassamble between 19 manufal	i de aprovida e e e e e e e e e e e e e e e e e e e	3/4
UPSTREAM UPPER PURTAL						
CONCRETE HEADWALL	3,200	CY				
CONCRETE LINING	1,300	CY	The state of the s	A series of the commence of Contract	A 10.00 ACMUSENANT COMP SERVICE	3
CONCRETE SLAB	750	CY				374
CONCRETE PIERS	800	CY		ang		3
CONCRETE OVERBREAK 12*H/6*V	300	CY				
REINFORCING STEEL	400	TON				3/4
UPSTREAM LOWER_FORTAL	e a signe super response de state de paperiose experience	•	en e	La trajar de la marcina de la colonia de la marcina		milit military applied the registerious and alternative to a complete to 2000 and a particular
CONCRETE HEADWALL	4+500	CY				그 선생님 그 그 얼마를 되어
CONCRETE LINING	3,000	CY				3/4
CONCRETE SLAP	300	C <u>Y</u> .	रक-क अरुकार कर द्वासकार का का उन्हार करें क	State of the second of the second second second second	tana dan maturup 1 dan 1 d	Turkening a second contract that we have
CONCRETÉ PIÈRS	700	CY				

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE.—ACRES AMER WATANA — "REVISION 4"	ican	· Carrier de la carrier de			date: 12-F _file: WAEB _page: 8	
IJEH_DESCRIPTION	QUANTIİY	etinu	UNIT_ PRICE	AHOUNT	TOTAL	REHORKS
				\$ 000	♦ 000	
CONCRETE OVERBREAK 12"H/6"V	350	CY	The state of the s	The transfer of the same and the second seco		3
REINFORCING STEEL DOWNSTREAN UPPER PORTAL	008	TON				3/4
CONCRETE HEADWALL	500	CY	al deminus na fie i deminus modernatural tres men kritzerratio das a desta m	na kuria sukebiriri s. silaman birrank darimbar gelamininkan	والمدارية والمستنبة والمستنبية والمستنبية والمستنبة والمستنبة والمستنبة والمستنبة والمستنبة والمستنبة والمستنبة	3
CONCRETE SLAR	100	ČÝ				
CONCRETE OVERBREAK 12°H/8°V	100	CY_				
REINFORCINO STEEL	40	TON	The state of the s	NACE OF RESIDENCE OF SHAPE AS A SECOND STATE OF SHAPE SHAPE STATE OF SHAPE	t meaning product productions are a second	3
DOWNSTREAM LOWER PORTAL						
CONCRETE HEADWALL	2,500	CY_	ange danie pierwys , go timpo di depinion . The Spiritua, as immercation	* • ****		3.
CONCRETE SLAB	100	CY				3
CONCRETE OVERBREAK 12"H76"V	150	CY				
REINFORCING STEEL	170	ton_	te per appropriate deposition of the contract	tipe printer to their semilarity, although the sprinter of	-	The state of the s
DOWNSTREAM FLIP BUCKET	800	CY				
CONCRETE SLAB CONCRETE WALLS	2,300	CY				그릇이면 그래 그는 그는 것 같다.
CONCRETE INVERT	1,200	ČÝ	mandali agricultura di 18 m at 26 ° 4 ° ating manadali antica di tanggan pinagan di tanggan di tanggan pinagan di tanggan pinagan di tanggan pinagan di tanggan di tang	the state of the s		
CONCRETE OVERBREAK 12 H/6"V	410	. ČÝ				3/4
REINFORCING_STEEL	280	TON				
DOWNSTREAM RETAINING WALL	The state of the s		Anna and a second of the secon	na ni) - mini, (do nim - - minimistr di 1 maril 21 il 1 describra d	a parametra (de la contració de la circo de la composição de la composição de la composição de la composição d	and the second s
CONCRETE SLAP	200	CY				3
CONCRETE WALLS	2,000	CY_				_3
CONCRETE OVERBREAK 12.4/6.V	110	CY				
REINFORCING STEEL	90	TON				원 목 보인 15 학생은 10 시간
EHERDENCY RELEASE CHANBERS	*	-	r ir saide syklautinajaintaja yannyksi lähtenijatta 16 kiin. altai kalaisinasiaja	esperato caba di rima despesa dell'Igent last debise, pell'ambiec		
CONCRETE PLUG	15,300	ČΫ				
4° SHOTCRETE	2,790	**************************************				
ACCESS TUNNEL TO BATE CHARB 2 SHOTCRETE	12,800	86				
215 SUPPORT & ANCHORS	AKYOUU	OF.				
LOWER TUNNEL						
ROCKBOLTS 1º 0 12'	3,650	EACH	nne des singuists décomplançes, décis : 4965 : 1 des diques qui est le 200 de			3/4
ROCKBOLTS 1' 9 9'	620	EACH				
STEEL HESH	217,100	SF	and the same of th			
BTEEL SUPPORT	220	HOT				
UPPER TUNNEL						
ROCKBOLTS 1' 8 12'	3>530	EACH	••••••••••••••••••••••••••••••••••••	Ko und de gran est. Mich eine aberieben für ein	Kaindakupuntama kakingki majip di sali sa salim giranging:	3/4
ROCKBOLTS 1º 6 9'	600	EACH				3/4
STEEL HESH	210,200	SF.				
STEEL SUPPORT	213	ION_	redigion (40 A) , there is a second of Administration of Designing Second 28 — species		-	
UPSTREAH LOWER PORTAL ROCKBOLTS 1 2 15'	240	EACH				3/4
ANCHORS 16 0 25	1+600	EACH				3
UPSTREAH UPPER PORTAL	Section Section & F.Q.V. V. Me.	EMUN	NUMBER OF STREET	age of the second secon	A ROW OF THE PROPERTY OF THE P	The second of the second of the second secon
ROCKBOLTS 1° @ 15'						
(INCL IN LOWER PORTAL)					<u>aan Iraa T</u>	
ANCHORS 1' @ 25'	700	EACH	e anno terre desta de la comp etación de la competación de la competación de la competación de la competación de La competación de la	ya me ka i kinga ay salahin dari		**************************************

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SUSITNA HYDROELECTRIC PROJECT date! 12-FEB-82 WATANA - "REVISION 4" QUANTITY UNITS UNIT PRICE AHOUNT TOTAL REHARKS ITEM_DESCRIPTION 9 000 DOWNSTREAM LONER FORTAL ROCKBOLTS 1º 0 15' 200 EACH DOWNSTREAM UPPER PORTAL ROCKBOLTS 1' @ 15' 100 EACH ANCHORS - 1 25' EACH 100 100 ROCKBOLTS 1' 9 25' HY EACH ROCKBOLTS 1º Q 15' HY 125 EACH STEEL HESH 3,600 SF STEEL SUPPORT 14 TON HETAL ROOF ANCH: 3/46 0 6' EACH ACCESS TUN TO GATE CHAMBER 775 ROCKBOLTS 1 2 12' EACH ROCKBOLTS 1 . 0 9' 240 EACH STEEL SUPPORT 55 TON 391900 3/4 8F STEEL HESH . 218 . STRUCTURAL - HISC STEELNORK SUSPENDED HETAL ROOF 2,775 3 EHERBENCY RELEASE CHAMBERS .21C HECHANICAL UPBTREAM LOWER BATES EACH BATE EQUIPHENT UPSTREAH UPPER GATES_ GATE EQUIPMENT EACH TRASHRACKS LB DOWNSTREAM LOWER OUTLET STOPLOG GUIDES STOPLOGS ING FOLLOWER DOWNSTREAM UPPER OUTLET STOPLOG GUIDES LOW LEVEL RELEASE ____SLIDE GATES INC STL LINER_ 122 UPSTREAM COFFERDAM 1221 EXCAVATION OVERBURDEN REHOVAL 1:000 ROCK FILL 38,400 16,600 CY FINE FILTER COARBE FILTER 15:900 CY ROCK BHELL 196,500 CLUSURE DIKE 58,500 CY RIP RAP 21,200 .223 CUTOFF __ BLURRY WALL

4,850

EXCAVATION

BUSITNA HYDROELECTRIC PROJECT date! 12-FEB-82 Pasat 10 WATANA - "REVISION 4" QUANTITY UNITS UNIT PRICE AMOUNT TOTAL ITEM_DESCRIPTION____ SLURRY WALL 43,600 .22D DEWATERING INITIAL DEWATERING HAINTENANCE .23 DOWNSTREAM COFFERDAN ___ 231 _ EXCAVATION ____ 5,000 OVERBURDEN ROCK 500 CY 3 14,500 _...REMOVAL OF_COFFERDAM_ .232 FILL 1,800 RIP RAP 15,200_ .233 CUTOFF SLURRY WALL EXCAVATION_ 1.830 14:500 SLURRY WALL 8F HÃO NIÂH É: HAO NIÂH E: .311 EXCAVATION OVRBRDN - ABOVE EL 1470 CY 2 2,026,000 CY OVRBRDN-ALLUV-BELOW 1470 5,320,000 ROCK USEABLE - ABOVE 1476 ROCK WASTE - ABOVE 1476 1/289+000 2/4 CY 2/4 1,950,000 CY ROCK USEABLE - DELOW 1470 478,000 CY RUCK WASTE - BELOW 1470 869,500 CY .312 FILL RIP_RAP_(UPSTREAH)__ 1,547,000 GRAVEL (UPSTREAH) 25,174,000 CY 2/3 COARSE FILTER (UPSTREAM) 1,646,000 CY FINE FILTER (UPSTREAM)___ 2/011/000 CORE (IMPERVIOUS) 8,254,000 2/3 FINE FILTER (DOWNSTREAM) CY 2/3 2,253,000 COARSE FILTER (DOWNSTREAM) 1,910,000 CY 2/3 SHELL - ROCK & GRAVEL (D/S) 11,342,000 2/3/4 CY SHELL-ROCK FR OTHER SOURCES 5,418,000 CY COBBLES (DOWNSTREAM FACE) 21003,000 CY 12,000 ROAD BASE FROST PROTECTION PROCESS PROTECTION___ _260,000. PLACE PROTECTION 960,000 CY REHOVE 1' PROTECT & WASTE CY 93.000 SCARIFY CORE SURFACE 193 FILTER FABRIC 740,000 FILTER FABRIC

.313___ SURFACE PREP/GROUTING_ SURFACE PREPARATION SUSITNA HYDROELECTŘÍC PROJECT. . FEASIBILITY STUDY ESTINATE - ÁCŘEŠ ÁMERÍCAN WATANA - "REVISION 4"

date: 12-FEB-82 file: WAEDS4.DAT/70 page: 11

TEH_DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TNUONA	TOTAL	REMARKS
				\$ 000	\$ 000	
UNDER CORE/FILTERS	militar est established de la	researched that despitation are no was so w	MANGEL AND STANDARD STANDARD OF THE STANDARD O	म इ.स. ० मा माध्यम तथे । व्यवस्थान व		makes produce the special his first the market when the produce the special party of the Re-
ABOVE EL 1500	1,675,000	8F				2/4
DELOW EL 1500	613,006	8F		NA 1 10 40 AM A 1 10 10 10 10 10 10 10 10 10 10 10 10 1		4
UNDER BHELL						
ABOVE EL 1500	3+186+000	8F				2/4
BELOW EL 1500	2,584,000	8F	makeri dan	ay de . E y angely spokensket to a accept you	والمراوية والمراوية والمحاوية والمحاوية والمحاوية والمحاوية والمحاوية والمحاوية والمحاوية والمحاوية والمحاوية	4
CONSOLIDATION GROUT						
DRILL HOLES	687,000	LF				2
CEHENT	697,000_	CF_		فيسيخ وينور وينجاهم ومنسب		2
DROUT CURTAIN						
DRILL HOLES	465,000	LF				2
CEHENT	188,000	CF	Makantapakain jay kanatitoonsa seriklapsa kisissä, jookunnan sennyännä ST-sin istoisetain.	and the second section of the second	·	2
DENTAL CONCRETE						
DENTAL CONCRETE	85,000	CY				2
317 DRAINAGE						
HOLES	136,000	LF				2, 2
.32 OROUT GALLERIES/PORTALS						
.321 EXCAVATION			-		the part of	•
TUNNELS/SHAFTS - CORE AREA			-			The second of the desired of the desired of the second of
ROCK HORIZONTAL	10,100	CY				2
ROCK_INCLINED	11.300	CY				
ROCK VERTICAL	2,000	CY	•			2
TUNNELS/SHAFTS - ACCESS	[11] 왕교를 관계되었다					
ROCK HORIZONTAL	13:000	CY.				<u> </u>
ROCK INCLINED	2,000	CY	The second secon	The second section of the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a second section in the second section in the second section is a section in the section in the section is a section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section is a section in the section in the section in the section in the section is a section in the section in		3
PORTALS						
OVERBURDEN	3,600	CA				3
ROCK	1,000	CY				3
1323 BURFACE PREPARATION	그래도 할 때에 먹는 것 않는					
PORTALS						
HORIZONTAL	30	8F	A THE STREET SHOW A STREET	Company of Fig. 1 and 1 and 1 ft 1 f	* * **********************************	3
INCLINED	200	8F				3
.324CONCRETE . SHOTCRETE						
TUNNELS - CORE AREA			The state of the s	age mother is an an activities assume the effects		managaran managa aya dan dan dan dan dan dan dan dan dan da
CONCRETE PLUGS	1:000	CY				
CONCRETE SLAB	2,300	ĒÝ				
REINFORCING STEEL	80	TON	· · · · · · · · · · · · · · · · · · ·	e national soul sole sole a	A THE REST OF THE SECTION AND SHAPE AMENICAL PROPERTY.	2/3
CONCRETE OVERBREAK 6'	1,150	CY				3/4
2° SHOTCRETE	15,000	SF.				2/3
TUNNELS - ACCESS		de un de la composition della	(k, amma gampung kanjan. 1769). Idani air am mingk o pin cipkologo union corpo nifin nje	alle - Will (4) - y ne par Philosophi - preparajulazio de la bannaria	ind a decrinologies or relative transformation and defend	The state of the s
CONCRETE SLAB	1+600	CY				
REINFORCING STEEL.	50	HOT				
CONCRETE OVERBREAK 6'	800	CY	Magnetin as in trade-manders (s.g., mr. Martin aug.)	Territoria de la compansión de la compan	ليست شينين معربيشق والهوائس ويواك الموجود والمراد والمداد	and the second s
2º SHOTCRE E	54,000	8F				3/4
SHAFTS - CORE_AREA						
2º SHOTCRETE	5:000	SF			and the states of the section of the	2/3
放设 3、1000000000000000000000000000000000000	MO W N W					

MOLRE BUSINESS FORMS, INC

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date! 12-FEB-82 SUSITNA HYDROELECTRIC PROJECT WATANA - "REVISION 4" Page! 12 QUANTITY UNITS UNIT PRICE AMOUNT TOTAL PORTALS (2 PORTALS) CY CONCRETE 20 REINFORGING STEEL TOR .325 SUPPORT & ANCHORS TUNNELS - CORE AREA 1,800 EACH RUCKBOLTS 3/4 0 6' STEEL SUPPORT TON 3,000 3 STEEL HESH BF ROCKBOLTS 3/4" & 6' 1:200 STEEL SUPPORT 20 TON STEEL. HESH ___ 1,100 SHAFTS - CORE AREA 2/3 ROCKBOLTS 3/4° 0 6' 1.000 __8F_ STEEL MESH PORTALS ROCKBOLTS 1 4 15' 30 EACH 1329 ARCHITECTURAL_ EACH PORTAL DOORS .32D MECHANICAL DEWATERING VENT. SYS. (INC W/331:12C) 133 INSTRUMENTATION .331 INSTRUMENTATION LPONER FACE) INSTRUMENTATION LB .4 RELICT CHANNEL 41 SHORE PROTECTION_ A11 EXCAVATION OVERBURDEN STRIPPING-2' THK 2+200 CY .412 FILL DUMP 1 SPREAD FILTER MAT'L - 2' LAYER 2,200 ROCK SPALLS/RIP RAP-3' AVE 3,300 24,000 RIP RAP 24,000 WASTE ROCK .44 CHANNEL FILTER BLANKET .442 FILL 2,700,000 COARSE FILTER FINE FILTER 20180,000 CY RIP RAP 192,000 CY .443 BURFACE PREPARATION FOUNDATION PREP CLEARING & GRUBBING 460 ACRE EXCAVATION 2,236,000 CY 460

APPROACH

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AN	ERICAN	جمير والمجهود به جندالوا ومستحمد بالماليدم بدايا ترسم عصد	and the second s	ம் சம் அம்லில் விரும் அவர்கள்		FER-82 884.DAT <u>170</u>
WATANA - "REVISION 4"		•			padet 14	The second secon
ITEH_DESCRIPTION	QUANTITY	8ŢĮŃŲ	_UNIT_PRICE	AMOUNT	TOTAL	REHARKS
				\$ 000	\$ 000	
OVERBURDEN	64,000	CY	or of the feeting and the control of	· constant interestic · c · · · · · · · · · · · · · · · · ·		T
ROCK USEABLE	318,500	CY				3
	64,000	су_		*****		3
CONTROL BIRUCTURE						
(TO END OF ROLLWAY)						en andre en
UVERBURDEN	B+200	<u>GY</u> _	ئۇن يەمەر ئەرسىرى دەر يەرسىرى ئەرسىرى ئۇرۇپۇرۇپۇرۇپۇرۇپۇرۇپۇرى ئارىرى ئارىرى ئارىرى ئارىرىيى ئارىرىيى ئارىرىيى	** ** *********************************	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2/3
ROCK WASTE	18,500	CY				2/3
ROCK USEABLE (INCLINED)	. 37,500	CY				2/3
ROCK_USEABLE_(VERTICAL)	<u>76,500</u>	CY	territoria de la companya de la comp	والمحارث والم والمحارث والمحارث والمحارث والمحارث والمحارث والمحارث والمحار	مستنشد ترتب مستنده والمجتند والمجتند والمجتند	2/3
UPPER CHUTE						机弹簧电弧机 人名法巴尔尔
(END ROLLWAY TO STA 11400)	104;500	čy.				2/3
OVERBURDEN		CY				2/3
ROCK WASTE	77,500					2/3
ROCK USEABLE (INCLINED)	215,000	CY	<u>.</u>			2/3
ROCK USEABLE (VERTICAL)	134,000					
LOUER CHUTE			and the second second			
(STATION 11400 TO 17400)	72,500	ĠY.				
OVERBURDEN :	43,500 43,500	CY	manung diministra (1.55 tapa panda da apatagan (1.58 tapa da 2.5 apatagan a a apatagan da apatagan da apatagan	, is the community throughout with	. And the state of	Control of the Contro
ROCK WASTE ROCK USEABLE (INCLINED)	107,500	CY	•			5
ROCK USEABLE (VERTICAL)	45,000	CY				
VALVE BLOCK/FLIP & OUTFALL			der signer at the signer and the state of th			
(FROM STA 17400 TO END FLIP)						
OVERBURDEN	52,000	CY.			n de la companya de La companya de la co	
ROCK WASTE	71,600	ČŸ	A the state of the	PA - A Quarterna james de arrigant de la constitución que	فسنك الفياطة في من يوسي في الأنت من الم الأبط في من الفيسية في	2/3
ROCK USEABLE (INCLINED)	316,000	CY				2/3
ROCK USEABLE (VERTICAL)	58,000	CY				2/3
DRAIN TUNNEL			and the second	ar juniorius area <u>a la companya de la compa</u>		
ROCK HORÍZONTÁL	4,500	CY		•		2/3
ROCK INCLINED		DÝ				
RIVER CHANNEL	A. B. Mariania Committee and Maria Committee and Committee		and the second of			A PARTIE AND THE PART
ALLUVIUH EXCAVATION	1,060,000	CY				3/4
,522 FILL						
GRANULAR BACKFILL	5,000	. GY				2
IMPERVIOUS	1,000	CY				2
.523 SURFACE PREP/OROUTING	de se e e e e e e e e e e e e e e e e e	Makaliya Makana asana ing katana asana	entra de la composition della	a I Kathali a cal manage to basis militar has	n ngọi gir a ngui mhi khi nghiện khi kh a ngọ chi di di na	According to the second of the
FOUNDATION PREP						
SPILLWAY						
ROCK HORIZONTAL	240.000	9F.	(Making same of open of the first of America along the complete company on the same)	and an entrance of the second second second	nte : de mont et pro-s spe <mark>ja de l'appropries </mark>	2
ROCK INCLINED	186,000	8F			化对邻亚氯甲基甲基	2/4 10 1 10 10 10 10 10 10 10 10 10 10 10 1
CONSOLIDATION GROUTING						
DRILL HOLES	54000	LE_	Andrew Commencer of the	ter a growing nagen decidence experience de	ment on the 2- are about the company and comments	A commence of the second secon
CEHENT CONTROL OF CEHENT	54,900	CF				화 경 하는 도시 기관 등 기관
GROUT CURTAIN (SEE 332.313)						
.524 CONCRETE & SHOTCRETE	ng dia managan dan bada amangang da		And the second s	A SECTION OF THE SECT		The state of the s
CONC APPROACH & STRUCTURE						

SUBITNA MYDROELECTRIC PROJECT	***40					date: 12-	
FEASIBILITY STUDY ESTIMATE - ACRES AMER WATANA - *REVISION 4*	LUHR	and production and president and a strong tops as	, e-a aba se	k apig in kalan in dan dan kerantan kan dan in K	to the the supplemental and state of the second	rasel 15	B84.DAT170
ITEM_DESCRIPTION	YIITHAUD	UNITS	_UHI	PRICE	ANOUNT	TOTAL	REMARKS
ping min same. Sing man man man ming july pinn sinn laber park and man man yang park man barn barn barn tang man man dan man dan barn barn barn barn barn barn barn ba	and the first trip that here and see any and see here one	long and and and and and and		*	* 000	, 8 000	نها، خون هند هند بنيو استار آنياز آنياز آنيا اين پيد بنيو هند هند هند هند ويا. دند
CONCRETE OUTERWALLS	20,500	CY	ter e del con e e e e e e e e e e e e e e e e e e e	en (n. 1995) er de av det de en entertain de indexemble de	ett skie aglijkane, parioti biliru. K pietrijdersk drugena, ži	نائنستان برنان بای م مسائند دهامی ش	2
CONC PIERB (FULL LENGTH) CONCRETE DECK	8,000 1,600	CY					2 2/3
CONCRETE ROLLWAY SLABS	17,500	ČÝ		er; The stage of page page that an external response of a	. District Course Springers of Street, and		2/3
CONC OVERBREAK 12"H/6"V	1,300	CY					3/4
REINFORCING STEEL	21700	TON	. Ages and General are not		An exist a single-state in our single-state and		3
CONCRETE CHUTE							The second secon
(INCL BOX DRAIN GALLERIES)							
(FROM END OF ROLLWAY) CONCRETE SLAB	22,000	CY					2/3
CONCRETE HALLS	10,500	CY					2/3
CONC OVERBREAK 18"H/6"V	11.000	CY.					2/3/4
REINFURCING STEEL	1,300	TON					The state of the s
CONCRETE VALVE BLOCK/FLIP -							
	27,500	. CY					2/3
CONCRETE DUTFALL LINING	2+500	CY.					2/3
CONC OVERBREAK 12 HZ4V	2,400	CÝ					2/3/4
REINFORCING BTEEL	1,300	TON		The state of the s	7 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A 1 A		3
CONCRETE DRAIN GALLERY							
CONCRETE_BLAB	1,000	<u> </u>		وذريبينيدية ومحصوبات ومحيدة ومحادثة ومدالها والمتحدد	and the second s		2/3
2° SHOTCRETE DOHE	5,000	SF					2/3
REINFORCING BTEEL CONC OVERBREAK 64	30 500	ton Ey					
.525 SUPPORT & ANCHORS		na de mandadade de des de la mine		erinte — to de sin upon misse annimissament de result to d'Assayer Line est	ergist (1.12 t) biliyayik (finanyatshasi) iran salamian		And the second s
DRAINAGE TUNNEL							
STEEL BUPPORT		TON		tila egitigi angitatani endikaning pi	1803 - 1870 - Aprilla Article State (1804) (1804) (1804) (1804) (1804) (1804) (1804) (1804) (1804) (1804) (180		2
STEEL HESK	1,000	8F					2/3
ROC'(BOLTS APPROACH	275	ÉÁCH.		•			
ROCKBOLTS DRAINAGE BALLERY		EACH	ودر ورست کا حصوصت در	a secure of a secure of the secure of		فالمستقلة بتعيم وإمر يستوسه مستوسع مستوسع	administration of the second s
3/4" 9 6"	576	EACH					2/3
ROCKBOLTS CHUTE & STRUCTURE							
i* e 15'	112	EACH		**************************************			2
ROCKBOLTS VALVE BLOCK/BUCKET		and the first of					
11 9 15	allalacadas acresus cracie (alias) acres 46, escue	EACH.		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	in the second section	Charlest Williams Because We are	A CONTRACTOR OF THE MACHINE MACHINE MACHINE AND THE CONTRACTOR OF
SLAB/WALL ONCHORS 1° 2 10'	9,300	EACH					2/3
527RAINAGE	77300	EHUN					
DRILL HOLES		era en aparecia productiva de la constitución de la constitución de la constitución de la constitución de la c		Analysis of the second second second of	the fee is a dispension emerger and	e and the second se	A marine a servició se constituir de constit
BOX DRAINS (TO DRAIN TUNNEL)	546000	LF					
31 RELIEF	640		an example agen	en de la companya de La companya de la companya de	The first of the second of the	minuder. 1985 geset legislatery kada - 4 digs 2 dike galandi kemid (sa	2 2
.52C HECHANICAL		ار از این از این از این از این این از این این از این این از این					오늘까 이렇게 가를 받는데?
DATE EQUIPMENT	3	EACH					
STOPLOG GUIDES	3	SETS				and the second section of	

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AME WATANA - "REVISION 4"	RICAN	and produce that		y Wester Both of Walter Both Size and State Stat	date: 12- file: WAE Page: 16	FEB-82 B84.DAT170
ITEH_BESCRIPTION	QUANTITY	UNITS	_UNIT PRICE	THUOHA		REHARKS
and the sign of th	1		Allo sale and the see the see are see and the see and	\$ 000	\$ 000	the Lee and any err may can one one one and that had hely plea any day one was
NISC ELECTRICAL .53 ENERGENCY SPILLWAY	engi Kunas Autonisian mananan uati Van A (Albera)	LS	தன் நடிக்கு ஆண்ணிக்க கொள்ள இருக்கு பெறு பெறு பெறு பெறு பெறு பெறு பெறு பெற	American Commission (Commission Commission C	and the second s	And the second s
(INCLUDING BRIDGE & FUSE PLUB) OVERBURDEN	4,440,000	CY	and distribution pages 3. Whether the St. St. States a visit of a states and a state of a state of a state of	iaran, und glasija, in armondeljaju parijus memele da erospina men	 	2/4
ROCK USEABLE ROCK WASTE	2,693,000 543,000	CY CY	tadagenesian nang disa serdapa - wisi dan ila jaga nasa k	g milan - dr. 1946 - gada Rosal, Alicid (1936 - via diviĝis konneditarentales).	Marin Marindi tependa nakalaina dughi di terahi.	2/4 2/4
.532 FILL FU8E_PLUG	29,400	CY	ngi ngining sa silangangan pangangan ngi ngi	namentan N (17) animasan akanjimina siyi animasan ili si inamid an	and the second	2/3/4
SURFACE PREF (UNDER - FUSE PLUG)		American de Limetros de Verintino de Logo de Logo de La como de La	C. di paragrapo o constanto de la constanto de	nogic print de indication, de débands (siz de sp. 30, 50, 50, 50, 50, 50, 50, 50, 50, 50, 5		
INCLINED HORIZONTAL CONSOLIDATION_GROUTING	5,200 46,100	SF SF				2/4 2/3/4
DRILL HOLES CEHENT	15+400 15+400	LF CF	anaganatan jan dala (po f r edicionalis del Artificio de Artificio			2/4 2/4
*535 SUPPORT & ANCHORS ROCKBOLTS * @ 15'	730	EACH	abidig vapovani. Abi Chaciquinasaning ulamba ay anco abi i abindahan i	ко Дуунгун үзүн на талуулан — таууу аруы Адаминін масарбар аларад	, Alice Control of the Control of th	2/4
BRIDGE		L8_				3
.6 POWER INTAKE (INCL INLET & IN- LET STRUCTURE CIVIL WORKS FOR TUNNEL SPILLWAY - SEE 332.5)						
•61 INTAKE STRUCTURE •611 EXCAVATION			н каменда құрақ дақ расқа даға (1 — 20 — 1 — 1 — 1 — 1 — 1 — 1 — 1 — 1 — 1 —	net many transfer for the same the same transfer for the same tran	A Section of the Lorentz Control of the Section of	
OVERBURDEN ROCK USEABLE	524,000 1,306,000	CY	ninen ein mit in		-	3
ROCK WASTE	138,000	ĊŶ				
HORIZONTAL INCLINED	25,600 88,300	9F 8F	The state of the s	The first the second se		3/4 3/4
614CONCRETE_& SHOTCRETE		***************	equalineanistic pagasinis some spirit (\$18.5%). Unique se trains arrivat		-	D 1984 as an
STRUCTURE CONCRETE STRUCTURE REINFORCING STEEL	121,000	CY 10%				3/4
CONC OVERBREAK 12"H/6"V	2,600	CY		The state of the s	is drv. addraugi ihr (1,16) i vasayat Mati (lagud i shis i vaddad	3
BTRUCTURE ROCKBOLTS 1' 8 15'	400	EÁCH	American de la companya del companya del companya de la companya d	go again beauth an agus agus ann agus agus ann an an agus agus an	and the second s	ne vien kalantan kun peringungan kentalah menjangan mendalah perpenduan salah janggan pengungan pengungan peng Tanggan pengungan pengun
TRASH RACKS/BUIDES GATE EQUIPMENT BULKHEAD GATE GUIDES	abbanic mikatika baik 1 k bana 14 . 15 6 . 1. 6 . L	BETS SETS	makanga atau da ayas dini sa da dini sa da dini sa da	gan ang kanada dan at na Panada.	Language of the second of the	3
BULKHEAD GATES INC_FOLLOWER_ SHUTTER WITH GUIDES	nesistantia estatua de la constanta de la cons	SETS.		# - # - # - # - # - # - # - # - # - # -	li pajrada (1888) di mili a, di milia, di milia di milia di milia di milia	

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTINATE - ACRES AN WATANA - "REVISION 4"	ERICAN	dates y production strong strong the difference of the		the second secon	date: 12- file: WAE pode: 17		
TEH_DESCRIPTION	YTITHAUD	UNITS	UNIT_ PRICE	AHOUHT	TOTAL	REHARKS	r A de con
	all, day and 300 likk any ary kay ame aip are bid	, Built wine fifthe man qual arms for it into	And the other size two states are seen and the other size of the o	\$ 000		and the and the time and the time and time and time and the time and time and time and time and time and	
ICE BULKHEAD WITH HOIST ICE BULKHEAD GUIY 25 INTAKE SERVICE CRANE	6 6 1	SETS SETS EACH		- NO TO A REPORT OF THE PARTY O		3 3 3	
BUBBLER BYSTEM HISC ELECTRICAL AGID INTAKE BUILDING	1	LS					
INTAKE BUILDING .7 SURGE CHAMBER .71 SURGE CHAMBER	1	LS		der te de districtiva que l'autoritant de disputs de la grandia de la grandia de la grandia de la grandia de l de la grandia de	andrimusumentality systematicus, survey and a	3	
.711 EXCAVATION CHAMBER RDCK VENT BHAFT ROCK	i01,000 2;200	ĊY CY_	and the state of t	in parameters in a way of a special of speci	a I minus auto d'Alma, mil d'artini	3 3	
.713 SURFACE PREPARATION SURFACE PREPARATION .714 CONCRETE & SHOTCRETE	29,700	SF	mangaling webserconfirms of suprampation decomments necessarily			3/4	ing for an 14 section
CHAMBER CONCRETÉ 4º SHOTCRÈTE	00006 00018E	CY SF	Annual Marie and the Antonion about war of the market	and and accompany to the second second			and the last
REINFORCING STEEL CONCRETE OVERBREAK VENT SHAFT	300 1,000	TON		Name to the spiritua of the spiritual spiritua	·	3	
2° SHOTCRETE 1715 SUPPORT & ANCHORS CHAMBER	5,900	SF.		- 1745 with Sale and American Philosophys or an international control of the cont			
ROCKBOLTS 1° 2° 25' ROCKBOLTS 1° 2° 15' STEEL SUPPORT	570 2,110 66	EACH EACH TON				3 3 3	
STEEL MESH VENT SHAFT ROCKPOLTS 3/4 9 6/	28:900 370	SF EACH					
STEEL HESH	1,200 15,500	SF LF				3/4	
.71C HECHANICAL STOPLOO GUIDES STOPLOO INC FOLLOWER	2	BETS BET		and the second s		3	Ke re ge
.8 PENSTOCKS .81 PENSTOCKS .811 EXCAVATION			majora (Alama). Danga dalah salah dankan dankan dankan danga danga dan		po tince comment of Milakush administrative party.		* 251-22-4
TUNNELS ROCK HORIZONTAL ROCK INCLINED B13 SURFACE PREP/GROUTING	53,400 54,000	CY.			na e titelikaning. Pengunak T., Mulika dhakaban galiling	3	
SURFACE PREPARATION TUNNELS	378,000	SE.			· in the "Especial" of the control o	3/4	

		SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACKES À WATANA - "REVISION 4"	MERICAN	an diamental analysis is the same of the s		Enter the second	detel 12-FEB-82 file: WAEBS4.DAT/ZO page: 18	
ŀ	LIEH	DESCRIPTION	QUANTITY	UNITS	_UNIT_PRICE	AMOUNT	TOTAL REMARKS	
Ç		ه که که خواه که که خواه که در به می دو در به که	*** ***********************************	And the sea has any tiny me and	•	\$ 000	\$ 050	The Control of the Co
1		CONTACT GROUTING CONSOLIDATION GROUTING		LS	Along to	P. S. S. STONES AND A. S. S. SERVICE, S. STONES STONES STONES STONES	3	The second secon
		CONSOLIDATION GROUTING	<u> </u>	LS	The state of the s	•	<u> </u>	ti entretter pro bein sterings and services a system over the services
		.814 CONCRETE & SHOTCRETE CONCRETE LINER REINFORCING STEEL	37,200 34	CY TON				
.		3º SHOTCRETE	34,000	SF	Committee of the second commit	milinderformi giriniminis inger sindagisi asir didagisi (3/4	and the second s
, ,		2" SHOTCRETECONC.OVERBREAK.6"	20,800 10,600	8F CY			3/4	
,		.815 SUPPORT 1-ANCHORS			a se en	erificari di desti pies a mener meneri en de de ademandi inimia s assi		Commence on Springershill but amore and again
();		ROCKBOLTS 1° 2° 25'	.150 4)200	ÉACH EACH			3 3/4	
,		STEEL HESH	193,000	EHCO 8F	anishing an all sections are sections as the section of the sectio	anada (Vizila) da majasin lamaninga sahiring News More da ay a	3/4	and the second of the second o
<u> </u>		.018 STRUCTURAL - HISC STEELWORK		W-0118				
, l		STEEL LINER 19 TAILRACE WORKS (1 PORTAL WITH	2,406	TON				Charles the Control of the Control o
왕 (왕		TUNNEL COMBINED TĂĬĹŔĂCĒ/DĪV- ERSION_INCL_IN DIVERSION						
FORMS.		WORKS 332.21) .91 TAILRACE TUNNELS/PORTALS						The second of the second section of the second seco
	•	.911 EXCAVATION			and the second s	nd communicate parties a make a chief minimum pair tief annu		The same of the sa
THE MICON	7	TUNNELS ROCK PORTALS	135,000					
	1	OVERBURDEN	3,200	CY	A Maring an entire property and an entire pro	Mizanya nyakeunkanadad iliinnan menengun palakeiden sagiin	3	AND
l		ROCK USEABLE ROCK WASTE	46,000 14,500	CY				
	F 11 12 11 11 11 11 11 11 11 11 11 11 11	.913 SURFACE PREPARATION				4 (from the management of the contract of the	ananan an	A Principal Section of the Control o
•		FORTAL8 HORIZONTAL	, cós					
	ļ ————	INCLINED	6,000	SF SF	er – ogsa i – manazonika ingerantere nimenen mentepik, njentere i maja, kur ingerijk – in ge	neto al più actori, alternazione dia manifestata de decarroque della constituzione del decarroque della constituzione della co	<u> </u>	A CONTRACTOR OF THE PROPERTY O
(TUNNELS						
	Ö	TUNNELS SHOTCRETE	266,000	SF	militari mana manadan da manada	The state of the s	3/4	O The Control of the State of t
(1	TUNNELS					는 사람들이 생활하다면 있다. 그 없는 것이다. 그 사람들이 사람들이 있는 것이다.	
	5	CONCRETE LINING CONCRETE OVERBREAK 6.	141500 7,500	CY	ng pakan na ang mananan na manana Mananan na mananan na m	en and an use of the second decreases of the second	g. ngang bahay and things may be a mandahan ang paramakan and a mandahan ang paramakan a mandahan ang paramakan a T	The state of the s
	,	2º SHOTCRETE	45,400	SF			3/4	
		REINFORCING STEEL	22, ,	TON_	agus galenia y punhan againmhío na agus again a again a sa again ga again again again again again again again	nne dravet pe station have all a manife dravet desirables sides	3	and the state of t
		PORTAL CONCRETE BASE BLAB	100	CY				
		CONCRETE WALLS	2,900	CY_	nd a reporter to a man all and a fine and a fine		geographical despire and the committee of the committee o	Stroken odske ovodkeja.
T.		CONC OVERBREAK 12*H/6*V REINFORCING BTEEL	110 195	CY TON				
	A			to the address on the strongs of their by Autonomical contract and any		er en	The state of the s	CS. S. M. Marie Marie Andre Andre Andre
U		사람이 되는 경기 시간 가 되었다. 생각을 받았다는 그리고 함께 되었다. 일본 사람들은 기를 받았다는 것을 보고 있다. 그리고 기를 보는 것이라고 있다.						
	4	Same and the same of the same and the same a	The second second section of the second section is a second second section of the second section of the second section is a second section of the second section secti	- September 1980 September 1981 Sept			il usus s misher indexistapping month extended in the state of the shape of the shape of the state of	
€ 6 , 1	8							
	<u> </u>	and the second of the second o	tanan dari kacamatan dari kacamatan dari dari dari dari dari dari dari dari	The second of th			N. M. Artindes (a. 1970). Similar Anish Makan Astillani, Massaching, Makan Massaching, S. Artinipes (b. 1981).	

FE	SITNA HYDROELECTRIC PROJECT ASIBILITY STUDY EBITHATE - ACR	EB AHERICAN	*	and the second of the second of the second	and the second s	date: 12- file: WAE page: 19	984 . DAT 1 70
	TANA - "REVISION 4"	YTXTHAUD	UNITS	UNIT_ PRICE	TANOUNT	TOTAL	REHARKS
	h die 2 is 9 des des lans est des	tion, and, also also also:			4 000	• 000	
and appear at the same of the same of the same of	and the state of t	A THE STATE AND ADDRESS OF THE PERSON OF THE	EACH	ள்ளத் அள்ளுக்கள் கண்ணுக்கார். சி. இருக்கும் அன்று முற்று இருக்கும் இருக்கும் இருக்கும் இருக்கும் இருக்கும் இரு	oper of a second second second second	AND THE PERSON NAMED IN COLUMN TWO	3/4
	ROCKBOLTS 1º 8 12'	2.750 480	EACH				3/4
	ROCKBOLTS 1° 2 9'	132	TONS				4
	STEEL SUPPORT STEEL HESH	133,000	SF				3/4
	The same of the sa		X- a écité				3/4
	ROCKBOLTS 1 @ 15'	110	EACH	Bankarjan (1968) (1966) (1966) (1966) (1966) (1966) (1966) (1966) (1966) (1966) (1966)	- gramma y g	undergiefeliebe fürstrichte der eine eine der eine der	The second secon
.91	MECHANICAL CHARGE		SET				3
	STOPLOG GUIDES		SET		THE PART OF THE PA		3
	STOPLOG INC FOLLOWER						
333 WATE	RUHEELS. TURBINES & GENERATORS						
	TURBINES & GOVERNARS			maker of the property of the p	Feet Antistration of American Supersystems - Super-American		the second secon
.11	TURBINES & GOVERNORS		EACH				3. g . n . n . n
	.111 SUPPLY		EACH				3
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WATANA - "REVISION 4"	<u> ERICAN</u>	n A and think and the second s	and the second of the second o	(d) - C., (d) ,) The place date determinants "My (Coloring to April	date: 12-FEB-82 file: WaEB84.DAT#70 rsge: 20
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.16 HEAT., VENT. 1 COOLING BYS.					
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SUSITNA HYDROELECTRIC PROJECT WATANA - "REVISION 4" paset 21 ATEM DESCRIPTION QUANTITY UNITS UNIT PRICE ANOUNT TOTAL REMARKS .3 AUXILIARY EQUIPMENT .31 POWERHOUSE CRANEB EACH .311 POWERHOUSE_CRANES__ .32 ELEVATORS .321 ELEVATORS LB .33 HISC. CRANES & HOTET____ .331 MISC. CRANES & HOIST .34 MACHINE SHOP EQUIPMENT ,341 MACHINE SHOP EQUIPMENT 4 GENERAL STATION EQUIPMENT DENERAL STATION EQUIPMENT .5_ COMMUNICATIONS_EQUIPMENT_ LS COMMUNICATIONS EQUIPMENT 336 ROADS, RAIL & AIR FACILTIES .1 ROADS .11 PIONEER ROADS & BRIDGES .111 .. OOLD CREEK-DEVIL CANYON ROAD (12.31 HILES) ACRE CLEARING 113 324,978 CY WASTE EXCAVALION_ 291,163 COMMON EXCAVATION CY ROCK EXCAVATION BORROW_ 3,460 18' CULVERTS 3 36' CULVERTS LB BRIDGES D-1 BASE MATERIAL 661444 FABRIC 3,192 SY HAINTENANCE NI/YRS HAINTENANCE .112 DEVIL CANYON-WATANA ___ROAD (41.25 HILES) 369 ACRE CLEARING CY WASTE EXCAVATION 855,321 WASTE EXCAVATION 855;321
COMMON EXCAVATION 619:500 ROCK EXCAVATION BORROW 0 18' CULVERYS 9:200 36 CULVERTS BRIDGES D-1 BASE HATERIAL 222,640 TON 14,946 FABRIC MAINTENANCL

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	SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AN WATANA - "REVISION A"	ERICAN	one see see see see see see see see see s		hai kantainintelezak rusioni	date: 12-FEB-82 file: WAEB84.DAT:70 page: 22	
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	CROSSING (7.88 HILES)CLEARING	170	ACRE_				
	WASTE EXCAVATION	498,845	CY	energianista en electrica de la selección de la relación de la relación de la relación de la relación de la re	- year - Ma suissis armin in a community	3	Market Special
	COHMON EXCAVATION	549:417	CY				
	ROCK EXCAVATION	7491641	cy.	production and the first state of the state	m v omo om objectivitati da di successiva	Procedure and the state of the	and the state of t
	BORROW	0	EY				
	18° CULVERTS	5,100	LF				
	36° + CULVERTS PRIDGE	4	LB LB	enterior de la	and the state of t		
	D-1 BASE MATERIAL	36,766	ton				
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	MAINTENANCE				The second of th		representation for the continuous historistics is that a decinion
	MAINTENANCE	118	HIYYRS				
	12 PERMANENT ROADS & BRIDGES						
	121 PARKS HWY-GOLD CREEK						
	R & H SEGHENT B-1 13:26 HILE CLEARING	210	ACRE				
ووسيستميم فستسدية	WASTE EXCAVATION	575,480	CY	manager authorities of "Neste provided utilities" days 1 - (implied these sepail in James and	NAME OF STREET	and the second s	na hilisikilis — Mario i shikading samaranamanyi ayang igi — yayi — yayi
	COKHON EXCAVATION	570,180	CY				
	ROCK_EXCAVATION	35,850	<u> </u>				Charles deplete deplete desert appropriate, le produce augusta a
	BORROW	126,800	CY			그는 그 가장 (1) 전공원, 공기인	
	NFS SUBBASE HATERIAL	135+500 74,480	CY				
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	A. C. BURFACING	28,462	TON				
	GUARDRAIL	9,800	LF_		<u> </u>		4.1 4.
	18° CULVERTS	7:055	LF				pic met. Aparel m Chamaina anima je vr da maji u pagaga (d.) bay vr ga (je vr da
	36° + CULVERTS		Lé				
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	THAW PIPES Topsoil & Seed	7,555 130	LF ACRE				
	TRAFFIC CONTROL DEVICES	13.3					
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	.122 GOLD CREEK -DEVIL CANYON						
	R & H SEGHENT B-2 12.31 HILE						
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is stayed	WASTE EXCAVATION	97 , 892	CY	en er en er ter•te en			
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area and the	ROCK EXCAVATION	23,625	CA	MARKET AND THE PROPERTY OF THE	and the state of t	ay mang mang mang mangganan ng mang ming mang mang mang mang mang mang mang ma	
	BORROW	416,311	CY				
	HTO BUBBAGE HATERIAL	126,750	CY.	galanda a karanta a ♣ A karanta a karant	Territoria de la compansión de la compan	attenda i madi pi i Kin pipe (1840) i maganingan majandan maganinanan kinamanan kinamanan kinamanan kinamanan k	14.0 mg - 14.0 m
	GRADE "A" BASE HATERIAL	69,160	CY				

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BUSITNA HYDROELECTRIC PROJECT WATANA - 'REVISION 4" Pase! 23 QUANTITY UNITS UNIT PRICE ANOUNT TOTAL D-1 BASE HATERIAL 28,860 A. C. SURFACING . 26,429 TON 6,700 LF GUARDRAIL 18° CULVERTS 4,750 LS 36° + CULVERTS 5:585 SY FABRIC____ THAW PIPES 8 . 845 LF 86 ACRE TOPSOIL & SEED HILE TRAFFIC CONTROL DEVICES BRIDGES . 0 8F HAINTENANCE ' ALZYRS _160_ ___ MAÍNTENANCE_ .123 DEVIL CANYON - WATANA R & M SEGMENT A-2 41.25 HILE MAIN ROAD ' 207 ACRE CLEARING 881,179 WASTE EXCAVATION CY. COMMON EXCAVATION 9841473 CY. ROCK EXCAVATION 146,527 CY 3 BORROW 73,145 CY A24.710. CY NES SURPASE MATERIAL GRADE 'A' BASE MATERIAL 2311739 CY D-1 BASE HATERIAL 961704 TON A. C. SURFACINO____ _68,557_ TON GUARDRAIL 6,050 LF 18° CULVERTS 13,840 LF 36 + CULVERTS 341874 FABRIC THAN PIPES 24,335 LF TOPBOIL & SEED 326 AC TRAFFIC CONTROL DEVICES 41 HILE SF 0 BRIDGES HAINTENANCE 248 HAINTENANCE .13 SITE ROADS 131 CONSTRUCTION ROADS ... SITE ROADS 20 MILE 141 HAINTENANCE HI/YRB 132 PERMANENT ROADS HILE PERHANENT ROADS 12 RAIL FACILITIES <u>iżi railhead-gold creek</u> RAILHEAD ACRE CLEARING 78,000 . CY WASTE EXCAVATION 505,000 COHNON EXCAVATION

FEASIBILITY STUDY ESTIMATE - ACRES AN WATANA - "REVISION 4"					file: WAEBS4.1	ATI70	
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354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES							
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356	OVERHEAD CONDUCTORS & DEVICES OVERHEAD CONDUCTORS & DEVICES CNDCTRS 2 k 954 kcm11/phase	55A	MILE		t a a se compete the time also applies to priving			s s je sa s
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359	ROADS & TRAILS ROADS & TRAILS ROADS & TRAILS CLEARING & ROADS	200 170	HILE HILE		New York (1994)	**************************************		Marie or and a
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391	INCLUDED IN 331.2 OFFICE FURNITURE/EQUIPHENT			mental consistence distance of the library of the constance of the constan	es > 9 June - 9 ch steps of England Mit Halland			
392	OFFICE FURNITURE/EQUIPHENT B		• 1					
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IIEM DESCRIPTION	PTINUYIITHAUD	UNIT FRICE	AHOUNT - TOTAL	REHARKS
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BACHELOR DORHS-HOHNT-TYI GUEST HSS-1 EA OWN/HOR/I CAMP MANAGER'S OFFICES	CON 3 L EA	CH CH		24° x 120° 28° x 120° 30° x 40°
STAFF CLUBHOUSE DINING HALL	E A	CH CH		50' x 80' 120' x 150' 120' x 220'
DINING HALL RECREATION BLDG. RECREATION BLDG.	1 1 1 1	C) Ch	- 136 - C.16 https://www.caten.ac.edu	120' x 160' 120' x 200"
SECURITY OFFICE SOILS/MATERIALS LAB:		CH CH		200' x 200' 4 60' x 60' 4 50' x 100'
WAREHOUSE - FOOD SERVICE WAREHOUSE - FOOD SERVICE	1 E4	CH CH CH	managa (1874) ar i sang i dan sah i sa: 40 600 kilon i i i i i i dan dan managa managa managa managa managa ma	90' x 100' 120' x 160' 100' x 120'
COMMUNICATION BLDG. HOSPITAL	1 E0	CH		20' x 30' 140' x 160'
ice rink Bank Store		CH CH CH	History and these makes supported by the party pulls and the supported by	140' H 300" 50' H 80' 30' H 60"
LAUNDRY BWIHHING POOL PERHAWALK		CH CH		20' x 80' 100' x 120*
6 FEET WIDE 10 FEET WIDE	3+000	<u>E</u>	A of the particular state of the state of th	
16 FEET WIDE .13 UTILITIES WATER	1,300	LF		
BUPPLY BYSTEH INTAKE - 3.4 HG POND PUMP STA - 1200 GPH		LS		
BOOSTER PUMP STA - 1200 SUPPLY LINES PIPES	GPH 1	LB		Alle Maria and America and Ame
B DI . & DI HEAT TRACING AND INSUL	10,000	LF	na, en grande e en manuel e en manuel an en manuel e en manuel e en manuel e e e e e e e e e e e e e e e e e e E e e e e	
8° PIPE 6° FIPE)	10,000	LF LF	The second secon	
UTILIDOR UTILIDOR TREATHENT PLANT - 1.7 H	10,000 i	LF L9	to the company of the	
BACK-UP WELLS DISTRIBUTION LINE TO CAMP	and the continue of the property of the property of the continue of the contin	LS.	The state of the s	A STATE OF THE STA
PIPE 8 DI	3,500		A C B Marketon Company of the Apple of the Company	

TEH - DESCRIPTION	- QUANTITY -	UNITS UNI	PRICE - AMOUNT TOTAL REMARKS			
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s, DI	3,500	LF	inistration in the second of the second of the second of	May 10 to black and American's revision among these above on		Transferration of the contract
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6° PIPE UTILIDOR	3,500	LF				
UTILIDOR AND A SA A SA A SA A SA	31500	LF LS	The second secon	1996 - S S J. E., ilian (mui p decembre il le deplembre in me	William Control of the Control of th	The state of the s
RESERVOIRS-1EA 1.7 MG/1.4 MG PUMP STATION - 35000PM DISTRIBUTION SYSTEM	anadalan alip birminggigini anni. A anni in se serie shi se	LS LS	all and the more account the account of the contract of the co	-1728 - Kullemania — der der teknik die bestelle Sille de	a manufacture company of the second	and the second of the second
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DISTRIBUT LINE UTLOR						
12' DIAHETER	3,100 4,300	LF.	alangaterenggapakannaga dang Heriota panilikats	\$100 Exceptions and Supplementary (see approximate		to the state of th
4º DIAHETER	960	ĹF				
HYDRANTS HEAT TRACING & INSUL	15	EACH	a policy and the second se	Statistics and and are represented an expension of the second of the sec	3	
12' PIPE	5,600	i.e	•			
6' PÎPE 4' PÎPE	41600	L f	neles il l'allacest description de l'allaces de l'allace	The state of the s	and the second seco	and the second s
VALVES	700					
VALVES	1	LS				
UTILIDORS UTILIDORS	B+400	LF				
BENAGE BUATEN						
COLLECTION BYSTEN	1,900	LF				
6° PIPE	1,600	. LF				
8° PIPE 12° PIPE	3,300 - 2,300	Ĺ r				4
18° PIPE	1,200					7
HEAT TRACING	1,900	LF				The state of the s
	1.600	LE .				
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TREATHENT PLANT SKINNING TANK	maganismakin militari anali Saptilan Imaginian asimbasi ini da 🐞 . (iliya in p	EACH	and the second s	E HE WAS BY A SECURITION WHEN THE SECURITION OF	inga mangkar in managalikan indaka managan pangkan indapan kanagan di kanada indaka di kanada indaka managan d Ma	enderen and a surface of the surface
LABOUNS - E1 & 385' x 205'		EACH EACH			1 4 8 28)' H 155'J
PHY8/CHEH-UNIT	american and action of the parties o	EACH	and the state of t	tana ang ang ang ang ang ang ang ang ang	ويتراه والمتابع	et Mariner and American and American and American and American
CLARIFIER		EACH				
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선생이 선택하는 사람들이 가득을 누는 모으면 하면 되었다.						

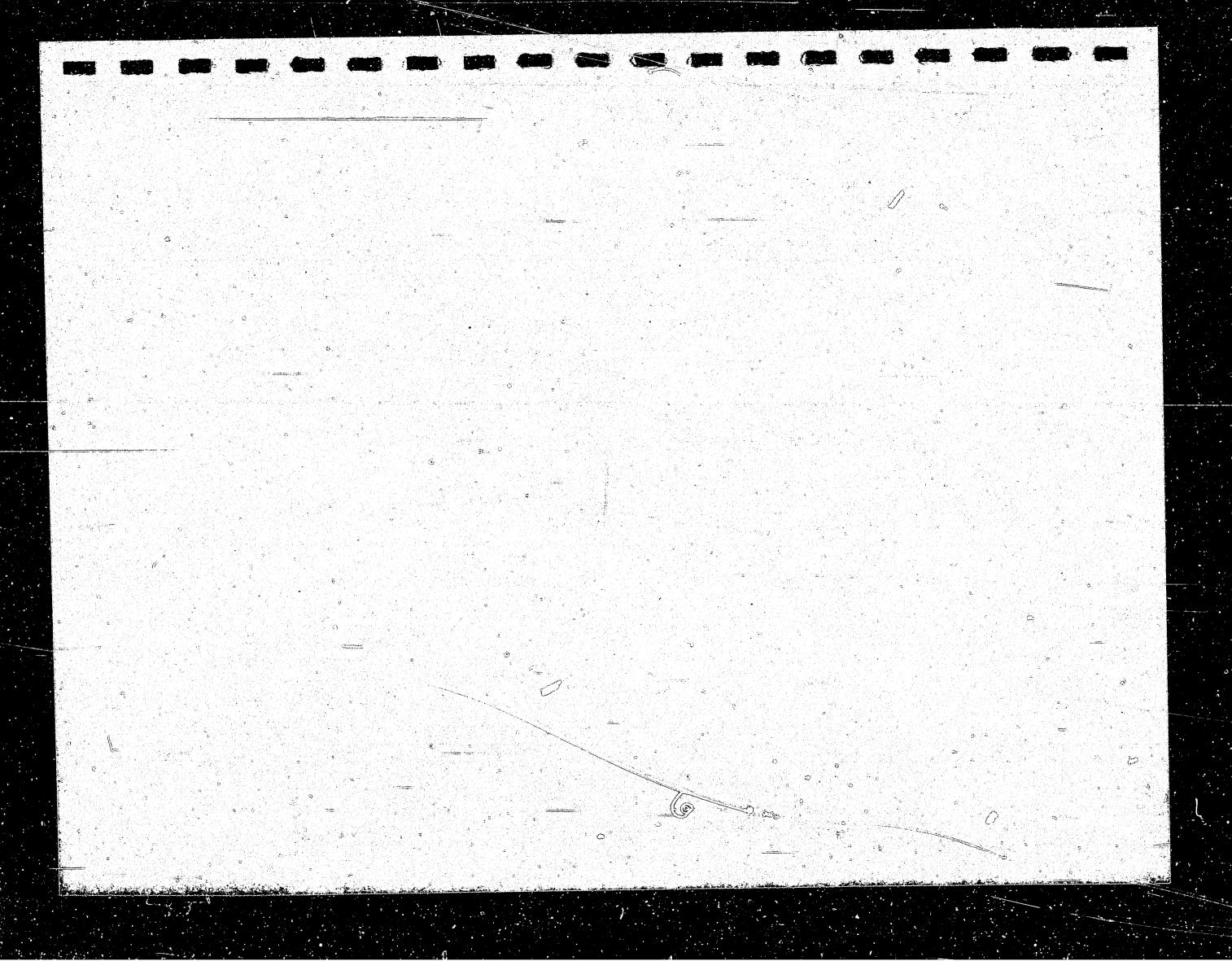
WATANA - REVISION 4" ITEM DESCRIPTION	QUANTITY	UNITS	UNIT	PRICE	AHOUNT	TOTAL	REMARKS
ITEH DESCRIPTION	plant medic and green and area wind and and and and and and and and and a		pala dan laya dan dan dan dan ke	Park and the second a		-\$-000	
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HEAT PUNP THICKENER		each					
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OUTFALL		EACH	a piece s	An experience in the second		\$\frac{1}{2}	And the state of t
BUILDING	managaraning pickeri, administrativa and and an an ana	EACH-	entre de de la composition della composition del	भ वताल विदेश किं किं			3
CONTROLS/INSTRUKENTATION PIPING, VALVES, FITTINGS		LS					3
LABORATORY	1	EACH-		van kunut a samisin se sa sa sakaran	AND THE PARTY OF T	. The second sec	
ELECTRICAL GENERATING STATIONS							a. The state of th
RUILDINGS		EACH	najmijagoujinamus, natikumi, amerit. 1	ne or the district or respects to district the sector.	align distribution and the second	And the second s	American Section of the Control of t
GENERATORS [850 KW]	9 9 9 1 1 1 3 3 1 1 1 1 1 1 1 1 1 1 1 1	EACH EACH					
DAY TANK FUEL STORAGE TANK		EACH -		na ang ang ang ang ang ang ang ang ang a			
SUBSTATION		EACH			*		
DISTRIBUTION	***************************************	LS LS	sageministra	Company of the second of the second	in a specific of a state of the		A CANADA CONTRACTOR OF THE PARTY OF THE PART
FUEL DIL DISTRIBUTION LIGHTING		te O					
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FIRE PROTECTION	25						
FIRE HOUSE		L§			Assert and contact to American Contact to the Conta	And the second s	40' X 80'
ALARH SYSTEH		L8	and the second s				
SPRINKLER BYSTEM HESS HALLS	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	LS					4 DRY TYPE
REC HALLS			, , , , , , , , , , , , , , , , , , , 	The state of the s	Andrews and the Control of the Contr		A DRY TYPE
HOSPITAL		LS LS					4 DRY TYPE
SCHOOL TELEPHONE BYSTEN	A Company of the Comp			ay ay ay ama an	to car que amois de se seguições sobre meditante apparamentais des.		· · · · · · · · · · · · · · · · · · ·
CAMP (WIRE)		L9 LS					
HICROWAVE TV/RADIO STATION			Section of the second section of the section	es cas dan mose manda tip dank dan dan tentakahan	ni de manes des des des des des des des des des d		The second secon
TV/RADIO STATION		LŠ					
SOLID WASTE FACILITY SOLID WASTE FACILITY	Company of the second s	tres, britis de la primer de la	Value 12 - Anglia Mariena (112)		a construction of the second of the second	terrial some the planting the party of the second of the s	na katalan kana ang manahalan manaha manahan manahan 18 (18 Million). San san 18 mga sahajisa ng 19 mga san ka
na a caracter de la periodo de la caractería de la companya de la companya de la companya de la companya de la							50' x 60'
GARAGE/HAINTENANCE BLDG		EACH	1144 1444 144	And the state of t	The same of the sa	Name of the last o	JV K OV
TANKS 50:000 BAL		EACH					
100,000 BAL	36	EACH	100			المستعدد الم	Company of the Compan
EARTHWORK	AND THE PARTY OF T	ACRE	La proper de la constante de l				
CLEARING & GRUBBING BERNS	45,000	CY					and the second s
	with the second to the second	the case property desirable and case of the			A Section of the sect		THE RESERVE OF THE PROPERTY OF
한민들은 실험한 기로 하는데 그리고 하는 사람이 불어들는 하는 것으로							그 없는 사람들의 함께 함께 다 됐다.

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AMER WATANA - "REVISION 4"	RÍCAN		gegeneral en	Security from the set of the set of the security for the	The second state of the se	date: 12- file: WAE pade: 30	FEB-82 BS4.DAT170
ITEH DESCRIPTION .	QUANTITY	UNITS	UNIT	PRICE	ANOUNT	TOTAL	REHARKS
			*****	* (10 mm m mineral)			
PIPING FUEL STATION	I amunicamentus serienis i amerikamenya artesi 🛊 s amerika	LS LS		no magni i magni i ng i ng i ng i ng ing i ng ing ing	n e e e e e e e e e e e e e e e e e e e	بالمستقولية الاستنارات بالمستعددة	and a second supplies the supplies of the second se
.2 MAIN CONSTRUCTION VILLAGE .21 SITE PREPARATION							
CLEAR STRIP & FINE ORADINO	130	ACRE-		The second secon	p. 10 to the security of the second section of the section of the second section of the		-TOTAL-4-5,636,000-SF-
INSTALL DRANULAR PAD CONSTRUCT ROADWAYS	#35,000	ĊY					DEPTH 8'
ROADWAYS IN VILLAGE	2,200	LF	Arry gate with the handler	ins 435 of all and month ascarding on the con-	To the state of the second and a second seco	** - American in installer qui a manuscat authorium ca	ASPHALT PUNT
HAIN ROAD 34' WIDE	2,200 22,000	ĹF					ASPHALT PUNT
CONNECTION TO ACC RD 34'	1,800						-VIE-LAT-HN-ACC A/C P
DRAINAGE							
DITCHING .	51,600	LF					RDUY TOT'S (%) 2
PERIMETER FENCING	13,200	LF	1 3 % about 10 despends on	managementalia ajakteritako e. Ki - manage	e 1990 på (1964) på Start såretter på 1964) på den 1992 på	Sec. 1887 Name Car. 2015 (1985) Marrier Assessment Carlot Community	
PERIMETER FENCING	12,000	LF					
PARKING AREAS				Planton and the Association of t	5.568 -552 Augment Paragraphic American	-	department of the second secon
PARKING AREAS	6,000	ŠF,					GRANULAR SURFACE
.22 BUILDINGS	•	EACH -	التعمروسية لداء داء	in the same of the			141-8-60
SINGLE FAMILY UNIT - 2 BORH SINGLE FAMILY UNIT - 3 BORH	72 200	EACH			* *** *** ****************************		14' x 60'
SINGLE FAMILY UNIT - 2 BORN	16	EACH					24' x 50'
SINGLE FAMILY UNIT - 3 DORH	16	EACH-		-	programme to past - had some parameter and parameters		24-7-50
BINGLE FAHILY UNIT - 4 BORH	16	EACH					28' x 50'
SCHOOL - 34,000 SF		L.S					to free la company de la c Esta de la company de la c
DYHNASIUN	1	LS	*****	Marie Sitemania de Companyo de	to the play to be a supplying and becomes produced up a summary go	maker a - American contraction and a second property and	-100' x 100
SWINNING POOL	3	LS LS					100' x 100' 80' x 100'
RECREATION CENTER STORE	· · · · · · · · · · · · · · · · · · ·	L8 L8	·	in the second section of the second	artmete, ug tal "Spatiske plates» selfalengan derivaten mangangan derivanya.		100 × 100
FIRE STATION		ĹŠ	* 1 1				30' H 40'
DAS STATION L6 PURP 3-BAY	\mathbf{i}	LS			(x,y) = (x,y) + (x,y) + (x,y)		W/ 2-10,000 BAL TANK
:23 UTILITIES · · · · · · · · · · · · · · · · · · ·	معاوسة والمعاورية والمتحاولين المجاورة المحاورة المعاولية والمتحاولية المادية			the comment of the section of the se	ert gift van vill af dez vroudeling andamer de og pred strage		designated the resignation of the contract of the second distribution of the contract of the c
WATER							
SUPPLY LINE 6"	8,300	FT					TRINT PLA TO VIL STA
PUNP STATION - 1.4 HO	1	ÉÁCH	Jens Opares man my	1	MANAGE A LIGHT & MATTER AND THE PARTY AND TH		
PAIER STUR TANK - 114 HU		: Gnuir					
historian rives	13,200			en Symptomic en la company	y i wika in tida arijun kural berijar	character of a statement of a statement of the statement	electrical an improperty socialization beautiful and algorithms are algorithms as a second
	1,500	ĹF	•				
10° D1	1,000	ĹF					
12. 01	17300	LF		A Company of the	Processor of the control of the space of the		AND THE PARTY OF T
HEAT TRÁCING ÁND ÍNBÚL							The second secon
and and the same of the same and the same of the same	21,500	LF					EINCL BUPPLY RUN
8° PIPE	1,500	LT			The state of the s	her the SA: Samuel States of States of	FROM VIL TO TREAT
12° PIPE	1,300	er Like					HENT PLANTI

A second
SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTINATE - ACRES AMERICAN filet WAEBS4.DATITO WATANA - "REVISION 4" Pase! 31 REHARKS QUANTITY UNITS ITEM DESCRIPTION VALVES -EST-1-VALVEX出DOOLF EACH OF PIPE HIMA- 2 EA 8 . EACH 2 FOR EA SIZE PIPE 10* EACH 12. EACH HYDRANTS # APPROX 40003 EVALVES & STUBS INC - 1 EA EACH 20 BEWERAGE COLLECTION SYSTEM 7.800 6º PIPE B. PIPE 61500 10" PIPE 1:100 LF 12º PIPE 800 700 14° PIPE HEAT TRACING AND INBUL CINCL FORCE MAIN 6º PIPE 21,600 FROM VIL TO MAIN 8 -- PIPE-87500 CAMP WATER THEAT-LF · 10" PIPE 1,100 HENT PLANTS LF 12º PIPE . 600 14 PIFE 700 PUMPING SYSTEM VILLAGE TO MAIN CAMP PUMP STATION BOOSTER-PUMP-STATION-LB. 13,000 TREATHENT PLANT 6" FORCE .MAIN UTILIDORS 181900 HAIN RUNG-IN-VILLADE-LF STREET CRUSSING 50 LF EA 1,000 LF PUMP STA TO TREATHT PLANT 8,300 -INCL-4*-SVC+ ETC+ 8TUBS TO HEE-540-LOTS - 20-11,200 STUBS TO BLDOS - 10 # 25' 250 INTEGRATED OFC AREA 120 - x-130 -DWNER/HORS OFFICE ELECTRICAL GENERATING STATIONS EACH INCLUDES DRIVEWAYS BUILDING GENERATORS - 850 KW EACH BENERATORS - 500 KW EACH DAY TANKS EACH FUEL STORAGE TANKS EACH SUBSTATIONS WITH WIRING EACH DISTRIBUTION ----ĹŜ DISTRIBUTION FIRE ALARM BYSTEN FIRE ALARH SYSTEM TELEPHONE SYSTEM LB TELEPHONE SYSTEM

date:-12=FEB=82

-	FEASIBILITY STUDY ESTINATE - ACRES WATANA - "REVISION A"	AHÉRICAN	tanna wipanyanina sa		No. 1 This was seen in the last	date: 12-FEB-82 file: WAEB\$4.DAT#70 pade: 32	again an an ann ann an an ann an ann an ann an a
TEH	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	ANDUNT	TOTAL REMARKS	·
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•	3 ACCESS ROAD CAMPS						
	FACS, CATERING & OFER SPR	T 21,100	HANDAY				1945 - Nadalah Amari - Indonésia Amarik Amar
	.32 ACCESS ROAD/RAILHEAD CAMP FACS, CATERING TOPER SPR	70+900	HANDAY-	and a second property of the second s	A in contra my sales of the contract of the co	3	
•	4 CAMP BUILDINGS CREDIT 25% OF LUMP SUM COST		Ls				
	5 - PERHANENT TOWN PERHANENT TOWN	a demokratikan arinam arinan dapanirishinda da da aran da arinan aris pana aris da arina da arina da arina da a L	L8	e i grande e de antida e e e e e e e e e e e e e e e e e e e	ها ومستحديث سيما فيبين الدينة والأولاي (١٠ - الوجوفورات الله	MERCHAN MATERIA DA CARRANTE MATERIA DE LA CARRANTE MATERIA DE LA CARRANTE MATERIA DE LA CARRANTE DEL CARRANTE DE LA CARRANTE DEL CARRANTE DE LA CARRANTE DEL CARRANTE DE LA CARRANTE DEL CARRANTE DE LA CARRANTE DE LA CARRANTE DE LA CARRATTE DE LA CARRANTE DE LA CARRANTE DE LA CARRATTE DE LA CARRATTE DE LA CARRANTE DE LA CARRATTE DE LA CARRANTE DE LA CARRANTE DE LA CARRATTE DE LA C	ري به بېدىيىسىيىنى دە بې
•	6 HAIN CONSTR CATERING & SUPPORT	3+750+000	HANDAY-	i mainingfui par de 'arregisteponede, maisistente appropagatamente de la des consciences.	The state of the s		Annahama State State and the Control of the Control
	7 ELECTRIC POWER	3,,,,,,,,,					
	.71 34.5 KV BYSTEH .711 TRANSFORHER STATION		Li	anni isharuntay ndi piriki kuthi usan sagari bir ngaga Saada . Wasiri asaga asaa saari ka	nterpreparation 2008 (1.32 de mada quinte le paration par accusaire militarios).		ما يوني و چو اول او دو اول اول دو
	.712 DISTRIBUTION BYSTEM (9 HI .72 CONSTRUCTION CAMP		L3				
	.721 DIESEL DENERATION .722 INTERTIE POWER	158/409	HWhr HWhf.		e de de se r e <u>dentagió in esta contracto de la co</u>		
	.73 CONSTRUCTION POWER			rang mig ning kangkinad bandana bingsar sapa pundah kepalans sanannanggari sa	and the state of t		
	(INCL IN CONSTRUC COSTS) .732 INTERTIE POWER	81,000	HWhr				
•	ONSTRUCTION HEATING & VENTIL: .81 HEAT. & VENTILATION PLANT			errende generale transporte en grand en de en en grand en grand en elle en			Project State Selection and American Company of the Selection Sele
	.811 HEAT. & VENT. PLANT		LB				
	.821 HV OPERATION	•	DAY				
4	LABOR EXPENSE			and the state of t) (minimum and a continued a
	LABOR EXPENSE (INCLUDED IN DIRECT COSTS)						
5	SUPERINTENDENCE		***************************************	agi a dinamananga pina a maka di maka dinama dinama a maka dinamananana A	g namentus — g gg , järjeksta natuurus kiristeinis ja kassia	and the second s	P go que securitarios han accordo acci. 20 - 1
· · · · · · · · · · · · · · · · · · ·	SUPERINTENDENCE (INCLUDED IN DIRECT COSTS)			attantique artis, 1941 sissem him 1940 silvit dist bistor 46 silvita silvit silvita silvita silvita silvita si	armyrini (.a. Sibleman,,		ng pinkingsa - nara managani ana managani managani
å	INBURANCE						
ورايات بينكم يالسبي المجاهد	INBURANCE	gade various garanteeristeen — and various statings and teach gas garantee (supplying	diginaria, in distribution of the distributions of the distribution of the distributio	mining one of the second secon	Act is a sping much in a survey in a	erindenkann, agus shife shin saudh e han e ge gag ge , no saidh all naoinn sinn hann dhann a' mai ba ha ng gaga a ga	illi estat e see es
9	FEES FEES		•	الله الله الله الله الله الله الله الله	en e g. Se deplete a reconstruction		nter (n. 1868) M. C. Spersoner minister all display year.
		and the second s	ind copy out making a country and and a second space of a		pale	mej ani, na matatani di 164 matatani dikir ganjinggarani pilapani ngaharah kabupatan diking (k. 14) 6, 14) 7, 14	under a Marine de la company
	강화하다일이 다시하는 학교는 건강되는 원인물						



	FEASIBILITY STUDY ESTIMATE - ACRES AHER DEVIL CANYON - *REVISION 4*	RICAN	n en nikolikuwa manana mpikana katan kamany <u>mpikana kata ki</u>	BOO INTO ANNIANZA ET ES ES ES ESPECIALES	an an air an an	date: 12-FEB-82 file; DEEBS4.DAT17: page: 1
ETEN	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AHOUNT	TOTAL REHARKS
			The such and state and price speed	and the pas and that has any the this time the	\$ 000	\$ 000
	PRODUCTION PLANT	mananan jawa, tunan da ku ayar ar ayar ayar ayar ayar ayar ayar	· · · · · · · · · · · · · · · · · · ·	en enger i best er skille i van de van d De van de va De van de v	10 3r 10 13.00% Sy 264	in a second a limit pair for spherically management residence was drive a management of
en e						
			2 Secretary Control of the Secretary	· Profession · 中央・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・		(1) A Problem of the Collection of Collection of Collection (Collection)
830	LAND & LAND RIGHTS					
	LAND			the completed over the state of the state of	The second secon	Marie (y 2) mile marie and a
	LAID	1	LS			
2	LAND RIGHTS	There was the same and private to the contract of the contract	e and property and the second	Secretarian de la companya della companya della companya de la companya della com	March Andrews March 21 a Age	
. 7	HISC CHARGES & CREDITS		LS	•		
	HISC CHARGES & CREDITS A	1	Ls			
		A CONTRACTOR OF THE PROPERTY O		oper alien die Kommenda is die sona interpretable demonstration des	महिन्न के किन्न को निर्माणक स्थान को स्थान के अनुसार का	PROF MAN Indiabation (4) 5 - 2 (4) - 1 was incompaint their decimaterial enducine. Indicated incompanion incompani
	POWERPLANT STRUCTURE IMPROVEMENTS					
	POWERHOUSE & DRAFT TUBE	enante proposition de la company de la compa	والهنديس والمتنبين يرتبه كالمتندس معدمه	enter (n. 1911), de la deservación de la companya d	راق بسير د کور پرسونۍ و هيو د د د ه ه	to the state of th
,	·111 EXCAVATION					
	POWERHOUSE VAULT ROCK	90,000	CY			.
	DRAFT TUBE ROCK	16,800	CY.	and the second section of the second section of the second section of the second section is a second section of the second section in the second section is a second section of the second section of the second section is a second section of the	Series 4 - etc minious indiagos temperininas persoláteus,	3
	113 SURFACE PREPARATION/GROUTING POWERHOUSE					$= \frac{\pi}{2} \left(\frac{\pi}{2} + \frac{\pi}{2} \right) \left(\frac{\pi}{2} + \frac{\pi}{2} \right) $
	SURFACE PREPARATION	73,800	SF	and the second s	THE SEC OF SHEET OF SECURITY SECTION SEC	3/4
	DRAFT TUBE					1
Farther to have a second	SURFACE PREPARATION	51 <u>v3</u> 00		all and a supplier of the control of	No. of the Manufacture and Special Chical Institute (3
	GROUT CURTAIN-(U/S OF P-H) DRILL HOLES	43,800	LF			
	CENENT	17:520	LF CF			3 7
	.114 CONCRETE & SHOTCRETE			e entre entr	Link gar Add Marfanderings day graphs a	C to the distribution of the control
	POWERHOUSE					
***************************************	CONCRETE	23,800	CY -	and the special of th	Top Allenta The demonstration of a	3/4
	REINFORCING STEEL 2. SHOTCRETE	1,200 1,500	TON SF		• •	3 3/4
	3. SHOTCRETE	3,100	SE.			3/4
	CONC OVERBREAK 12"H/6"V	1,800	CY		200 10 - 1 - 200 - 4 - 50 - 4 - 50 - 50 - 50 - 50 - 50	1. \$25.1 a distanting the control of the state of the sta
	DRAFT TUBE					
	CONCRETE REINFORCING STEEL	B,000 660	CY TON	Programme and the second secon	கூண் காங்கள் அள்ள அள்ளு	The state and arranged it advantages and account to the state of the s
	2º SHOTCRETE	800	SF			
	CONCRETE DVERBREAK &*	1,650	CY			.
	.115 SUPPORT & ANCHORS					ern er om gen 1940 (1955) i 1940 - Amerika Gastrig (1960) i 1964 (1964) i 1964 (1964) i 1964 (1964) Till state og till state o
	POWERHOUSE ROCKBOLTS 1. 6 52, HA	700	EACH			
زېدېنځو به هې څونې	ROCKBOLTS 1' # 15'	390	EACH EACH			3/4
	STEEL HESH	28,200	9F			3/4
	STEEL SUPPORT	102	TON		The second second	

date: 12-FEB-82 file: DEEBS4.DAT#71 rese: 2

DEVIL CANYON - "REVISION 4"	QUANTITY	ETINI	UNIT PRICE	AHOUNT	TOTAL REHAL	RKB
TEH DESCRIPTION		man nga siab bud nad man bug nad . L	The party rate and the same and and the first same districts and the same and the s	\$ 000	\$ 000	The second secon
The same and the s	iòò	EÄCH			3	
ROCKBULTS 1' 9 25' HY	140	EACH	1	wind the later than the second section of the section		
ROCKBOLTS 1. 0 12'	70	EACH			3	
ROCKROLIS 1' 0 9'	12,600	SF			3/4	
STEEL HEBH			F-7	the see the section of the section o	A A STATE OF THE S	
HOLES (U/S OF FOWERHOUSE)	15,000	LF				
HOLES (A) A LOMENHOUSE LEURING	21,960	LF			3	
HOLES (POWERHOUSE CROWN)			and the second of the second	and the second of the second o	er en 1228/Cartellick at State and annual administration for the photograph	with the second
itie STRUCTURAL - HISC STEELWORK						
POWERHOUSE & DRAFT TURE STRUCTURAL STEEL/CRANE RAILS	1	LB		•	3/4	
SIKUCTUKHL STEEL OKAKE KINALE	1	L8_	and the same and t		3/3	
STEEL COMP. WATER PIPE(8')						
119 ARCHITECTURAL						
POWERHOUSE	1	LB '	ina mandining (r sings specific c) , a sings signific c (solid) i	The state of the s	A STATE OF THE STA	And the second s
ARCHITECTURAL	And the state of the same of t					
,11C MECHANICAL DRAFT TUBE GATES	2	SETS			*	
DRAFT TUBE GATE GUIDES	4	SETS	Comprehensive and the	#	<u> </u>	The second secon
DRAFT TUBE CRANE	1	EACH			3	
PUNP INTAKE TREHRKS & GDS	1	LS				
FUND DUTLET STOPLOGS/GUIDES	i _		The same of the sa	and the state of granting and appropries of Automotive	-	
The state of the s						
.12 ACCESS TUNNELS & PURITES						
TUNNELS - ROCK			and the state of the second se	-	3	
HAIN TUNNEL	106,000	CY			3	
TRANSFORMER DALLERY TUNNEL	17,000	ÇY			3	
GROUTING BALLERY TUNNEL	2:300	ĒY	the second common sections of the contract of the second contract of	a grantum in management see .	3	and the same of th
SURGE CHAMBER ACCESS TUH	7,800	CY			3	
PEHSTOCK ACCESS TUNNEL	50,000	CY			3	
PENSTOCK ELBOW ACCESS TUN	10,000	CY			3	
ACCESS SHAFT TUNNEL	3,300	CY				
CONNECTOR TUNNEL	1,800	CY			3	
COMP. WATER TUNNEL 10'D	2,200	CY	agentie in an bedienerfeb fichte al in eine al. d. d. d. d. d.	The special section with the section of the section	3	
COMP. WATER TUNNEL 35'D	27,000	. CA				
HAIN PORTAL		CY			3	المراجع المستقولة المجاورة المحاورة الم
ROCK	5,000	U	and an experience of the first of the contract	ing a garangan ang a ang ang ang ang ang ang ang		
CONP. WATER PURTAL	₩ ΛΑ	CV			3	
ROCK	300	•			The second secon	en e
.123 BURFACE PREPARATION	and the second s	and the second		and a section of the	The state of the s	
TUNNELS	440.000	18			3	
HAIN TUNNEL SLAB	112,000	31			3	Little and property and a second second
CONF. WATER TUN 35'D BLAB	28,400	Si Si	A CANADA CAN	ang pangangan di kacamatan di ka Kacamatan di kacamatan di kacama		
PENSTOCK ACC TUNNEL BLAD	52,560					
HAIN PORTAL		61				
HORIZONTAL	200	91 91		•	3/	4
INCLINED	2,100	91				
COMP. WATER PORTAL					,	

FEASIBILITY STUDY ESTINATE - 1 DEVIL CANYON - "REVISION 4"	ACRES AMERICAN				file: DEE	894.DAT171
ITEH DESCRIPTION	YTITHAUD	UNITS	UNIT PRICE	ANOUNT	TOTAL	REHARKS
	estance and amount process of the second	No shorte, No ale o spring of the spring of the second		\$ 000	3 000	aller and the entire property of the second section of the section of the second section of the section of the second section of the section of
HOR1ZONTAL	200	SF				
INCLINED	2:100			**************************************		3/4
.124 CONCRETE & SHOTCRETE	Annanciamente des minures conseste del Allegericales aux automotivamente de Allegerica (C. 1977). The second secon	திரண்ட சுண்ண ஆட்டும் இருக்கும் படியாம் ப ^{ுகுக} ிய மு	en aleman in anti-company in the second of	Mary and the second	شيدين بعرف د ديپيدر يا ريشيع	accomplying and Country from a work to be seen to the seen to the
HAIN PORTALS						
CONCRETE BLAB	30	CY				3
CONCRETE HALLS	570	CY	त्रण विभावति । विकास व्यवस्था । वर्षः १४०० - व्यवस्था । त्राः । त्राः वर्षः कालास्य । वर्षः । त	4 V . T. de a demonstra desimilariste	* **	3
CONC OVERBREAK 12'H		CY	•			3
REINFORCINO BTEEL		TON.	e e e e e e e e e e e e e e e e e e e	gr (Crist) yage kanan an	No. wate Selection and American	3
CONP. WATER PURTAL				a a low search services with A		- I was a second of the second
CONCRETE SLAB	30	CY				3
CONCRETE_WALLS	570	CY	tare stady. Verk and inches system and place that is a stady designation only another is a state of the stady	1855 - Ne stransferierre participation and a compet Witth Lib		3
CONC OVERBREAK 12°H/		CY				3
REINFORCING STEEL	40	TON				3
TUNNELS	andre ar an in v - directificature annicius dilipaturius,confunt disconfictano (400 pis an 1960, 1880).		r Santa a su	ALTERNATION OF THE PROPERTY OF THE SECOND SE	Alle di singline, anganèse (de sementes	
CONC. SLAB MAIN TUNN		CY				3
CONC OVERBREAK HAIN		CY				3
REINFORCING STEEL HA		HOT	rapitation and the second and the se	reconstruction of the second section was appropriately by the		4
CONC PLUGG PENG ELBU		CY				3
CONC. COMP WATER SLA		CY				3
CONC COMP_WATR_SLAB		¢ <u>Y</u>	The second secon	THE CONTRACT OF THE RESERVE AND THE RESERVE		
COMP WAT BLAB REINF		TON				4
HAIN TURNEL 2° SHOT		SF				3
TRANSF_OAL_2_SHOTC		<u>_</u>	and the property of the second	·		
SURDE CHAIL ACC 2'SHO		8F				3
PENSTOCK ACC 2° SHOT		SF				3/4
PENS ELBOW ACC 2 910		SF.	months from the second of the	् तक्षाप्रभाव केला क्लेक केला कर		er e maria de la maria de la maria de la companione de la
ACCESS SHAFT 2*SHOTC		BF				<u> </u>
GROUTING BAL TUN SHO		8F		100		3 7
CONNECTOR TUN 2° SHO		<u>sf</u>	THE RESERVE AND A STREET OF STREET	CONTRACTOR CONTRACTOR OF CONTRACTOR		3/4
COMP.WATER 35'D 2" COMP.WATER 10'D 2" 8		8F SF				3/4 3
	931641 430	ar				
	Aparas anglesianis din Ar	about the first of the second	water and a		E. S. W. L. B. Marg. C. San San San Service Co.	Charles and A. Inglander . He see
ROCKBOLTS 1° @ 12'	1,440	EACH				3/4
ROCKBOLTS 1 4 12		EACH	•			3
STEEL SUPPORT	izo	TON		esemble and	19 april 19 april 19	*** 3
STEEL HESH	132,500	SF				3
HAIN TUNNEL FORTAL	••••	~				
ROCKBOLTS 1 9 15'	50°	EACH		* ******	eri er segger gelske in. Literatur	.
TRANSFORMER GALLERY TUNNEL		wnwii				
ROCKBOLTS 1º 9 12'	230	EACH				3
ROCKBOLTS 1 0 9	30	EACH	NO MODEL A			Alexander Alexan
STEEL SUPPORT	ing and the second of the seco	TON			and the second	3
STEEL HESH	20,940	SF				3
GROUTING GALLERY TUNNEL	on and an annual section of the se	No the view with a second of the contract of t				 Two, the property of the property
ROCKBOLTS 3/4° P 6'	220	EACH				3

TOTAL BUANTITY UNITS UNIT PRICE THUUNA REHARKS ITEM DESCRIPTION \$ 000 \$ 000 TON SUPPORT STEEL STEEL HESH SURGE CHAMBER TUNNEL ROCKBOLTS 1. 6 15, BOCKBOLTS 1. 6 2, 150 EACH EACH 30 STEEL SUPPORT 13 TON 13,200 STEEL HESH SF PERBTOCK ACCESS TUNNEL EACH ROCKBOLTS 1" @ 12' ROCKBOLTS 1. 8 9' EACH 90 STEEL SUFPORT STEEL HESH 62,150 SF PENSTOCK ELBOW ACC TUN ROCKBOLTS . 1 . 0 12 280 EACH ROCKBOLTS 1 9 9' EACH 80 STEEL SUPPORT 20 TOR STEEL HESH___ 14,760 ACCESS SHAFT TUNNEL ROCKBOLTS 1º # 12' 30 EACH ROCKBOLTS 1. 9 9'. EACH 50 STEEL SUPPORT TON 20 STEEL MESH SF 2,500 CONNECTOR TUNNEL 160 EACH ROCKBOLTS 3/4" 8 6' STEEL SUPPORT TON 2 STEEL HESH SF COMP. WATER TUNNEL 35' D 370 ROCKBOLTS 1º 8 12' EACH ROCKBOLTS 1º 8 9' <u> 50</u> EACH STEEL SUFFORT TON 33,600 SF STEEL HESH COMP. WATER TUNNEL PORTAL ROCKBOLTS 1 2 13' EACH COMP. WATER TUNNEL 10' D ROCKBOLTS 3/4" @ 6' STEEL SUPPORT 90 STEEL HESH ARCHITECTURAL .129 HAIN FORTAL DOORS (2 SETS) LS CONP. WATER PORTAL DOOR LB HECHANICAL VENTILATING BYSTEM (INCL IN 63.61 \$ 63,62)

14,500

date: 12-FED-82

PBSE 4

file: DEERS4.DATF71

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON - "REVISION 4"

13 ACCESS SHAFT

EXCAVATION ROCK

FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN

FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN file! DEEBS4.DAT171 DEVIL CANYON - "REVISION 4" UNIT PRICE AMOUNT ITEH PESCRIPTION BUANTITY UNITS REHARKS \$ 000 \$ 000 SURFACE PREPARATION .133 SHAFT CONCRETE & SHOTCRETE .134 CY 3,600 CONCRETE LINING CONCRETE OVERBREAK 6" 1,300 SUPPORT & ANCHORS .135 ROCKBOLTS 3/4" & 6." ÈÀCH 1,120 STRUCTURAL - HISC STEELWORK .138 50 HISC. STEELWORK TON ARCHITECTURAL .139 (INCL IN 331.2 CONT. BLDD) .13C HECHANICAL LB **ELEVATORS** 14 FIRE PROTECTION HEADTANK .141 EXCAVATION 1,150 ROCK .143 SURFACE PREPARATION HEAD TANK 2,800 CONCRETE & SHOTCRETE CONCRETE CONC. OVERBREAK 6" CY 45 TON 10 REINFORCING STEEL ,145 SUPFORT & ANCHORS ROCKBOLTS 1 # 12' 15 EACH EACH STEEL HESH_ 8F STEEL SUPPORT TON STRUCTURAL - HISC STEELWORK HISC STEELWORK 1140 HECHANICAL PIPING & VALVES-SEE 3351 15 BUS TUNNELS (TOTALS FOR 4 BUS TUNNELS) EXCAVATION ROCK HORIZONIAL ROCK INCLINED 1,740 .153 SURFACE PREPARATION 7,450 TUNNEL CONCRETE & SHOTCRETE .154 CONCRETE SLAB 470 2" SHOTCRETE 600 CONCRETE OVERBREAK 12" 310 TON REINFORCING STEEL SUPPORT & ANCHORS_ ROCKBOLTS 1' @ 25' EACH ROCKBOLTS 1. 8 12' 110 3/4 EACH

date: 12-FEB-82

SUSITNA HYDROELECTRIC PROJECT

detet 12-FER-82 FEASIBILITY STUDY ESTINATE - ACRES AHERICAN fligt DEEBS4.DAT171 DEVIL CANYON - 'REVISION 4' Paget 6 TOTAL. YTITHAUD UNITS REHARKS ITEM DESCRIPTION UNIT PRICE THUUNA \$ 000 3/4 EACH 30 ROCKPOLTS 1 2 9 STEEL HESH 7.000 SF TON STEEL SUPPORT 13 .16 TRANSFORNER GALLERY .161 EXCAVATION 22,000 CY ROCK SURFACE PREPARATION :163 SF 14,850 TRANSFORMER GALLERY CONCRETE & SHOTCRETE 9,400 CY 3/4 CONCRETE BASE SLAB TON REINFORCING STEEL 120 3' SHOTCRETE 800 SF CY CONC OVERBREAK 12*H/8*V 530 .165 SUPPORT & ANCHORS EACH ROCKBOLTS 1º 8 25' HY 110 ROCKPOLTS 1. 8 15' EACH 3 60 SF STEEL HESH STEEL SUPPORT TON 14 DRAINAGE 91200 HOLES (IN BALLERY CROWN) .17 CABLE SHAFTS (TOTALS FOR 2 SHAFTS) .171 EXCAVATION 3,000 CY 3/4 ROCK **BURFACE PREPARATION** 3/4 361000 SHAFTS CONCRETE & SHOTCRETE .174 3/4 CY CONCRETE LINING 720 3/4 CONCRETE DVERBREAK 6" CY 670 SUPPORT & ANCHORS .175 3/4 ROCKBOLTS 3/4" & 6' 570 EACH 178 STRUCTURAL - HISC STEELWORK 13 TON MISC STEELWORK .179 ARCHITECTURAL ENCLOSURES +17G HECHANICAL HANHOIST EACH · 18 _ DEWATERING .181 DEWATERING (POWER FACE) DEWATERING LB INSTRUMENTATION 191 INSTRUMENTATION INSTRUMENTATION LS

SUSITHA HYDROELECTRIC PROJECT

HISC, BUILDINGS & STRUCTURES

HISC. PUILDINGS & STRUCTURES

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DEVIL CANYON - "REVISION 4"		permanent plangsskalphallip für nach stagesspräche A. N. e. de der voor 2005.	WEST STREET WITH BUILDING TO	A A S 40 T 4 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5	Padel 7	en e
ITEM DESCRIPTION	YELTHAUD	UNITS	UNIT PRICE	THUOHA	TOTAL REHARKS	والمالية المالية المساومة والمالية المالية المالية المالية المالية المالية المالية المالية المالية المالية الم
	in a sure of the s	and a statement of the		\$ 000	\$ 000	en e
332 RESERVOIR, DANS & WATERWAYS	The desired the transfer of the desired to the desi	er mannet en mannet e	المجاورة المستجدات والتأميد فتتأري بالمجالية	An De Halifa e Commine tres e Reconstitución	y and the state of	ுர் அன்னை நகுவைக்கூற்க எ
.1 RESERVOIR						
.11 CLEARING	6,350	ACRE				
.2 DIVERSIDA TUNNELS/COFFERDANS	where the second	en dig ih pidangia ustra usanaran 1973 - pentan	And the second of the Mg	ASSERTMENT OF THE PROPERTY OF		desirence of the second section
.21 DIVERSION TUNNELS/FORTALS				en de la companya de La companya de la co		
.211 EXCAVATION		ipisige go ng ngagagagananananangan pali silamanani Mkaphainbannahif go ng	er e		The state of the s	
TUNNELS				All the second		The Mark Market Comment
ROCK	48,300	CY				
EXC. CONC. FOR PLUB	450	CY	Libraria campa identermo assistante qua ser d'Azistaphilip della , qui d'annesse e gi si e e	Alteria spiritaria de la compania del compania de la compania de la compania del compania de la compania del la compania del la compania de la compani	And the second s	End & Some the service of the servic
PORTAL UPSTREAH OVERBURDEN	1.750	CY		or for the second of the seco	**************************************	
ROCK	50,200	CY			3/4	
PORTAL DOWNSTREAM	Andrew To Problems	سيوين ٦. رو ٣. پېښانته تابه يې خدندگاينه السام خدوانه په	neli - Siminapai inserie w in teremine. Anis, unp dibairi di persero, , , , a, p. proje	No 17 Westerlift strengten in engagement-yak ett järne, springelift, elikif Alffa.	CASA (1999) Transferred general state of the contraction and contraction of the contracti	And the second s
OVERBURDEN	6,600	CY			3/4	
ROCK	54,000	CY	and the state of t	A Charles of the section of the Sect	3	works have defined because the contract of the
213 SURFACE PREP/BROUTING		and the second second				
FORTAL UPSTREAM	4,400	Ŝ₽				
HORIZONTAL	15,300			and the second s	And the last of the second sec	· · · · · · · · · · · · · · · · · · ·
PORTAL DOWNSTREAH	4474v	****				
HORIZONTAL	1,300	SF			3	
INCLINED	2,900		ميدوري	Alemania and a second discounting of the second sec	3	The Control of the Co
GROUT TUNNEL PLUB						
DRILL HOLES	2,050	<u>L</u> E	the state of the s	Spr = 20 M. map model: dispression, modeline six modeline.	3.	CONTROL AND AND MAKE MAKE MAKE
CEMENT	410	CF				
.214 CONCRETE & SHOTCRETE TUNNEL					and the second of the second o	
CONCRETE LINING	81100	CY		A STATE AND ADDRESS OF THE PERSONS ASSESSED.	3	ACCIDE TO SERVICE ON THE SERVICE OF
CONCRETE DVERBREAK 6	3,200	ĊŸ		•		
2' SHOTCRETE	4,400		applicated who are space. The digital is a line of the state of the st	as paper is 64 case separate for the separate	8 cm may be the transmission of the transmissi	
CONCRETE PLUG	3,000	CY				
REINFORCING STEEL	15	TON			3/4	
PORTAL UPSTREAH CONCRÉTE HEADWALL	2,800	CY.	and the second section of the second section of the second section of the second section secti	a copi fina : The Minimization wild in the High Section	gipalar ir ningu ir na kumain aptima ambaranini miga ir ni ir kumain maranin may ir at Vinding (Corp.).	
CONCRETE HEADWALL CONCRETE LINING	1,550	CY				
CONCRETE PIER	400	CY				
REINFORCING STEEL	310	NOT		Angele Company	The Control of the Co	
OVERBREAK 12"H/6"V	500	CY				
FORTAL DOWNSTREAM			en kaan alka 1 magaan ka ka ka magaan ka Magaan ka magaan ka m	ere to the second secon	The state of the s	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)
CONCRETE HEADWALL	1,000	CY				
OVERBREAK 12"H/6"V	100	CY				
REINFORCING STEEL .215 SUPPORT & ANCHORS	3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	TON	الأرازي المراجع المامية اليعم وحموا كالرواية	ing and the second of the seco	- a cop a commercia de la majaria de destrucción de destrucción de de la companya del la companya de la company	

FEASIBILITY STUDY ESTIMATE - ACRES AN DEVIL CANYON - "REVISION 4"	ERICAN				file: DEE	DS4.DAT871
EH DESCRIPTION	TITHAUD	ETINU	UNIT PRICE	THUUNT	TOTAL	RENARKS
The second contract of the second sec	gade vijek dilija (mija disa lijus vijek vijek disa ka	Constitute Surgerandinani is the N. William . The	annet anne anne anne anne anne anne anne	\$ 000	\$ 000	
ROCKBOLIS 1' @ 12'	800	EACH				3
ROCKBOLTS 1 9	90	ÉACH				3
STEEL HESH	. 76,900	SF		The second of th		3
STEEL SUPPORT	90	TON				3
FORTAL UPSTREAM			manda managalan samanig na 1818 at 181			
ROCKDOLTS 1 9 15'	80	EACH				3
ROCK ANCHORS 1º 8 23'	40	EACH				3
ROCK DOWELS	60	EACH	و يورنون	B. No Frankrich G. Spiecker	ed alsian out de semblementer : - semblemen	
PORTAL DOWNSTREAM	*	e A Min				
ROCKBOLTS 1° 9 15'	120	EACH				3
ROCK ANCHORS 1° 9 25' ROCK DOWELS 1° 9 10'	3 <u>0</u>	EACH_	construction and construction of the way of the construction of th	plants de since "primages que a destribución comunicia arma		
.210 HECHANICAL	0	EACH				
UPSTREAH GATE						
DATE EQUIPMENT		EACH	ing or a state of the contract	Provinci Valid winsterdsteinheit die Steinheit des Leiter des Steinheitsbescheiter bescheiter des Steinheitsbescheitersbescheiter des Steinheitsbescheitersbescheiter des Steinheitsbescheitersbescheiter des Steinheitsbescheitersbescheitersbescheiter des Steinheitsbescheitersbescheitersbescheitersbescheitersbescheitersbescheiter des Steinheitsbescheitersbescheitersbescheiter des Steinheitsbescheitersbesc	n etreta di cipanina della del	3
DOWNSTREAM OUTLET					1.3	
STOPLOG GUIDES	1	SET				3
STOPLOOS INCL: FOLLOWERS	1	LB	ajuningangan para at a erroringan ya kalamban antanginarin	n Marian (ni samunin majajajajajajajajajaja s _a 1 ₆ 1 ₆ 1 ₆ 1 ₇ 1 ₈		3
.22 UPSTREAH COFFERDAH						
.222 FILL 1	والمنافعة المورد والمراوية		oma kanifona – piana – opi de – m panagan de mai o ni	en a deservação de adestrações conhectados	The Springer Spring was a fine state of the Springer	
CORE	4,600	CY				3
FINE/FILTER	2,800	CY				3
COARSE FILTER	2,700	<u>CY</u>	-	· ***		3
ROCK SHELL	19.800	CY				3
CLOSURE DIKÉ	41,900	CY				3
RIP RAP	7,000	and the second s	and with the second section of the second se	er an eile legiste is Algebriggerich Despusieren der Fesp ichige		
.223 SURFACE PREP/GROUTING		•				
CUTOFF & GROUT	A. And) (m			•	7
HOLES GROUT	1,600 256,000	LF CF	and the second of the second o	***		
.22D DEWATERING	2001000	UF				
DEWATERÎND		LB				
.23 DOWNSTREAM COFFERDAM	de experience en minimistration de la constitución de la constitución de la constitución de la constitución de	marine and successful district the same of the same of	ON PROPERTY WITH AN EXPLORED TO THE METERS OF THE CONTRACT OF	- GAV (1-2) Sharikesida - 17 (14)	or, Additional and secure. While of prospers	and the state of t
.231 EXCAVATION						
REHOVAL OF CO ERDAN	42,000	CA				3
.232 FILL .			idan in the remove	The Control of the Co		enakangangan dir. 1946 - Andria dir. 1944 - Andria
RIP RAP	1,650	CY				3
CLOSURE DIKE	47,000	CY				3
.233 SURFACE PREP/DROUTING	en e					The second secon
CUTOFF & DROUT						
HOLES	2,300		reference or the same of the	فندر والمتعددة والرابية	سلمت يو وهونجه بهيئ	3
CEHENT	368,000	CF				3
.3 HÀIN DAN						
.31 HAIN DAH	no a magamba ngarandanya pamokala nya magamba a a	To the August See See See	en e		· · · · · · · · · · · · · · · · · · ·	
.311 EXCAVATION	ر. ما مرضوع المصطور الأراد ال					
OVERBURDEH	35,600	CY				3

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date: 12-FEB-82 file: DEEBS4.DAT071 rade: 9

TEH DESCRIPTION	YTTHAUD	UNITS	UNIT PRICE	TRUÖNA	TOTAL	REMARKS
And page this area on the second of the seco	province to the second province of the second secon	THE RESIDENCE COMES WHERE STATES AND AND ADMITS AND ADM	AND A 4	\$ 000	\$ 000	an yan di pandamatan kadi anga da kadi da maga anga anga anga anga anga anga ang
ROCK	320,700	ĊY			en e	
.313 SURFACE PREP/OROUTING	36417VV	W.I				
SURFACE PREPARATION	Mikateren 94 ermylumenti depropresiyasi — frança " der " e di — bila e	ra water and a second		e de matematika i kanala de ka Manala de kanala de	Name of the state	nana managaing lata dan aga bandana tarip ani dibina maga 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 1991 - 199
UNDER DAH/THRUST BLOCKS	171,000	SF				
CONSOLIDATION GROUT						
DRILL HOLES	176,900	LF	Committee on the second of the	The state of the s		3
CENENT	176,900	CF				2/3
GROUT CURTAIN.	and the second s	numa Contribute dell'in muni t. L'amender dell'	alle es comprésente des constants	r per	inski, prot. – Salisije opač, plikar pjerimanim nam	a palament makes and parameters in the same of
DRILL HOLES	259,000	LF				2/3
CEHENT	103,600	CF				2/3
.314 CONCRETE & SHOTCRETE		• • • • • • • • • • • • • • • • • • •	ngagan kama ayan ayan da kama ka kama ka kama da kama da ka da	to of action distribution and are an area of a set follow	ment a animal Metallity, it the principles	
DAH	1,281,000	CY				4
CONCRETE REINFORCINO_STEEL	4,500	TON				*
CONCRETE OVERBREAK	10,400	CY	mainte par tripo processo y substante despotante alla Estano segui	r or regregation agreement or section of the public of the section	**************************************	3
THRUSTALOCKS	******					
CONCRETE	105,500	CY				3
REINFORCING STEEL	375	TON	nga panakan mandada ka aliga magamin mahadilikin Marika ka pangah pada adibi di Ma	ettimaphin siite ii deeletti tii ja – ja ragi lähistimmuutsinet raavamuuda julkislahidi		3
CONCRETE ÜVERBREAK	1+100	CY				3
JOINT GROUTING		armely distance from the continues as a second state of the continues of t	g sjyddyggag gaarrenn offerfolio agol angr too the 5 jegochisagian ee - 2	the secretary is a second of the second of t		and the state of t
OROUTING	1	LS			and a second of the second of	
.315 SUFFORT & ANCHORS						
ROCKBOLTS 1 9 25'	580	EACH	the second secon	شابيبيني عاي سنساره ويتبين وويان والمراب والمراب والمراب		
STEEL NESH (ON SLOPES)	275.000	8F				
.317 DRÅINADE HOLES	85,800	LF				•
.32 OROUT GALLERIES/FORTALS	037000		-	dien. 2 An is me vier konsten autori ammirandes partir d'im-a		the state of the s
.321 EXCAVATION						
TUNNELS/SHAFTS - CORE AREA		· · · · · · · · · · · · · · · · · · ·				
ROCK HORIZONTAL	13,100	CY -	***************************************			2
ROCK INCLINED	5,300	ĊY				2
ROCK_VERTICAL	3,400	<u> </u>	manufactura de la companya de la com	سسسنيت مروش السباق بالباليات		<u> </u>
TUNNELS/SHAFTS ACCESS						
ROCK HORIZONTAL	12,400	CY				2
PORTALS	and the same of		manuska kalendari e sa kena sena	and the second state of the destination of the second state of the	and the second of the second second second	
OVERBURDEN	28,700	CY				
ROCK	16,500	CA			· · · · · · · · · · · · · · · · · · ·	
+323 SURFACE PREPARATION	The state of the s			ing the state of management and state of the	e der manuel en la la manuel en entre men	manifestados de 1960 de es de planesta de Aparilha de parados se de compres de describir en la compresa de compres
PORTALS HORIZONTAL	50	SF				3
INCLINED	410	SF				
.324 CONCRETE & SHOTCRETE	emine ausaniani megarinda bilipi et i dagi yi telak ke i seri i dagi yi telak ke i seri i dagi ya telah ke i d	P Said at Automorphisms (1) and (2) and (2)	gal yanda ana ini ni	Market and the second s	ng an mile a dise of a symbological backsistationed	and animalian appropriate biodesical relation baselines specification of the contract of the c
TUNNELS - CORE AREA						
CONCRETE SLAB	1,800	CY				2
REINFORCING STEEL	62	TON	***		Total many acts, all a control of the sandown	2/3
CONCRETE OVERBREAK 6.	900	CY				3

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SUSITNA HYDROELECTRIC PROJECT . FEASIBILITY STUDY ESTINATE - ACRES A	HERICAN	and the second property of the second	······································		19te: 12-	B84.DAT171
DEITE PANYMU CHPHENGAG AS					raie: DEE Pase: 10	I\ Hu Poq
TEN DESCRIPTION	RUANTITY	ETINU	UNII PRĪCĒ	AHÖÜNT		REHARKS
	and the state of t	Secreta demonstration with antichtic State,	The second secon	* 000	\$ 000	And the same were some and the sink sink sink said and sing sing
2° SHOTCRETE TUNNELS - ACCESS	\$,300	• SF				2/3/4
CONCRETE BLAB	1,400	CY	· · · · · · · · · · · · · · · · · · ·	sa inim Mississ	v. v. j. 1850. – Brit lejucienikovani nija mengi	2
REINFORCING STEEL	30	TON				2/3
CONCRETE DVERBREAK 6"	700	<u>CY</u>	mandisani - Aprilio ising) maji pagir i aprili i pagir i pagiri i			3
2° SHOTCRETE SHAFTS — CORE AREA	2,500	SF		n 16, 1986 Namenink navings (classically de 15)	WATER CONTRACTOR	2/3/4
		4.4				
2º SHOTCRETE	6,500	gr gr	ende sagradus as an	* From Wordships Indicated where the		2/3
PORTALS (4 PORTALS) CONCRETE						
REINFORCINO STEEL	40	CX				3
325 SUPPORT 1 ANCHORS		TON	The second secon	F. M N. M. School Marketon (de mark physiological) (1) Species	** • ** ******************************	3
TUNNELS - CORE AREA						
ROCKPOLTS 1 6 12'	150	EÁCH				
ROCKBOLTS 1. 6 3,	1 <u>30</u>	the second of th	magazinin karantari inakan akti akti akti ina mada karantari kan	· · · · · · · · · · · · · · · · · · ·		3/4
ROCKBOLTS 3/4° @ 6'	1,250	EACH EACH				3/4
STEEL SUPPORT	27	TON				2/3
STEEL HESH	12,200	SF SF	to the second se			2/3/4
TUNNELS ACCESS		ər				3 ,
ROCKROLTS 3/4' 8 6'	1+200	EACH				
STEEL SUPPORT	12	TON	The state of the s	latings op some on the one dispersional approach. We are understanding in		2
STEEL NESH	500	SF				2/3
BHAFTS - CORE AREA		•				3/4
ROCKBOLTS 3/4° 8 8'	300	EACH	Amender Camming L. myllin of distance observabled with the Tomb	M belt A second prima retaining the second of the second of		
BTEEL HESH	1:300	ŠF				2
PORTALS						
ROCKBOLTS 1° 8 15'	150	EACH	American (1945) - America (d. pr. cep. — de file deles antiques de	F. HOPP TOO - THE TE SPECIALISE PROMISED IN THE MESS AND		2
FORTAL DOORS	4	EACH	mangin sanink sepaké kindinink te e g t . sineppin g Hek . provincens na			3
DEVATERING HAINTENANCE VENTILATION SYSTEM		LS				3
(INCLUDED W/ 331.120)	naman ng saladah ng kada lang a sa s	and the second second second in the second s	A Section of the Control of the Cont	A THE SER OF THE ROOM PART OF THE	priide — Adryc. (1963) filosomposotom area on the initigate influence for	renadiophilan py minur a Andrews while bequite play a value, ag
.331 INSTRUMENTATION	The second secon	and the same of th	Annual Annual of African and Annual of African and Annual of African and Annual of African and Annual of A	A STATE OF THE STA		
INSTRUMENTATION 4 SADDLE DAM	1	ĹS		The same of the sa	THE PARTY STATES OF THE PARTY STATES AND ADDRESS OF THE PARTY STATES OF THE PARTY STAT	the state of the second
.41 HAIN SADDLE DAH						
.411 EXCAVATION	er retire estéres es musicas regulaires en la caria de la cari	· · · · · · · · · · · · · · · · · · ·	and the second s	Mark State Company of the Company of		
OVERBURDEN	عدد جوس ف			The second secon		ராளாள நாக்கிட்டுள்ள பாக்கி மார் கிறிபுள்ள வருக்கு முறிபுள்ள மு
ROCK	1,145,000	CY				3
.412 FILL	301,000	CY	andra de la companya br>Na amampia de la companya de la com	···	4	3
IMPERVIOUS CORE	المرقوبين فيدونها					
FINE FILTER	313,500	CY			•	3
COARSE FILTER	231,000 193,000	CY			a santain sa santain sa santain sa santain sa santain sa santain sa	3
OUPLOE VIELER	IYA+000	CY				

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SUSITHA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AMER DEVIL CANYON - REVISION 4°	RICAN		file: DEER84.DAT171 pudot 11	
ITEH DESCRIPTION	QUANTITY	UNITE UNIT PRICE	AMOUNT TOTAL REMARKS	<u> </u>
			\$ 000 \$ 000	•
participates for the participates of the second sec	1	CY		
RIP RAP	174,500	čy		ر روستان در
ROCK SHELL (DOWNSTREAM)	345,000	CY	The same of the sa	A R P P P P P P P P P P P P P P P P P P
ROAD BASE	3,500	CY		
ROCKFILL	127,000			
FILTER FABRIC	170,000	ŠF.		
FILTER FARRIC	1701000			
.413 SURFACE PREP & OROUTING			3 and design man over the property of the second se	en e
SURFACE PREPARATION	191,500	9F	4.5 4.8 - A A A A	
UNDER DAN CORE	432,500	SF	3	
UNDER DAN SHELL	The same to the same		and the second s	
DENTAL CONCRETE	7,100	CY	3/4	
DENTAL CONCRETE				
CONSOLIDATION GROUT	57,500	LF	AND THE RESERVE OF THE RESERVE OF A SECURIOR STREET, AND ADDRESS OF THE RESERVE O	
DRILL_HOLES	57,500	CF	2/3	
GROUT CURTAIN (SEE 332.313)				
UKUUI CUKIHIN 1000 300 1000			2/3	
.417 DRAINAGE (SEE 332.317) .5 SPILLWAY VALVES (IN DAM)				
,5 SPILLWAY VALVES (IN DAM)				
.51 SPILLWAY VALVES .519 VALVE CONTROL STR_(IN_DAH)			The second secon	
.519 VALVE CONTROL STR_(IN_DAR)	1	LS		
HISC, ELECT	- -			
.51C MECHANICAL TRABHRACKS/GUIDES	1	L8	3	
BULKHEAD BATE BUIDEB	1	LS		
BULKHEAD DATES & FOLLOWERS	1. 14. 12. 1. 2 . 1.	EACH		
DANTRY CRANE	<u> 1</u>	L9 · · · · · · · · · · · · · · · · · · ·	S. V. J. West C. S. S. W. Marketterstein Company and Control of Co	
FIX CONE VALVES(7 PLUS 2		san bi parametra de la companya de l		
SFARE)	1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /	1.8		
RING FOLLOHER GATES (7)	1_	LS	the same same same same same same same sam	
HISC. HECHANICAL EQUIPHENT	1	LS		
152 HAIN (CHUTE) SPILLWAY				
.521 EXCAVATION		to the second se	Winner Windows and Administration of the Winnerson September Community of September September 1974, a september 1974, and the	***
APPROACH	the state of the s			
OVERBURDEN	44,000	EY	2/3/4	
ROCK USEABLE	80,000	CY	4/3/4	•
ROCK WASTE	17,000	CY		
CONTROL STRUCTURE				
(TO END OF ROLLWAY)		and the same of the anti-matter to the same of the sam	Commission of the second of th	F. 7.
OVERBURDEN	21,300	CY		
ROCK USEABLE	87,000	CY		
ROCK WASTE	13,000	CY	A REAL WAY AND A SERVICE AND A	
CHUTE & FLIP	Military was displayed as the second of the second			
(END ROLLWAY TO END FLIP)				
OVERBURDEN	128,300	CY	171/A	
ROCK USEABLE (INCLINED)	38,000	CY	2/3/4	
ROCK USEABLE (VERTICAL)	401,000	CY		

FEASIBILITY STUDY ESTIMATE - ACRES AN DEVIL CANYON - "REVISION 4"	ierican				file: DEEBS4.DAT/71 Pade: 12	
ITEN DESCRIPTION	QUANTITY	RTINU	UNIT PRICE	AHOUNT	10TAL REHARKS	
		سندريس: حجازه خرمسينيست سين		\$ 000	\$ 000	
ROCK WASTE	93,500	CY				
OUTFALL	the second seconds as the second a		والما والمواقع المالمودانا والموا	n ng nguya - 4-11-16-20-14-16-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		twinds
(FROM END OF BASIN) OVERBURDEN	44,500	CY				
ROCK USEABLE	141,500	CY			2/4	
ROCK WASTE	41,300	CY	Paradelines and House Service & the sales of the Antonio			The same of the case of the ca
DRAIN TUNNEL	727000		•			
ROCK HORIZONTAL	1,500	CY.				
ROCK INCLINED	2,300	ĒΫ	agents of term in a dead on the end of the depth of the arrange of	***************************************		rialitatik Indonesimunga
RIVER CHANNEL						
ALLUVIUH EXCAVATIOH	67,000	CY	renominariosos y ijarės kantas — i iraspirė įsikoj vastinis.			k, daga in Nasa, ay ga
523 SURFACE PREP/ORDUTING						
SURFACE PREPARATION		•				
SPILLWAY	400 000		Committee of the Sanks Novel and the significant	to 45 and pipelingual belower.		an desc _a e
ROCK HORIZONTAL ROCK INCLINED	108,000 41,300	5F 8F			2 2/3	
CONSOLIDATION GROUT	417300	or.				
brill Holes	22,000	<u> </u>	بالتفريق الديمة المهمسينية بعثم التعم المعمد المرتسبين	ر چېرونونونونونونونونونونونونونونونونونونون	, and proceedings that the contract of the con	
CEHENT	22,000	ČF			사람들은 사람들이 나를 다 하는 사람	
GROUT CURTAIN						
(SEE 332.313)		· · · · ·		And unit the second property and second the		-
.524 CONCRETE : SHOTCRETE						
CONCRETE STRUCTURE .			rhange & at annimate spir spray arrange . And table 27 273 to got	نبه نستنداه سنهاسته منت		
(TO END OF ROLLWAY)						
(INCLUDING STORAGE AREAS)	in in	Ma La				
CONC OUTER WALLS	12,200		we see: 'sid para - as one - 4.016 large - impire points sid	ningagia malagratissi septekkan menang a temp	····	manus (agla
CONC PIERS (FULL LENGTH) CONC DECK	7,700 1,600	CY			2	
CONC ROLLWAY SLAB	33,000	CY			5	
CONC OVERBREAK 12'H/8'V	1,400	ĊŸ	pagamintagagrapi s simana — in majorathian phillips a traspisa		2	THE PERSON OF TH
REINFORCING STEEL	21300	TON				
CONCRETE CHUTE & FLIP						
(END ROLLWAY TO END FLIP)	The second secon					
(INCL BOX DRAIN GALLERIES)						
CONCRETE SLAB	13,000	<u>CY</u>	rangerer galt kalendage giv. et in visit til klasse vige sklasse.	App. 150-1- hally day and 21 - A desired continuent	Z	· · · · · · · · · · · · · · · · · · ·
CONCRETE VALLS	20,500	CY				
CONC OVERBREAK 18 H/6 V	61300	CY				
REINFORCING STEEL CONCRETE DRAIN GALLERY	1,300	TON		with the water that the comment	ngik (Shike et	The Sec.
CONCRETE BLAR	400	CY				
2° SHOTCRETE DONE	2,500	SF				
REINFORCING STEEL	14	HÖT	age seek villings of the seeks	Banyos e aye	3/4	PERCENT SE M
CONG OVERBREAK 6	200	CY				
.525 SUPPORT & ANCHORS	المناور والمراور والمراوي والمراوي والمراور	4	angunta ang at mang at		and the state of t	
DRAINAGE TUNNEL		The second secon				
STEEL SUPPORT	A	TOH			3	

FEASIBILITY STUDY ESTIMATE - ACRES AME DEVIL CANYON - "REVISION 4"	rican	ar h maringa aran ada mang aran sandi 1 da da Agantan ang a			date: 12-FEB-8 file: DEEB84.D pade: 13	the commence of the state of th
ITEM DESCRIPTION	QUANTITY	UNITE	UNIT PRICE	THUOHA	TOTAL REM	ARKS
and finding the specific of the specific field of the specific	e eminimistra e e e e e e e e e e e e e e e e e e e	an annual communication of the state of the	· · · · · · · · · · · · · · · · · · ·	\$ 000	\$ 000 m	
STEEL NESH ROCKBOLTS DRAINAGE GALLERY	500	8F				
3/4° 8 6' ROCKBOLIS APPROACH	700	EACH				
ROCKBOLTS CHUIE & STRUCTURES	110	ENCH	nakulan harakini shine. Akan yaya bir ila balar da ila ila ila ila ila ila ila ila ila il	and the state of t		
1° 8 15' SLAB/WALL ANCHORS	85	EACH			2	
1'8 10'	3,700	EACH	The state of the s	ESS ACTIONS OF CASE NAME	2	t the contest that an expensed to proceed that they will be considered to the
.527 DRAINAGE DRILL HOLES						
BOX DRAINS-TO DRAIN TUNNEL	28,000	LF LF	nder dem later). Der der W. englischender der der Leifergerichten der mitter betreuten andere Bellette Walter und zu erleit.	The other physical production of the second section of the section of the second section of the s	3	transmission that the sea of the season of t
3" RELIEF	300	LF.			3. ·	
	3	EACH	nism () Name simmed (s) of the same simple substitution of supervision ()) of the Di	der als dere die de Chara administration des appayents a	gy ad an aga agai gy sanan aga aga ag	and the second s
STOPLOO OUIDES	3	SETS			3	
STOPLOGS INCL FOLLOWER		BET LB	AND THE PARTY OF T	angerifians p.a. Affering house private as quantagings	3	
HISC. ELECT53 EMERGENCY SPILLWAY .531 EXCAVATION (INCLUDING -						
BRIDGE & FUSE PLUO)	Mathematica i de la conferencia de la c	in the second se	-c. nac transformation falores in classific annual symmetric minimates in the first of the classific annual symmetric materials and the classific and the classific annual symmetric materials and the cl	, apig i ramandi — iki apini jaki — japoliyinink Singhayadalalalalah 1956	t 2. Carles Services (no. 100 constitution) of the constitution of	
OVERBURDEN	281,500	CY			2/3 2/3	
ROCK USEABLEROCK WASTE	1,019,000 215,500	CY CY	and the second s		2/3	
1532 FILL						
FUSE PLUO	26,000	<u> </u>	enterent land the service of the ser	politicans was an electric description of the first for	<u> </u>	minimum an east plants arrives d
.533 SURFACE PREP/GROUTING SURF. (PREP UNDER FUSE PLUG)						
HORIZONTAL	75,500	SF			2/3	/4
INCLINED	2:500	ŠF.	mercanis amo e, sindi gramasamo, ha de mente ancipa de 3, 2, 93 dago, 3, 5, 300 970	ake, administrative stratific responsible to the space . Appl of the ability, ability, ability.	2/3	/4
CONSOLIDATION GROUTING	23,000	LF			2/3	
DRILL HOLES CENENT	23,000	CF	management of the state of the state of the state of	and the second of the second of	2/3	and the state of t
GROUT CURTAIN (SEE 332.313)						
.534 CONCRETE		ni principal de la complementa de plajago que de principal de la complementa del complementa del complementa de la complementa del complementa de la complementa del complemen	·	alia da para da di da angarana da di da angarana	in the same of	
GROUND BLAB	6,000	CY			3	
REINFORCING STEEL CONC GVERBREAK 12*H/12*V	210 3,000	HOT CY				
.535 SUPPORT & ANCHORS	mer y marchine and G. P. D. O. C.	animenta y regar y nagra y sa 🥞 🎉 j		AN 化抗型配换 油 数据	ar ar en	and annihilation that therein and playing which was
ROCKBOLTS 1' 0 13'	300	EACH			2/3	
ROCK ANCHORS 1° 8 25'	760	EACH	and the second s		2/3	Commence and Commissionary agreement of the Assessment
.538 STRUCTURAL-NISC. STEELWORK GUARD RAILS, PADS, ETC	650	LF			2/:	
.53B BRIDGE		ang dia ng Tao Sangaran. Ng katalong panggan nagatan ng katalong ng katalong ng katalong ng katalong ng katalong ng katalong ng katalon	ing talah di Sebagai Kabupatèn Babasan Baba Babasan Babasan		The second secon	growskie za war war war war war war war war war wa
BRINGE	a de la companya de	LS			2	

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date! 12-FEB-02 BUSITNA HYDROELECTRIC PROJECT Filel DEEBS4.DAT171 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN DEVIL CANYON - "REVISION 4" P# ! 14 QUANTITY UNITE TOTAL UNIT PRICE AHOUHT REHARKS .6 POWER INTAKES .61 FONER INTAKE STRUCT & APE .611 EXCAVATION 77,000 OVERBURDEN 3/4 ROCK 201,600 .613 SURFACE PREPARATION HOR1ZOHTAL 12,100 3/4 INCLINED 50,000 .614 CONCRETE & SHOTCRETE STRUCTURE 14,500 CONCRETE STRUCTURE REINFURCING STEEL 940 TON 3/4 1,530 CONC OVERBREAK 12"H/6"V 3/4 CY 1615 SUPPORT & ANCHORS APPROACH ROCKBOLTS 1' @ 15' 3 140 EACH .61C HECHANICAL TRASHRACKS & GUIDES BETS BULKHEAD DATE BUIDES BETS BULKHEAD DATES & FULLOWERS BET INTAKE GANTRY CRANE EACH INTAKE GATE EQUIPMENT EACH HISC. ELECT. LS .610 INTAKE BUILDING 3/4 INTAKE BUILDING 1 . .7 SURGE CHAMBER .71 SURGE CHAMBER .711 EXCAVATION CHAMBER BOCK 57,000 VENT SHAFT ROCK 2,300 .713 SURFACE PREPARATION 16,200 SURFACE PREP .714 CONCRETE & SHOTCRETE CHAMBER CONCRETE CHAMBER 3 BHOTCKETE 1.400 2" SHOTCHETE 1,300 SF REINFURCING STEEL 160 CONCRETE OVERBREAK 500 VENT SHAFT 2° SHOTCRETE 6,300 CHANBER ROCKBOLTS 1' # 25' 320 EACH

330

STEEL SUPPORT

	SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTINATE - ACRES AND DEVIL CANYON - "REVISION 4"	IER1CAN	***************************************				paset 15	984.DAT#71
ITEH	DESCRIPTION	QUANTITY	UNITE	TINU	PRICE	ANOUNT	TOTAL	REHARKS
	DESCRIPTION		pai un ann am am der die 1865 26 . A 2 Garpennanceinnen S 1840 - 185		\$	1 000	\$_000	n of the same and administrative constraints of the state of the same of the s
***	STEEL NESH	12,900	ŜF					3
	VENT SHAFT	400	EĀCH		e medicae y tr e n. Otoboro		se el e stado dese	3
	ROCKBOLTS 3/4° & 6' STEEL NESH	1,300	TON					3
	.8 PENSTOCKS	13,650	T.F.	13 Patricina crayer 4	***************************************	- The state of the		To the state of th
	.81 PENSTOCKS	manus de la companya	ne alles the district to \$1,446 and \$1.45		The second second	Arsens (Nov. 12-37 to		gegenerationelle - basie yentyjytyn dat ardelf little F. M.
*	.811 EXCAVATION							
	TUNNELS							3/4
	ROCK HORIZOHTAL.	19,800	<u> </u>	-	e na ominativa in income	g - a sammanament milita	THE REAL PROPERTY AND DESCRIPTION OF THE PERSON OF THE PER	3/4
	ROCK INCLINED .013 SURFACE PREP/OROUTING	25,000					D - no allowation of horizontal trade a sent of	
·	SURFACE FREFARATION	141,300	8F	(11.35) 300 - 4 - 20 04 5 1 4 14 14 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	AND THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TO THE PERSON NAMED IN COLU	A CONTRACTOR OF THE PROPERTY O		3/4
	CONTACT GROUTING				.2			3
	CONTACT BROUTING	1	L8_			substant in a committee of		
<u>, </u>	CONSOLIDATION GROUTING CONSOLIDATION GROUTING		LS					
	.014 CONCRETE & SHOTERETE	14,400	CY		هرمة صد عبي	espect	M (And Sec. 4. 8 January of the Sec. 4. 8 Jan	3/4
	CONCRETE LINER	1777V A	TON					3
	REINFORCING STEEL	15,400	SF			and the second sections of the second		3/4
	2° SHOTCRETE CONCRETE OVERBREAK 6°	3,800	CY	and the same of				3/4
	CONCRETE FLUO	10,000	ĊY					4
	CONC OVERBREAK PLUG		CY_	tu nadaje i stanjeno o nie do		enter and proper a see in a finance	Ar +	3/4
	.815 SUPPORT & ANCHORS							3
	ROCKBOLTS 1° 8 23'	100	EACH					3/4
	ROCKBOLTS 1. 8 6'	1,100	EACH	****	ه پ رسمانید بیشته در سربی در در	-	***************************************	3/4
	STEEL HESH	70+200	8F					
money programmer in the second	.818 STRUCTURAL - HISC STEEL WORK	1,600	TÖN	ाकुट <i>ा संस्थित कुर</i> ा ऽ		g a sa wa a	destination of condition in the contract the	A CONTRACTOR OF THE CONTRACTOR
	.9 TAILRACE WORKS .91 TAILRACE TUNNELS, PORTALS .911 EXCAPATION				## # # # # # # # # # # # # # # # # # #	The same of the sa	to the speciment of the	and the second of the second o
**************************************	TUNNELS ROCK	329,300	· CY					3/4
in a second	PORTAL	42,000	CY			***		And the second s
	OVERBURDEN	15,000	ČÝ					
	ROCK	40,444					Salah Sa Kabangaran Salah Sal	48.0 × 1-ye · Next. Antiquing and a security and water ·
	913 SURFACE PREPARATION	Anna and Ann	- ब अ पुर कार्यक्रमः । प्रचारिका रः १ क्षरः । १ ९		The second secon			
	PORTAL HORIZOHTAL	2,500	SF					
a de la c	INCLINED	1,000	8F				والمستوالية والمتاركة	A MARIE AND A MARI
	TUNNEL							3/4
	TUNNEL	582,000	SF					ar an ar an a n an

	FEASIBILITY STUDY ESTIMATE - ACRES AHER	itan					file! DEE	BB4.DAT#71
	DEVIL CANYON - *REVISION 4*						LENK! TO	
ITEH	DESCRIPTION	YTITHAUB	BTINII	THIT	PRICE	THUOHA	FOTAL	REHARKS
	The first first first was from that their first was now have their tide risk was from the source for first was from their tide was first tide for the first tide of the first	THE SECTION SE		*)	\$ 000	\$ 000	and first free year too, but was sind any are say.
	K. and to go take a seek a tree of the contract of the contrac				ा कृत्य रहा को सक्त भीको श्रीकृतिहरू क्री अब	் உட பதிரையை இட்டியில் இவரை விறுவ ள்		
	.914 CONCRETE & SHOTCRETE TUNNEL							
	CONCRETE LINING	31,700	CY		The second secon	A to a graphical section of the sect		3/4
	CONC OVERBREAK 6'	16,200	CY					3/4
· · · · · · · · · · · · · · · · · · ·	2 * SHOTCRETE	17,500	SF					3/4
	REINFORCING STEEL	13	HOT					3
	PORTAL							
	CONCRETE BABE_BLAB	100	c <u>y</u>		a man managan	-	- marketing - the section of the	
	CONCRETE WALLS	650 50	CY				rate and the second	
	CONC OVERBREAK 12'H/6"V	50 30	CY					3
	REINFORCIND STEEL .915 SUPPORT & ANCHORS		iou		- 177 - Tarantinia (1874) 1874 - 1874	which is a spring in an interest and in the con-		
	TUNNEL							
	ROCKBOLTS 1' 0 12'	3,160	ĚÁCH					3/4
mail and an included	ROCKBOLTS 1 . 9'	190	EACH	energy of gradual and a second	The Commission of the Print	militaria di di 1925 profesionale dell'anni de militaria de l'anni	ada establish director experience and	3/4
	STEEL HESH	271,000	SF.					3/4
	STEEL SUPPORT	232	TON	<u> </u>				3
	FORTAL							· ·
	ROCKBOLTS 1 0 15'	50	EACH					3/4
غامتين سنس بهرور سند.		-		androphalog ag	ernaganytan synamona brito o giron untik	t and the first to a stand material, and these		بيان المستحد والمستحدد والمستحدد والمستحدد والمستحدد والمستحد والمستحدد والمستحدد والمستحدد والمستحدد والمستحدد
	STOPLOB GUIDES	1	LS	teria. Altorio de lo s tre				3
	STOPLOGS INCL. FOLLOWER	I	LS					
333	WATERWHEELS, TURBINES & GENERATORS				مستوهنه مستدي	arian panga di Mandair Cini ana an		
	1 TURBINES & GOVERNORS							
	.11 TURBINES & GOVERNORS							
termina i papa i tari pi at at at at	.111 SUPPLY	4	EACH	American September 18 September	- अ. स्टब्क्ट कंपन्निशिक्कान्त्रकः ३,०००	and in the taining distance of the control of the c	فيواده والمسافحين بمستقى موسوع والمقتسم المدوسة	<u>Banang danan akan akan bentengan pengangkan dala</u>
	.112 INSTALL .	4	EACH					
	.2 GENERATORS & EXCITERS					-		
1	121 GENERATORS & EXCITERS							
	(SUPPLY & INSTALL)		*************************************		an Nation			
· · · · · · · · · · · · · · · · · · ·	.211 GENERATORS & EXCITERS		EACH_	cy: # popt pacagam cg	Marriages was been as a	in and the second secon	المساولين والمائية ووجاها والاداء والماء الماء الماء	<u> </u>
****** A	AMERICANY PLEMANONAL PRINTER							
334	ACCESSORY ELECTRICAL EQUIPMENT							
	.1 CONNECTION, SUPPORTS & STRUCT.	-			an an displace in Albert Salame sha	K. or a file of absolute the property of the state of the	And the best of the same of the same of	ng diginahan managa pagama manga pangangan bahan mangan pangan bahan bahan bahan bahan bahan bahan bahan bahan
	+111 STRUCT (INCL BELOW)							š
	ganta illustrate againg ct.							
-	.12 CONDUCTORS \$ INSULATORS	a paragraphic services and a service of the service	LS	** * *		N. NOV. THE DW. BOX PATENCE SHOULD SEE	an de la completa de	Ex agricultura pare de la la la garació mentionales des estadores de la comunidade de la co
	.122 HV FONER CARLES & ACCESS.	1	L.8					
	.123 LV POWER CAPLES & ACCESS.	1	LS					
	.124 CONTROL CAPLES & ACCESSURIES	and the second section of the second section is a second section of the second section	LB	* ** ***		kan ang at kaon na managan Tanggarang	orananski i Marsi - karamanak arabaniania	en e
	.125 GROUNDING SYSTEM		LS					
والمستعدد المستعدد	.13 CONDUITS & FITTINGS	a phonony as a sing or or original phonony as a single-	مستنس مناصا مدرون ورور				ر المراجع الم	nach deministrative street, de service des 1850 ; 1987 - 1 decembration
	.131 CONDUITS & FITTINGS	1	LB	* * * * *				

SUSITNA HYDROELECTRIC PROJECT dute: 12-FEB-82 Tilel DEEBSA. DATI71 FEASIBILITY STUDY ESTINATE - ACRES AMERICAN Poster 17 DEVIL CANYON - 'REVISION 4' ANOUNT TOTAL QUANTITY UNITS UNIT PRICE ITEM DESCRIPTION . \$ 9 000 \$ 000 .2 SWITCHGEAR & CONTROL EQUIPMENT .21 AUXILIARY TRANSFORMERS .211 AUXILIARY TRANSFORMERS .22 CIRCUIT BREAKERS ,221 CIR BRKRS (NOT REQ'B) .23 SURGE PROT & GEN CUBICLES LB .231 SURGE PROT & BEN CURICLES .24 SWITCHBOARDS 1 LS .25 AUX. FOWER EGFT-INCL BAT .251 AUX. FOWER EOFT INCL BAT 1 LS
.3 CUBICLES & APPURTENENCES .31 CHTRL RELAY & HETER. BRDS. .32 COMPUTER CONTROL SYSTEM .321 COHPUTER CONTROL SYS 3 IHCL IN 353 .33 SUPERVIS. & TELEMETER. SYS 3 INCL IN 353 .4 POWER TRANSFORMERS .41 PONER TRANSFORHERS EACH .411 FOWER TRANSFORMERS .5 LIGHTING SYSTEM .51 LOT, P/H & TRANS GAL .511 LIGHTING F/H & TRANS GAL .52 ACCESS TUNNELS & ROADS ,521 ACCESS TUNNELS & ROADS .6 MISC. ELECTRICAL EQUIPMENT .61 HISC. ELECTRICAL EQUIPHENT .611 HISC. ELECTRICAL EQUIPMENT BURF. ACCESS. ELEC. EQUIP. .71 4.16 KV & LV EQUIPHENT .711 SWITCHBOARD CABLES .712 .713 AUX TRANSFORMER 73 DIESEL GENERATORS - STANDBY .731 DIESEL GENERATORS - BTANDRY 2 .74 EXTERIOR LIGHTING .741 EXTERIOR LIGHTING LS HISCS. POWERPLANT EQUIPMENT .1 __AUXILIARY BYSTEMS _ UNDERGROUND .11 STATION WATER SYSTEMS .11 STATION WATER BYSTEHS
.111 STATION WATER BYSTEHS 1 LB
.12 FIRE PROTECTION BYSTEHS 1 LB
.121 FIRE PROTECTION BYSTEHS 1 LB .13 COMPRESSED AIR SYSTEMS

BUSITNA HYDROELECTRIC PROJECT Jete: 12-FEB-82 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN fills DEEBS4.DAT171 DEVIL CANYON - REVISION 4" Pudet 18 QUANTITY UNITS UNIT PRICE ANDUNT FOTAL ITEM DESCRIPTION .131 COMPRESSED AIR SYSTEMS .14 OIL HANDLING SYSTEMS LS .141 OIL HANDLING SYSTEMS .15 DRAINAGE 2 DEWATERING .151 DRAINAGE & DEWATERING .161 HEAT, VENT & COOLING SYS LS .17 NISCELLANEOUS LS .171 HISCELLANEOUS .2 AUX. SYST. - SURFACE FAC. .21 AUX. SYST.-SURFACE FAC. .3 AUXILIARY EQUIPMENT .31 POWERHOUSE CRANES EACH .311 PONERHOUSE CRANES .32 ELEVATORS LB .321 ELEVATORS .33 HISC. CRANES & HUIST .331 MISC. CRANES & HOIST .34 COMPENSATION PUMPS EACH EACH .35 HACHINE SHOP FAC. .351 HACHINE BHOP FAC. .4 GENERAL STATION EQUIPMENT DENERAL BYATION EQUIPMENT LB .5 CONKUNICATIONS EQUIPHENT CONHUNICATIONS EQUIPHENT LS 336 ROADS .1 ROADS .12 SITE ROADS SITE ROADS HAINTENANCE .13 TRANS DAN CROSSING HILE CONSTRUCTION .14 PARKS HWY - DEVIL CANYON 212 HI/YR'S HAINTENANCE TRANSMISSION PLANT 350 LAND & LAND RIGHTS

	FEASIBILITY STUDY ESTIMATE - ACRES ANER DEVIL CANYON - 'REVISION 4'	RICAN				Page: 19	994.DAT 171
ITEH	DESCRIPTION	QUANTITY	UNITR	VÄÏT FRĪCĒ	ANDUNY	TOTAL	REHARKS
					\$ 000	\$ 000	aj ar trimpatigga i rapija ir sammas, iki dakti sir ibi simpa ar baki s
	LAND & LAND RIGHTS						
352	SUBSTATION & SWITCHING STATION SUBSTATION & SWITCHING STATION STRUCTURES & IMPROVEMENTS						
. 1			L9		* 2.5 (4. m) 1994 - Spins	and the same of th	an giring benevati kalancara ki karancara manana di Pinis yak ki karanca karanca
353	SUBSTATION/SWITCHING STA EQUIP SUBSTATION/SWITCHING STA EQUIP						
	ESTER WILLOW KNIK ARM	1	LS LS LS		A sign demonstration of College Service (College Service Servi		
	UNIVERSITY WILLOW ENERGY HANAGE SYS (EMS) WATAHA & DEVIL CANYOH IN-		L3			t de man management de la company	
	PLANT NONITOR & CHTRL EOPHT		LB				
354	STEEL TOWERS & FIXTURES STEEL TOWERS & FIXTURES TOWERS (INCLUDING FOUND-	de des la companya de la companya d		ngganista mangunggi baja uni danga - a danah mangunggi baja uni danga	na agail ang at ang an a ag attant ag ang ang ang ang		
	ATION & HARDWARE)	546	<u>EACH</u>	Silvanesser militari gigo et gigadió (), c v espeny som de gresse	· · · · · · · · · · · · · · · · · · ·	<u> </u>	
356	OVERHEAD CONDUCTORS & DEVICES			alle an elle spanier se elle elle elle antique antique a	r Sacjo Andreas ablain dengre deprinap de in	و ماد و دو الماد و دو	
	CNDTRS 2 x 954 kcmil/phase Subharine Cables (3)	124 1	HILE				3
359	ROADS % TRAILS ROADS & TRAILS			Acceptance of the second of th			
	GENERAL PLANT					and a whole is the might be an in the second of	
387	LAND & LAND RIGHTS LAND & LAND RIGHTS (INCLUDED IN 330)		**************************************				
390	STRUCTURES & IHPROVEHENTS STRUCTURES & IHPROVEHENTS (INCLUDED IN 331.2)	namentali salahanna dalah nagari sasa da				THE SHEET SEE	

	FEASIBILITY STUDY ESTIMATE - ACRES ARE DEVIL CANYON - "REVISION 4"	Rican				ाक्षा चर्च अन्यक्ष्मा का पहली । श [े] ला शेष्य क्षरे शिक्षाक्ष्य स्थापित	dete: 12- file: per page: 20	FEB-02 BB4.DAT171	
TEH	DESCRIPTION	QUANTITY	UHITS	UNIT	PRICE	AHOUNT	TOTAL.	REHARKS	
						\$ 000	9 000		
	교회에 돌아가고 하는 때 전환 경험이 되는 것도 하고				•				
591	OFFICE FURNITURE/EQUIPHENT B		aply desirable day. Sures Springarings and	· · · · · · · · · · · · · · · · · · ·	oman opačto be deset	: aga disalge . a jaja-d dismolojaan ayahili alabahasi caa			nerical material and the second
	OFFICE FURNITURE/EUGITHERI B								
372	TRANSPORTATION EQUIPHENT				da akan, acinta parta - PA - Net papa	C KWARISHES AND CONTRACTOR OF THE STATE OF T	ii adamada 4 dala dala dala dala dala dala dala		
	TRANSFORTATION EQUIPMENT B								
393	STORES EQUIPHENT								
	STORE! EQUIPHENT B								The second secon
19 4	TOOLS SHOP & GARAGE EQUIPHENT								
×.*X	TOOLS SHOP & GARAGE EQUIPMENT B				and a survey named on the survey of	* * * * * * * * * * * * * * * * * * *			
4A.P	t saikteano pauditruit								
395	LABORATORY EQUIPHENT B								
376	FOWER OPERATED EQUIPMENT B					والمستون والمستون والمستون والمستون والمشروة والمستون والم والمستون والمستون والمستون والمستون والمستون والمستون والمستو			
	LOMEK DEEKHIED EAGILUEUI B								
397	COHHUNICATIONS EQUIPHENT	identina praesionalista della constituta di seria della constituta di seria della constituta di seria della co			,, t t	nie der Gart sale antengenant de anderster in intermeter de sie			
	COMMUNICATIONS EQUIPMENT B								
398	HISCELLANEOUS EQUIPHENT								
	HISCELLANEOUS EQUIPHENT B			ringerija (galangi (g					
-#A	OTHER TANGIBLE PROPERTY								
377	OTHER TANGIBLE PROPERTY		adamentary a market his discontinuation in the straight . The immany	managan disam tanggi taniah diseji atkatajar	and a second sec	n 1960-1974 Milyanderskips, A Milyanderskips de makrips (200	en estima de armoudo de departo armoudo de a r	بعد منيث ويعاهم جيئولية بمادي بمستورس فالميرس	manifestati organi deper
	OTHER TANGIBLE PROPERTY	1	LS						
· · · · · · · · · · · · · · · · · · ·	and the second s	and the second s	· Annual Company of the Company of t		and the second s	rate 1879 of the State of Stat			
	INDIRECT COSTS								
	Statistics at \$P & \$0.	r, prider pli 350 Mr. mir. Andrew is sin radiosus manuscidore, un consciuence sen	a minimakan kanganinin san asa maganga - masa sanasa maganga	erdeka diskakan basika ka	ing significant section of the secti	and the same of the contraction	y spojsky americansky popularista	to the state of th	and and and and and
61	TEMPORARY CONSTRUCTION FACILITIES								
0.1	TEMPORARY CONSTRUCTION FACILITIES								
	(INCLUDED IN DIRECT COSTS)	and the second	ikipi saan adi hangan ada afranjaan in aana taikini in giraninia.	Marine and 1993 1 1997	tera de disposa coma impos	egi (M. Dirigida) — M. yan yanggari (uraindunk ir ilganii sam r addinii u radd <u>a</u> r ranii ban alaada	Contraction of the second section of the section of the second section of the secti	an Armania.
62	CONSTRUCTION EQUIPMENT								
`. `.	CONSTRUCTION EQUIPMENT	dang pakeuna semalah darmaniak ah amandagai mej ga di da , dija-	genderack, v B riphys they	and was	e de la companya de La companya de la co	d salah e saja saja na dipinik inga	company mini de l'adapte a	na a summinimistraturi (16. salah 16. a ah firma	File Spinisterior (etc. 1870)
	(INCLUDED IN DIRECT COSTS)								
3 3	MATH PHUOTPHINTTON CAMP	remarked house is a second speed to the second		Mariantenia y - 1997	ஆன் அரசு மார்க்கள் இது இது இரசு இது இது இது இது இது இது இது இது இது இத		ije - tresamicio moindilė pragigija sassadil		N KAMPATA NIN SI PANGANIN NI
0 3	HAIN CONSTRUCTION CAMP .1 HAIN CONSTRUCTION CAMP								
	.11 SITE PREPARATION	des Names à la mais de la se se	y - y a kyy ah daga ani ani ani ani ani ani ani ani ani an	erane.	a .	n describing case .	and the second s	ada a a company de a company de c	on mister
	CLEARING & STRIPPING	93							
	INSTALL GRANULAR PAD	7.5Y # 4UU	CY						

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SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTINATE - ACRES AHER DEVIL CANYON - "REVISION 4"		ne' agair yan dipakana a menganana kan 19 8 2 2 2 4 .			FER-82 EBS4.DAT171
ITEH DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AHDUNT TOTAL	REHARKS
	The second second second second second	named the desirence of the SES OF S.	Commence of the second		
	en de Maria. Maria				
CONSTRUCT ROADVAYS HAIN ROADS IN CAMP-E34/3					
CONNECT. RD. TO ACCESS RD.	7,200	LF	24 1 2 1 2 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1		***
SECONDARY RD [24/]	400	LF			
DRAINABE			manufacture transfer of the different states of the control of the	The part of the second	and the second s
DITCHING	31,400	LF.			
CULVERTS	640	LF			
PERIHETER FENCING PERIHETER FENCING	7,850	LF			The second secon
PARKING AREAS	77000				
PARKING AREAS	37,000				The state of the s
.12 BUILDINGS					
BACHLR DORHE-108 HAN CHPLX	28	EACH	THE STATE OF THE S		28' x 224'
PACHLE DORNS-HGHNT-TYPE A		EACH-	a to although the Mr. I debies to a server representation to a	a 4 g · statement supported to plant the second supported to the second support to the s	28' R 120'
BACHLR DORMS-HOMNT-TYPE B GUEST HSES-1 EA OWN/MOR/CON F		EACH EACH			24' x 120' 28' 7 120'
CAMP HANAGER'S OFFICES		EACH-	antai jälikulisejan paavanta vasta säy -sikkikuu suki. Ari kunnastan par san karitaistikkan		-30'-x-40'
STAFF CLUBHOUSE	Ĭ	EACH			50' x 80'
DININO HALL	i	EACH			120' x 80'
DINING HALL		EACH-	many and a second was a second	F TO A STATE OF THE PROPERTY OF THE PARTY OF	
RECREATION BLDG.	1	EACH			120' x 160'
RECREATION BLDG.	1	EACH			10L x 120'
SECURITY OFFICE		EACH EACH			200' x 200'
FIRE STATION		EACH			40' x 80'
	and the same transfer and the same of the same	EACH	ar de la company	n en enne de france (2.000 a laccidade en como que en 2.000 partir en	40' n 80'
HAINTENANCE BLDO.	1	EACH			80' x 100'
WAREHOUSE - MANAGERS	1	EACH			100' x 120'
		EACH -	akan mengangan panggan digitan ang panggan kepada salah salah salah berada	erik isalah - Arik man dipunan magas dibahan mana arin mananin mengalah dan mananin dipunan dan dipunan dan da	
CONHUNICATION BLDG.		EACH			20" x 30" 120" x 140"
ICE RINK	and the second s	EACH.	Been schwere, and the school of the school	The state of the s	
BANK		EACH			50' x 60'
STORE	1	EACH			30' x 60'
LAUNDRY		EACH-	. Die der der bestehen im Die der Die Die der Die Berteile bestehe State der Die Berteile d	ar (de me)	20'~ x-30'
SWINNING POOL	1	EACH			100' и 100'
PERHAVALK	- 10 mm - 10				
6 FEET WIDE	600	LE.		n Kita (1966) – samana, il Sami Sant Ball phinologia (1966) – samana Ambaya yi (1966) (1966) (1966) (1966)	 colony decidity measures to basis (xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
10 FEET WIDE	2,250 1,000	LF LF			
10 FEE WIDE	A7400	L r	manner (1994)	and the state of t	And the second s
WATER					
SUPPLY SYSTEH		Barrier A		물의 등으로 이 경기를 들었다.	
INTAKE POOL 1 CRIB-IN		L9			
PUHP STA - 720 GPH	1	2.3			
BOOSTER PUNP STA - 720 GPH		LS		병원 기반을 반대하고 있습니다. 그는 바이 살아 있다.	

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FEASIBILITY STUDY ESTIMATE - ACRES AND DEVIL CANYON - "REVISION 4"						FEB-92
TEH DESCRIPTION	OUANTITY	UNITS	UNIT PRICE	AHOUNT	TOTAL	REHARKS
	a alata magananda alah galapat maja majar sa kana da sabila dibinggalabanga		arama is a same 🛊 and a same a same		\$ 000	ay a saya a saya saya saya saya saya sa
SPLY LINES (2EA) 1-4 1	4,500	LF				1-6" , UTILDR . HAT
TREATMENT PLANT = 1.0 HOD RESERVOIR DISTRIBUTION SYSTEM DISTRIB ', INES = BURIED	2	LS LS		C Section a constitution of the constitution o	and graph the size from the state of the size of the s	800.000 BAL
	800	LE				
	240 100	LÉ.				
DISTRIB LINE UTLDR	200	CF :		=		
10° DI	1,800	LF				
	2,500 2,000		marine and the second s	MAN - 1900 MANAGA - A A A A A A A A A A A A A A A A A		The same area and the same area and the same
til se de la compansión de DI de la compansión de la comp	1,800	i.				
HEAT TRACING & INSUL		an transfer the address of the fact of the	angana hani. Ing tipur (1.14) Englan alaman dagintany nyiny mitopogy (na 1.94)	Management of the No. of the State of the St	skramikan zaszracze samikionen	
10° PIPE	2,600	LF				
8' PIPE	2,740	LF				
6 PIPE	2,100			Alpha a grant month annihametricina		
PIPE FITTINOS	2,000	of goats for ™ Esp fettor				
VALUEB		L5	and an alpha of careful and alpha of alpha of careful and careful	Color Annual Computations and Computation	-	
HYDRANTS	12	EA				3
UTILIDORS			maganan ang panggan ang pari sa	nists de le come actuarmynt productivamente flesion		
SEWAGE	G1100					
COLLECTION BYS CUTLORS						
PIPE		The second second	andread and a separate of the first of the last of the	the maintrease as a comprehensive probability whichis		
6° PIPE	3,000 2,400	LF LF				
		LF.	umpik nama halkiy 1918 i Shakes — dine kiris upamanani, isaharana — ik . ik ikid	MESS declare of the Mess San Adoption to a bismail whose		
12° PIPE HEAT TRACING & INSUL	2,800	Lis Control				
patrimina de la residencia de la composition della composition del	2,000	LF.	and the second s	e de la companya de	or and additional control of the second of t	K. Angelegenskinskinskinskinskinskinskinskinskinski
	3,000 2,400	LF 1.F				
10.		LF			. Linear of the state of the second section of the secti	nd 5 38° marchy, nd 66, and 1 millionercommonants - minute, nd 1 Mill Indianactics - 1 mag 2
	2,800	LF			r de la Maria. La la Maria de la Lacada de la Calabara de la Calab	
TREATHENT PLANT	and was the supple of the supp	EACH		HALL FREY MARKETAN CAME AND	www.page.comp.com	antication and at the later was an anticated and the special parts.
LAGDONS (1 @ 385' x 205' &		EACH				9 260' x 155*
RBC*		EACH				The second secon
PHYS/CHEH UNIT	an nahanggi yann mis jost n'ar rangarita i junisiminina 🙎 langt a l	EACH -	maginal and a second	Service Landing and Landing and	ونيل ومنصف الهاجها المستنبية	and the same of th
CLARIFIER DISINFECTION		EACH EACH				
HEAT PUHP		EACH			म अक्र र अवस्थानस्य स्था	n an magazasis » dasimilias (imministrationalismostismostismostismostismostismostismostismostismostismostismos
THICKENER		EACH				
FILTER PRESS	1	EACH				

DEVIL CANYO	N - "REVISION 4"	nga yang mengangan nganggan n	ay ga - are, prayeaw dir inddykey ng	7244 m	Pagel 23	
ITEM DESCRIPTION	n man dais auss ann aig sinn hag seò ann aig aigs mar aigs pair aigs aig the pag dhe gun ann ann mai gail ann ann an	QUANTITY	UNITS	UNIT PRICE	ANDURT TOTAL	REHARKS
tina and tina ting pagasay a an manak ka minakaya a saka a saka antina a saka ka saka a saka a		* miles gay by a market and property as a second	ingerengghappi sarangangangangan sarah yang at sa		* - \$ - 000 \$ - 000	There are the property of the second
ne	YING BEDS	2	EACH			
	TFALL LINE C10.3	4,200 -		· managaring and an analysis of the same o	e hier - p - maketh dalar herek saintangan kapangan menadag - pa-ga - pa-ga pangananan dalam sebahan dalam	Richard Print. In high bases described in the community of the printing of the
បា	ILIDOR	1,100	LF			
	ITFALL	1	EACH			
	TRICAL			produce on a second production of the second second second second	· Andrews - Commission - Commis	
	ERATING STATIONS	en de la companya de La companya de la co				A series of
	ILDINGS		EACH			3/20' x 20'
	NERATORS C850-RW1		EACH-	PM West Binds bik pany a 1986	THE COLUMN STATE OF THE ACCUSATION OF THE STATE OF THE ST	n minister of the contract of
	Y TANK	*	EACH EACH			
	JEL STORAGE TANK			rim analessique for the parameter to the an the an		
	IRSTATION		EACH			
	DLE HOUNTED LUHINAIRS	44	ÉACH			
	OOD LIGHTS	15	EACH	deal while it is not to the same to the sa	min - singer et strikklig grunder dem deutscheidende de - e roder - danscheidenscheid	TOTAL COMMENSATION OF THE STATE STAT
	STRIBUTION	ĭ	L5			
	RE ALARH SYSTEM		•			
	IRE ALARH SYSTEH	<u>t</u>		manifestation of the part of the property of the party of	and the state of t	The state of the s
	EPHONE BYBTEH		4 · · · · · · · · · · · · · · · · · · ·			
	LEPHONE SYSTEM		LB			
	RADIO STATION			- The section of the	15 7 M P 15 B . SAME STATE STA	4 1999 (Marchaneses Galacines (Anglithes)))) has (Marchanes) described in a supermy from 1910 (1911) (1911) (1912)
	//RADIO STATION	1	1.5			
	.1D WASTE FACILITY					
POL	OLID WASTE FACILITY		La			
	ARABE/HAINTÉNÁNCÉ BLDO		EACH			30' x 60'
	KS	الله المراد الدوارات ميسود مسيقاتينو مسيقاتين	Bio F P W F S.	to the statement of the state of the statement of the sta	SANCER, AND TO STANDARD CONTRACTOR WASHING AND ADDRESS OF PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS	
	0,000 BAL .	4	EACH			
	00,000 GAL	20	EACH			
EA	RTHWORK			-	and a super-months are the construction of the	A 150
	LEARING & DRUBBING	∀	ACRE			
		30,000	CY.			
	IPING		·	making programma and have a deposed as a second of	and the state of t	ate Capital administration and the second agreement of the second and the second and the second agreement of the second agreem
	UEL STATION		LB			
	TRUCTION VILLAGE PARATION					
	LEARING & STRIPPING	95	ACRE	स्त्राहरू क्षा ६ काल्याकारणाच्या । संदर्भ र वर्षा (विश्व विष्य विष्य विषय विषय विषय विषय विषय विषय विषय विष	The same of the sa	43 s.i.
	ASTALL GRANULAR PAD	459.800	CY			3/ DEPTH 8'
	STRUCT ROADWAYS	7W/FUVV	T.P. T.	ا في الحراج إلا أنها إلا إلى المنظم العالم الم	an a said a s	The Table And
	ADWAYS IN VILLAGE					
	AIN ROAD 34' WIDE	2,300	LF			ASPHALT PUHT
	ECONDARY ROADS 24" WIDE	17,800		NWA WAR	and the second s	ABPHALT - PVHT
	ONNECTION TO ACCESS RD 34'	4,000	LF			VIL LHT-HN ACC A/C P
	AINAGE				1994년 전문 경우스 네트 바다 시간	
D	ITCHING	51,600	L	*** *** *** *** *** *** ** **	and the second of the second o	RDWY-TOT's (R) 2
	ULVERTS - 320 LOTS	7,440	LF			8 20' \$ 40' XINB 126
rie de la periodo de PE	RIHETER FENCING					

SUSITNA HYDROELECTRIC PROJECT FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN DEVIL CANYON - "REVISION 4" date: 12-F58-82 file: DEE884.DAT#71 page: 24

ITEH	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AHOUNT TOTAL	REMARKS
		the control of the co	in agranda de la compansión de la compan		\$ 000 \$ 000	to a state of the management of the state of
	PERINETER FENCINO	9:100	LF			
	PARKING AREAS	The state of the s	e and an action of the second second of the second	managa militar ang managa sa m	and the second of the control of the second	and the state of t
	PARKING AREAS	37,500	. SF			GRANULAR BURFACE
	.22 BUILDINGS					
	BINGLE FAM UNIT - 2 BORM	72 -	EACH-	The second secon	parate or grain accommendation of the contract and accommendation of the contract accommendat	14'-x 60'
	SINGLE FAM UNIT - 3 BORM	200	EACH			14' × 60'
	SINGLE FAM UNIT - 2 BORM	16	EAGH			24' x 50'
	SINGLE FAM UNIT = 3 BDRM	18	EACH-	takan jaka saan saan taka kuntuu sa ja	ga — e s qui quadri stratig stemas halde es — manag his seg satigadipas manag hases e de	24 × 50
	SINGLE FAN UNIT - 4 BORH	16	EACH			29' x 50'
	SCHOOL (22,750 9F)	1	LS			(12 CLASSROOMS)
	OYHNASIUH			referencies processor of menocials is a separate parties of the separate of th	ne's stand annie des angermannengen an 1970 is des sounds (the stand annie an annie season) an	100′-×-100′
	SWINNING POOL		LS			100' x 100' 80' x 100'
	RECREATION CENTER	*	LS LS-			100'-x-160'
	STORE		77.77		The second section is a second	30' x 40'
	FIRE STATION	*	LS			
	DAS STA E6 PUMP.3-BAY		1.8			2-10,000 BAL TONKS
	123 UTILITIES					
	WATER SUPPLY LINE 6*	4,900	FT			
-		41700	EACH-	the mast statement of the season which while a latter or and specialists of	de stade slage is space helicologically like the highly pre likewar absoluteration and in	-
	RESERVOIR E8507000 BALI PUMP STATION 4500 BPM	*	EACH			
	DISTRIBUTION SYSTEM	, transition of the second	EHUN			
	DISTRIBUT LINE-BURIED			nimas pilining, mpagamanias kan follomba (m) sandip	er og et petrologies, y kristinske states i kristinske residensk et 1900 et trotte kristinsk kristinsk et trott	n distriction de la company d
	10° DI	850	LF			
	a de la companya de l	305	ĹF			
ا ا بوری بیس این شاه است	The same of the sa	280		والمرازية فالمواجد الحاجة المحبوب بينجيد بينا ويتجيد	F 19 4 Spring of Spring April 19 19 Spring S	K is districted for the transmission of the states transmission secures. They desired
	DISTRIBUT LINE-UTLDR					
	10*	7,650	LF			
	END CONTROL OF THE CO	2,750	LF-	anning seminarities and the seminarity of the se	rom je pozya izpanime nist. – mj. in . – mj. in . – mj. in . mys. svede ime być brodnost. Sujemninski se aktivisacija	and the second s
		2,350	LF			
	HEAT TRACING ,					
	10" PIPE car was a ser of non-information immediately	B,500 ·	LF .	great the training state of the	and the second of the second o	t dans dight stiggenertundigdenser und die dereit, die der der der unt unt 👉 🕳 en einstelle – a un einstelle – a
	8" PIPE	3,050	LF			
	6" PIPE	2,600	LF			
	VALVES	ente ditaministra manore este de algo este de la decencia de este	riant materials of the standard of the standar		programme to the second se	di - der 15 gradusk administratum pijde kjeleje - deri delakiske - 2.2 . vo. 15 gra deris mijsselje.
	10", 8", % 6"	1	LS			
	HYDRANTS					
materia despuesta a e pa	EVALUES 1 STUBS INC = 1 EA	21	EACH		$S_{\rm cons} = 10^{-2} {\rm erg} \cdot {\rm $	e AFFROX 400'1
	SEWAGE					
	COLLECTION BYBTEH					
***************************************	6. SISE	5,450				errore de la medica en
		3,000	LF			
	THE PARTY OF THE P	2,350	LF			
	12º PIPE	100	· LF			
	HEAT TRACING	المناسوعة السوا			그 것 그렇게 되었다. 하다	
	A PIPE	5,450	LF			CINCL FORCE HAIN

--- date: 12-FEB-82-

OCAE BUSINESS FORMS, INC. III

SUSITNA HYDROELECTRIC PROJECT-

HEATING AND VENTIL: OPERAT: ----

date: 12=7EB-82 SUSITNA HYDROELECTRIC PROJECT filet DEEBS4.DAT#71 FEASIBILITY STUDY ESTIMATE - ACRES AMERICAN DEVIL CANYON - "REVISION 4" Pase! 26 TOTAL ITEM DESCRIPTION -64 --- LABOR EXPENSE LABOR EXPENSE (INCLUDED IN DIRECT COSTS) BUPERINTENDENCE 65 SUPERINTENDENCE (INCLUDED IN DIRECT COSTS) INSURANCE INSURANCE 66 (INCLUDED IN DIRECT COSTS) 67-FEES ((INCLUDED IN DIRECT COSTS) 3 (4 Ž(