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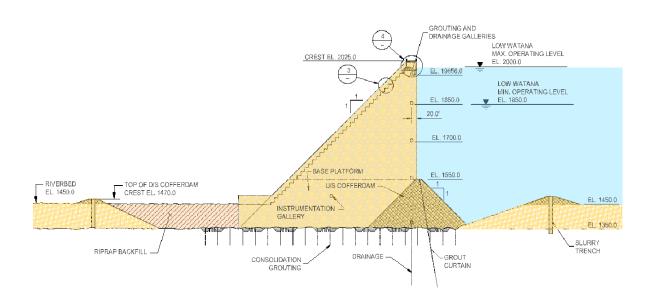
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Susitna Project Supplemental Report Low Watana Dam RCC Concept Cost Evaluation FINAL

November 29, 2010



Low Watana Gravity Dam – RCC Concept

Prepared by: R&M Consultants Hatch Associates Consultants Jack Linard Consulting

EXECUTIVE SUMMARY

At the time of the Susitna Project studies for the 1983 FERC License Application and 1985 amendment to the License Application, roller compacted concrete (RCC) technology was not regarded as sufficiently developed to use in the construction of large dams. Over the past 30 years, however, roller compacted concrete has developed as a construction material for dams of increasing size and techniques of material placement and composition of the RCC mix has been refined with experience.

R&M Consultants study team (R&M) was engaged by the Alaska Energy Authority (AEA) to develop a conceptual design and perform concept level cost estimates for a RCC dam at the Watana site and Devil Canyon sites that were described in the R&M report dated November 16th, 2009. This is an addendum to that report and examines the Low Watana RCC dam options by exploring the cost differential between an expandable option and a non-expandable option, and gravity section vs. gravity arch. Additionally, the advantages and disadvantages of underground vs. surface powerhouse are explored as well as simplified transportation options utilizing updated information on railroad costs in conjunction with "rail only" surface transport to the project.

We have found no fatal flaw in Low Watana RCC Gravity Arch Dam or surface powerhouse options, and initial estimates indicate that there may be significant potential savings, particularly with the RCC dam arrangements. RCC dams have been constructed in cold climates and at greater heights than the 700-feet of Low Watana.

It is possible that developing the RCC concept to its final design configuration and moving toward construction could result in development opportunities for basic industries in Alaska in producing cement and exploitation of natural pozzolanic sources.

Access and logistical considerations including road, rail, and air transport are of concern at a remote site such as the Susitna Project sites. Addition of unrestricted access to undeveloped areas is often controversial. The access alternatives considered have assumed rail only access to the project site.

The cost estimate summary, Table ES-1, presents the estimated construction costs of the options, all of which consider surface powerhouses and "rail only" ground transportation.

Description	Low Watana Embankment Non-Expandable \$1,000 (1)	Low Watana RCC Non- Expandable \$1,000	Low Watana RCC Expandable \$1,000	Low Watana Gravity Arch RCC Non- Expandable \$1,000
Construction Cost Total				
(Millions of Dollars)	\$ 4,500	\$ 3,900	\$ 4,200	\$ 3,600

Table ES-1 Summary of Cost of RCC Dams for the Susitna Project

(1) HDR 2009

Supplemental Report Low Watana RCC Concept

November 29, 2010

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1.0 Introduction

R&M Consultants, Inc. (R&M) formed a team under the R&M/AEA term agreement that includes Hatch Associates Consultants, Inc. (HACI) and Jack Linard Consulting (R&M/HACI/JLC) to investigate the feasibility of Roller Compacted Concrete (RCC) technology for the Susitna Project as an alternative to impervious core rockfill dam (ICRD) concepts that were developed during the licensing studies which concluded in 1985. Additionally R&M/HACI/JLC performed a review of regulatory and FERC licensing activities and timelines for precursor activities to issuance of a FERC license, and developed and a licensing phase strategy for the project. The results of those investigations were presented in the R&M report dated November 16th 2009 (R&M 2009).

The investigation was amended to consider additional alternatives with potentially lower costs. This document presents the results of the further investigations. It is an extension of the previous R&M 2009 report. In an effort to keep the comparison valid, the costs are based on December 2008 USD and are presented in the same format and structure as in the R&M 2009 report. The focus will be on a Low Watana option with the same general project size as described in recent studies (HDR 2009). Concepts focus on RCC dam options exploring the cost differential between an expandable option and a non-expandable option and straight gravity section dam vs. gravity arch dam.

The advantages and disadvantages of underground vs. surface powerhouse are also considered.

Transportation options utilizing updated information on railroad costs are developed with the alternative of "rail only" surface transport to the project. The cost estimate uses equipment/material prices consistent with the previous Watana cost estimate currently available from AEA.

2.0 Project Layout

2.1 General

The following assumptions and technical considerations were included in developing our conceptual project layouts. Replacement of one dam design for another affects more than just the dam. Many features of the project general arrangement may be affected by the selection of dam type. In keeping with our understanding of the dam design and costing task we have included the following considerations:

- Hydrology and hydraulics;
 - Assumed the same reservoir water levels as described for the Low Watana ICRD option;
 - Diversion scheme and tunnel capacities are different as the diversion scheme employs a shorter tunnel due to the smaller footprint of an RCC dam and the consequences of overtopping of RCC dams is lower than with ICRD;
 - The spillway configuration is different than for the ICRD alternative (eliminating the side channel spillway) and incorporating an overflow section into the RCC dam. The spillway configuration requirement included initial examination of energy dissipation and potential for scour and to reduce the potential for total dissolved gas (TDG) production at the project. The hydraulic capacity was taken to be the same as for the current ICRD configuration. The RCC dam Spillway design is conceptual only at this phase without detailed analysis, modeling and in depth review of energy dissipation of potential for rock scour.

- The intake structure and water conveyance use similar invert elevations and diameters as for the ICRD dam option;
- The powerhouse layout uses the same equipment sizes at the same setting as for the ICRD option;
- Foundation Conditions and Excavation Depth: Foundation conditions and foundation treatment, including the single line grout curtain, will be similar to those for the Full Watana RCC dam concept, which were similar to treatment of the foundation below the impervious core for the ICRD dam scheme;
- Dam cross section design RCC dams are designed to the same principles and standards as concrete gravity dams. Design loadings and factors of safety are per FERC guidelines, including; waves and freeboard, earthquake, ice and silt loads. The principles used to develop the Full Watana RCC dam concept are the same as used for the Low Watana RCC dam concept.

2.2 Alternatives

Several RCC alternatives were examined for comparison with previous ICRD expandable and non-expandable Low Watana alternatives. To achieve this, we have focused on the elements of the RCC dam alternative that differ from the existing ICRD alternative. Elements that are similar will remain identical for both alternatives in order to achieve an "apples to apples" comparison to the extent possible. The alternatives being compared to the RCC schemes are the ICRD Low Watana Expandable (see Figure 2.2-1 through 2.2-4) and the ICRD Low Watana Non-expandable.

The following alternatives are addressed in this report:

- Low Watana RCC Gravity Dam Expandable;
- Low Watana RCC Gravity Dam Non-Expandable;
- Low Watana RCC Gravity Arch;
- Additionally, there is a discussion of above ground vs. underground powerhouses for these alternatives.

Major considerations are:

- Dam layout (axis, gravity arch vs. gravity);
- Intake (integral to the dam or separate, expansion to full height Watana);
- Spillway sections that could be modified for the expanded option;
- Powerhouse (location, surface vs. underground, expansion options).

Advantages of the RCC dam concept compared to ICRD include: a smaller footprint, lower dam volume, integral spillway, considerably shorter diversion tunnels and no vulnerability to overtopping. Table 2.2 shows a comparison summary of significant features of each alternative.

Feature Description	Low Watana Non- Expandable ICRD	Low Watana Expandable ICRD	Low Watana RCC - Non- Expandable	Low Watana RCC - Expandable	Low Watana RCC Gravity Arch
Total Dam Fill Volume (cy)	22,000,000	32,000,000	7,600,000	7,600,000	6,000,000
Diversion Tunnel Diameter (ft)	36	36	27	27	27
Average Diversion Tunnel Length (ft)	3,700	3,700	2,000	2,200	2,000
Intake Area Excavation (cy)	1,970,000	1,970,000	270,000	760,000	270,000
Average Power Tunnel Length (ft)	200	200	260	300	330
Average Pressure Tunnel Length (ft)	400	400	550	1500	170
Tailrace Tunnel Length	1,500	1,500	N/A	N/A	N/A
Powerplant Concrete Volume (cy)	40,400	60,600	62,500	83,000	62,500
Powerplant Excavation Volume (cy)	242,000	363,000	1,500,000	2,200,000	1,500,000
Spillway Gates	(3) - 64' Tall x 44' Wide Radial Gates	(3) - 64' Tall x 44' Wide Radial Gates	N/A	N/A	N/A
Spillway Chute Excavation (cy)	2,960,000	2,960,000	N/A	N/A	N/A
Spillway Chute Conventional Concrete (cy)	130,300	130,300	99,000	99,000	99,000

 Table 2.2: Low Watana ICRD and RCC Alternatives Summary

This study does not have the scope for an exhaustive exploration of layout options, so some engineering judgment has been used to develop the configurations used for comparison. We have selected a layout based on general comparisons to existing projects. The Shasta project in California in particular is similar in size and layout to our selected configuration for the RCC Gravity and Gravity Arch dam arrangements (Kollgaard and Chadwick, 1988).

2.3 **Powerhouse Layout**

The powerhouse layout was examined to explore potential cost savings associated with the smaller footprint of gravity or gravity arch dams and robust concrete construction which allows configurations that would not be available with an ICRD dam.

A common reason for selecting an underground powerhouse is to take advantage of a steep gradient of the river between the dam and the tailrace; however this is not the case at the Watana Dam site. Another important consideration is to minimize the length of the water passage. The smaller footprint of the RCC dam allows shorter water conveyances as well as the option of intakes and water conveyance either through the dam, or in the rock abutments. The geological conditions must be suitable for an underground powerhouse, which they are at Watana. A surface powerhouse requires enough room to place the powerhouse along the river without excessive excavation, which is also the case. Our conclusion is that both an underground and surface powerhouse configuration is feasible at the Watana site and the choice should be based on economics, constructability and serviceability issues.

2.3.1 Surface vs. Underground Powerhouses

The choice of a surface or underground powerhouse is largely dependent on the project setting and site conditions. The following list compares the two options:

- Typical surface powerhouse advantages are:
 - Elimination of tailrace tunnel;
 - No requirement for tailrace surge chamber;
 - Less expensive excavation;
 - Ventilation is easier;
 - Less geotechnical exploration required (as less geotechnical risk to cost and schedule).
- Typical underground powerhouse advantages
 - Location is more flexible;
 - Shorter headrace tunnels with considerable reduction in length of steel-lined high pressure conduits;
 - Work area can be more easily separated from dam construction (two separate construction areas and schedules);
 - Powerhouse is not located in or near river bed materials;
 - Exterior shell not needed (rock forms support);
 - Protection against the elements (longer construction season);
 - Turbine setting can be lower;
 - Less concrete needed to control hydraulic uplift;
 - Less maintenance required.

The 1982 Acres Feasibility report discusses the choice of an underground powerhouse based on general assumptions of less costly installation for underground installations, additional operational flexibility and climatic considerations.

The 1985 Harza Ebasco FERC license application (Harza Ebasco 1885) includes a comparison of an underground to a surface powerhouse by major civil mechanical and electrical cost items where the surface powerhouse was shown to be more expensive due to the far greater cost of the power tunnel/penstock (see Table 2.3-1). The comparison in Table 2.3-1 is a simplified comparison and does not include the costs associated with the powerhouse superstructure or the considerable substructure required to insure that the powerhouse is stable against hydraulic uplift.

Table 2.3-1 Comparison of Surface to Underground Powerhouse (Harza EbascoStudy 1985)

	SURFACE	UNDER	GROUND
	(\$000)	(\$000)	(\$000)
Item	4 x 210 MW	4 x 210 MW	6 x 140 MM
1 - 1 ²	and the second second		
ivil Works:		and the second	
Teteles	54 000	F/ 000	70 400
Intakes	54,000	54,000	70,400
Penstocks	72,000	22,700	28,600
Powerhouse/Draft Tube	29,600	26,300	28,100
Surge Chamber	NA	4,300	4,800
Transformer Gallery	NA	2,700	3,400
Tailrace Tunnel	NA	11,000	11,000
Tailrace Portal	NA	1,600	1,600
Main Access Tunnels	NA	8,100	8,100
Secondary Access Tunnels	NA	300	300
Main Access Shaft	NA	4,200	4,200
Access Tunnel Portal	NA	100	100
Cable Shaft	NA	1,500	1,500
Bus Tunnel/Shafts	' NA	1,000	1,200
Fire Protection Head Tank	NA	400	400
Mechanical - For Above Items	54,600	55,500	57,200
Electrical - For Above Items	37,400	37,600	41,200
Switchyard - All Work	14,900	14,900	14,900
TOTAL	262,500	246,200	277,000

TABLE B.2.2.6: SUMMARY COMPARISON OF POWERHOUSES AT WATANA

We have developed a potential project arrangement with a surface powerhouse (loosely based on the Shasta Hydroelectric Plant layout, Development of Dam Engineering in the United States, 1988) with an intake on the left abutment, transitioning to a tunnel. The length of the water passage is similar to that of the Low Watana underground option (Harza Ebasco 1985). The tailrace discharges directly into the Susitna River.

2.3.2 Surface Powerhouse Configuration

Considerations for the surface powerhouse include: setting of the units, elevation of high tailwater to prevent powerhouse flooding, rock cover over the tunnels and the need for steel lining, stability against hydraulic uplift, construction access, cofferdamming and diversion requirements to accommodate dam, powerhouse foundation, and tailrace channel. Costs of waterways (tunnels, shafts and intakes) are not included in the cost account for powerhouse cost comparisons but are in a separate cost account.

The conceptual layout of a surface powerhouse for the Low Watana RCC dam alternative was selected for favorable hydraulic characteristics as well as for cost effective excavation downstream of the proposed dam. The concrete volume for the surface powerhouse is a volume sufficient to ensure that there would be enough mass to prevent powerhouse floatation without installation of anchors.

The surface powerhouse is set on the south river bank (left bank) such that the tailrace apron end sill is adjacent to the end sill of the spillway stilling basin, as these two features are at the same elevation of 1450 ft. The tailrace end sill apron creates a downstream control weir for the powerhouse, thus maintaining minimum tailwater conditions. Several design considerations including;

excavation volumes, effects of discharge on downstream hydraulics, and the effect of spillway discharge on powerhouse operation, must be evaluated to determine the optimum physical setting of the powerhouse. The surface powerhouse for the low Watana RCC alternatives was set to be offset 27 degrees from the stilling basin, which is generally the expansion ratio of 2 longitudinal to 1 horizontal as defined by the USACE (HEC RAS v4.1 Reference Manual). This alignment directs the Low Watana RCC dam surface powerhouse discharge efficiently into the downstream river channel, noting that further downstream of the dam the river bends to the north.

For this study, the dimensions of the surface powerhouse were set to accommodate the same equipment layout proposed for the ICRD dam designs. The transformers will be located within the surface powerhouse rather than in a separate cavern as with the underground design. The surface alternative has the transformer deck set above the draft tube outlets and their overall dimensions are similar to those of the underground alternative. The entrance angle of penstocks with respect to the surface powerhouse remains the same 62 degrees as with the underground design.

The power intake (for the non-expandable and gravity arch RCC dam alternatives) is integrated into the dam body and transitions into two concrete lined tunnels that lead to vertical shafts and high pressure tunnels that bifurcate and transition into steel lined penstocks that lead into the four Francis units in the powerhouse. The intake invert and size for the RCC dam alternatives are approximately the same as in the ICRD dam alternatives and the overall penstock lengths are similar for the surface and underground alternatives. Although the penstocks are somewhat longer in the surface alternative than in the underground alternative, having sections of the power tunnels integral to the RCC dam may reduce tunnel excavation/support, and concrete lining costs.

The significant cost advantage between the conceptual RCC surface powerhouse and previously designed ICRD underground powerhouses is the elimination of surge chambers, tailrace tunnels and access tunnels for the surface powerhouse which are considered in the waterways cost account. Given the limited scope of this study, the surface powerhouse was investigated to determine its feasibility and provide an estimate of comparative costs. With this criteria, the surface powerhouse does show to be a feasible alternative. However, the scope did not include optimization of an underground design for the RCC designs. An underground powerhouse with the RCC dam may have shorter pressure tunnels a hydraulic transient analyses may demonstrate that surge chambers are not required.

Further analyses should be performed to evaluate both surface and underground layouts that will improve the configuration of the powerhouse, including; optimizing unit settings considering concrete requirements and excavation costs, optimizing high pressure and low pressure penstock lengths, as well as optimizing the tailrace configuration. Additional study will be required to better define hydraulic effects of the spillway discharge on powerhouse performance, including physical model testing. Indications are that both surface and underground powerhouse configurations are feasible for the Low Watana with an RCC dam, and future analyses will need to be performed in order to determine the optimum configuration.

2.4 Dam Design Considerations

2.4.1 RCC Dam Design

The geotechnical information is typically the most influential element for developing a dam design and the Watana site has well developed site information. The RCC dam alternatives were developed on axes similar to that of the ICRD dam axis. This is considered a conservative assumption, adopted to provide a dam axis in the location with the maximum amount of existing information on the foundation subsurface conditions, but not necessarily at the most efficient location. It is possible or even likely that a more efficient dam axis location could be found with further investigation.

The site has a foundation and abutments that are well suited to a concrete gravity dam. Concrete gravity dams are relatively straight forward to design, and many computer programs are available to improve the process of initial and final design. The dam design can be initially developed using assumptions for concrete strength based on similar mixes used on other projects. The final configuration of the dam requires accurate material properties for the RCC material that can only be determined by trial mix design using the actual selected cement and pozzolan and the aggregate material available from the site. Foundation treatment for all RCC dam options includes consolidation grouting under the dam footprint and curtain grouting similar to that assumed in the previous RCC dam study.

There is a buried channel north of the dam site which has been called the "Relict Channel". For the RCC alternatives, the treatment for the Relict Channel has been taken to be identical as developed for the Low Watana non-expandable ICRD.

It is important to note, particularly with regard to the comparison with the gravity arch alternative that the Low Watana cross-section retains the 1H:1V downstream slope established for the High Watana option (R&M 2009). This face slope was considered to be on the conservative side for the high dam and is even more so for the low dam option.

At this stage of proceedings, it is not appropriate to try to refine or optimize the various elements of the different schemes, but it is important to bear in mind that more detailed analyses may well change the relative ranking of project alternatives. By the same token, more detailed analyses can only serve to ensure that the eventually selected alternative will be more attractive than the alternatives indicated herein because of the conservative approach adopted throughout in these comparative studies.

A more conventional spillway option for a dam of this configuration and height would be a smooth surfaced chute with forced air entrainment discharging back into the river via a flip bucket into a plunge pool. Such an arrangement would require the dam axis to be relocated to ensure that the jet from the flip bucket impacts in the river with an alignment such that back scour is minimized. The use of flip bucket and plunge pool may also result in hydraulic conditions that could lead to high total dissolved gas (TDG). TDG occurs when air mixes with water and goes into solution at depth, creating water supersaturated with air. If fish breathe supersaturated water, air can come out of solution in their blood stream causing gas bubble disease, which can be fatal. The stepped spillway may allow spill without a plunge to depth that could lead to excessive levels of TDG. The design would look to dissipate as much energy as possible and create a spillway that creates skimming flow downstream of the spillway. The present work scope does not cover spillway and dam axis optimization and for that reason, the stilling basin concept, which is compatible with the ICRD axis, has been adopted for present reporting purposes.

The conceptual spillway for the RCC alternatives is incorporated in the dam structure. The flood outflows are discharged through an ungated spillway into a stepped, converging chute and terminating in a downstream stilling basin. As discussed in the R&M 2009 Report, the stepped spillway is expected to provide significant energy dissipation and to be compatible with the stilling basin arrangement shown on the drawings. However, a stepped spillway of this size exceeds precedent and details will have to be verified by comprehensive hydraulic model studies.

An extensive study, including large scale physical models (not less than 1:40 scale) will be required prior to finalizing the details of spillway configuration. The preliminary hydraulic calculations performed for a stepped spillway indicate that it is a potentially cost effective configuration and should warrant further consideration and analyses during future design studies. Modeling may well show that the optimum stepped spillway and stilling basin is different to the conceptual configuration, or that a different type of spillway may be required. Any modifications may influence not only the spillway costs but also the powerhouse costs as the layout may have to be reconfigured.

2.4.1.1 Steps for RCC Design

Development of the RCC dam design will require several steps, comprised of:

- Confirming design criteria, including loads and load combinations, materials and foundation properties, minimum factors of safety and allowable stresses;
- Evaluation of site climatic conditions which have a major impact on both construction programming and RCC mix design;
- Performing preliminary design determine required performance, development of basic geometry, preliminary mix design and strength requirements;
- Performing three-dimensional finite element analysis (using initial assumed material properties), including dynamic and thermal stress analyses;
- Locating and testing aggregate, cement and pozzolan sources that will be used for construction;
- Establish RCC placement temperature, maximum allowable internal temperature and required temperature control measures; and
- Developing trial mixes for the full scale trial embankments (FSTE) to fine tune the mix design.

The trial mix program would be initially oriented towards:

- Aggregate gradation optimization;
- Selection of two preferred cement types and content;
- Selection of two preferred pozzolan types and content; and
- Selection of two preferred retarder types and content.

The minimum time from beginning the study of the prospective RCC to confirmation of mix details is 16 months. Conservatively, it would be appropriate to allow 18 months. At least 18 months is required to investigate, select, procure, ship and set up the necessary equipment (crushing plant, batching plant, conveyors). Most of this work is done during the trial mix/FSTE phase and the end result is that the RCC production facilities can be ready within 2 years of starting trial mixes. An upper limit would be 2.5 years.

2.4.1.2 Seismic Design Consideration

The most important safety concern of concrete dams subjected to earthquakes is excessive cracking, which can lead to potential instability from sliding or overturning. Sliding could occur on an existing plane of weakness in the dam foundation, at the foundation-dam interface or within the dam. Although some major concrete dams have experienced strong ground motion with some damage, it is of note that there has been only one major concrete dam failure in recent times as a result of earthquake induced ground motions. This failure was in Taiwan where the dam was constructed literally over the top of an active fault. In general, instability of gravity dams caused by excessive cracking of the concrete is most likely to occur in the upper half of the dam.

The application of defensive design measures when designing a dam is the most dependable approach to alleviate safety concerns. Defensive measures for concrete dams include the following:

- Adequate drainage is the first line of defense against foundation instability, in part because it is the most economical;
- Designing RCC mixes and construction procedures to ensure that direct tensile and shear strength parameters are always achieved without excessive cement content in the mix. (Increased cement will increase thermal stress problems, which may be more of a concern than the seismic risks);
- Use the best geometric design and structural detailing. The dam should have minimum geometric irregularities and gradual variations in structural stiffness. Examples of good geometric design are curved transitions and minimal mass at the crest;
- Effective quality control during construction to ensure foundation preparation, strength of the concrete and appropriate cleaning and preparation of lift joints and placement of reinforcement when used; and
- Design contraction joints to accommodate displacement.

2.4.2 Low Watana RCC Gravity Dam Expandable

The Low Watana RCC Expandable dam alternative consists of the Watana dam constructed to a lower height of 700 feet and a four-unit powerhouse with a total installed capacity of 600 MW (see Figures 2.4-1 to 2.4-3). The expandable option allows for a dam raise to the height of the original Watana concept with a dam height of 885 feet and installation of a new intake structure, an additional power tunnel and two additional generating units with a capacity of 1,200 MW. In order to provide for future raising of the dam and expansion of the powerhouse, the location of the powerhouse and power intakes were adjusted from the non-expandable alternative. The powerhouse was translated 185 feet downstream compared to the non-expandable RCC gravity dam alternative to allow room for RCC material to be placed downstream of the dam as part of the dam raise.

The power intake structure was located on the left abutment as opposed to being integral with the dam for the non-expandable alternative to provide more flexibility for the dam raise. If the power intake were integral to the dam, a new power intake would be more constrained and complicated by existing structures. During expansion, a new intake channel could be excavated above the existing structure at the appropriate invert elevation. Intakes for the expanded option could be developed at a higher invert elevation than the first stage intakes. The intakes for the expansion, second stage would be connected to the first stage water conveyances at the vertical shaft, to tap into the lower, high pressure portion tunnels leading to the powerhouse.

The powerhouse includes empty bays that can accommodate additional generating units in the future. The gravity section will be raised by placing additional RCC on the dam crest and downstream face of the dam. High strength steel anchors will be installed on the first stage dam faces and will tie into the second stage RCC placement. Prior to placement of the second stage RCC the surface of the first stage will be cleaned and scarified using high pressure washers. The spillway for the second stage will be constructed using the same placement procedures and similar design as in the first stage.

The gravity dam section was checked using the CADAM program for static and pseudo dynamic stability and found to have adequate safety factors (see R&M 2009 for a description of the analysis, loading and material properties).

The process of raising a dam at a later date is not a simple matter. We have included some general considerations, procedures and a potential sequence to provide some indication as to the process involved.

GENERAL

- 1. Planning and design prior to start of Stage 1 are critical. It may be necessary to place some Stage 2 base RCC (up to stilling basin level) during Stage 1 to minimize overall Stage 2 duration.
- 2. Stage 1 RCC mix will be designed for Stage 2 loads and loading conditions.
- 3. Foundation excavation for most or all Stage 2 should be performed during Stage 1 works to avoid blasting close to in-service dam and powerhouse.

- 4. Note that same 5.5 months per year is max time available for RCC placement (5 months for conventional concrete).
- 5. Draw reservoir level down to the minimum operating level at end of winter. Generate during summer to keep reservoir level as close as possible to the minimum level, Note that a critical problem is handling of flood inflows during Stage 2.
- 6. RCC production rates will be slower for Stage 2 than for Stage 1 due to greater constraints on placement.
- 7. Dam/spillway expansion construction expected to take approximately 5 years.

PROCEDURE

- 1. Clean existing RCC surface to exposed coarse aggregate.
- 2. Make sure exposed surfaces are saturated and surface dry and that outer 18 inches is above freezing point.
- 3. Place bedding mix on horizontal surfaces immediately prior to placing RCC.
- 4. Use grout enrichment to bond new RCC to sloping surfaces in existing RCC.
- 5. Otherwise standard RCC procedures will apply (anchors between Stage 1 and Stage 2 RCC are not required).

SEQUENCE

Year 1:

Clean-up and prepare foundation and abutments.

Remove concrete from Stage 1 chute and stilling basin.

Commence aggregate production and stockpiling.

Year 2:

Place RCC in base (up to stilling basin level) and on abutments up to approx El. 1650.

Year 3:

Continue RCC placement up to El. 1900 approx.

Place conventional concrete stilling basin.

Remove spillway conventional concrete including bridge and piers (winter).

Year 4:

Place RCC to underside of stage 2 spillway.

Place conventional concrete in chute.

Complete RCC to crest El. on right abutment.

Year 5:

Complete RCC to crest El. on left abutment.

Construct Stage 2 spillway crest works.

2.4.3 Low Watana RCC Gravity Dam Non-Expandable

The Low Watana Non-expandable RCC Gravity dam alternative has the same dam profile and the general configuration is similar to the expandable alternative above with a dam height of 700 feet and a four-unit powerhouse with a total installed capacity of 600 MW (see Figures 2.4-4 to 2.4-7).

The major differences that lead to reduced installation costs are the shorter diversion tunnel length and shorter power tunnel length for the surface powerhouse as well as the size of power tunnel and tailrace. The intake structure is shown as being incorporated into the dam on the left abutment. The assumption is that conventional concrete would be used for the intake structure with RCC placed against the conventional concrete.

The Powerhouse is shown as close to the dam and spillway as possible in order to minimize the water conveyance length. The powerhouse layout does not consider future expansion options.

2.4.4 Low Watana Gravity Arch

A Low Watana gravity arch RCC dam option was also considered (see Figures 2.4-8 to 2.4-10). The axis adopted for these preliminary gravity arch studies was effectively that adopted for the conventional gravity dam option. In turn, this was the axis chosen for the ICRD in the studies carried out in the 1980's. From this background, it can clearly be seen that the axis used for the G-A layout is by no means optimum.

This preliminary gravity arch dam configuration was based on several factors. First, the crown cantilever section was selected to be similar to the Hungry Horse (gravity arch) Dam in Montana which is sited in a geometrically similar canyon. The Hungry Horse Dam (Development of Dam Engineering in the United States, 1988) crown cantilever was configured with a vertical upstream face and a 0.6 Horizontal to 1.0 Vertical sloped downstream face. The Low Watana gravity arch crown cantilever section was configured with a vertical upstream face and a 0.7 Horizontal to 1.0 Vertical sloped downstream face. The larger ratio was selected based on the larger expected seismic hazard for the Susitna site and preliminary analysis for a gravity arch RCC dam at the High Devil Canyon site.

The stream channel physical dam location, arch (constant) radius and center point was selected based on the qualitative topographical features at the site. In studying the topography of the site, it appears that this site is not as well suited for arch action foundation support over the full 700-foot height of the dam. From about elevation 1850 to the crest elevation of 2025, the cross-valley slope is relatively small compared to the slope below elevation 1850. Therefore, in locating the arch, the topographic contours between elevations 1550 and 1850 on each side of the canyon were collectively examined for orientations that would best provide for arch thrust into the foundation. After the "best" thrust foundation profiles were located on each side of the canyon, the approximate tangent lines to the profiles on each side were laid out on the site plan. Their

intersection established the radius and center of the upstream arch. Having established the arch radius and center, the remaining geometry of the dam is integrated into the canyon using the basic section geometry of the crown cantilever and the topography of the site.

The seismic loading will have a large component of load in the upstream/downstream direction, and a thrust block structure may be required to accommodate this loading. We have assumed for this preliminary estimate (which will need to be confirmed by three-dimensional finite element analysis, when abutment and dam properties are better known) that an additional 25% of the base concrete costs would be sufficient to account for this component of the dam.

With the configuration described above, the structural support behavior of the dam is conceived to be primarily arch-gravity action in the lower two-thirds of the dam and gravity only in the upper third. It is to be noted that the preliminary configuration is only the starting point of the comprehensive structural and stability analyses that would include both seismic and PMF loading. Although the configuration is likely to be modified based on such analyses, the preliminary configuration serves to provide a reasonable estimate of dam volumes and construction costs.

The gravity arch has a smaller footprint than the gravity section, however the area will remain large enough for equipment to move efficiently. The assumption for this preliminary study has been that placement rates and RCC unit costs would be the same for all alternatives. There will be some difference with the grout treatment at the upstream face that will have a small increased effect on the overall unit cost, but this should be developed in more detail if this alternative is addressed in detail.

3.0 Project Access Issues

Access to the construction site for the alternatives considered in this report are by rail link alone to limit access to the site and reduce costs. The Alaska Railroad provided some input on recent costs to develop the rail link along the south side access corridor alignment. An airstrip would be provided near the Watana project to allow use of aircraft up to a C-130 Hercules or equivalent.

3.1 Previous Project Access Costs Comparisons

Previous cost estimates for project access infrastructure for the Full Watana RCC dam and High Devil Canyon RCC dam (R&M 2009) assumed both rail and road transportation to the site on alignments in the south side corridor. This alternative was compared to a Watana ICRD concept with only road access from the Denali Highway through a northeasterly corridor (HDR 2009). While it is true that the RCC concept would benefit greatly from the ease of transporting bulk cement and pozzolans and major equipment and logistical access to the site by rail, road transport of these materials equipment and supplies would also be feasible. The different project access and logistical support transportation assumptions between the RCC and ICRD concept studies led to a significant distortion of the comparison of the project costs. For an "apples to apples" comparison of the options, the same basic transportation configuration (road only, road and rail, or rail only) should be assumed for both schemes with logistics costs included to account for transport of imported materials. For this immediate report, we are assuming rail access only, during construction. Future considerations regarding access may result in removal of the rails and converting the railroad to use of trucks and other over-the-road vehicles.

3.2 Rail Access

The alignment for the rail link only option along the southern alignment (see Figure 3.2-1) is based on the project access and logistical studies done by R&M. A report on the Access Planning Study by R&M for Acres was issued in January 1982 and a Supplement to the Access Planning Study was issued in September 1982.

For the R&M 2009 report on RCC concepts the rail link alignment was assumed to be as shown on Figure 3.2-1 which was drawn from the alignment details presented in the R&M 1982 report. The rail access would connect to the existing Anchorage-Fairbanks alignment of the Alaska Railroad near Gold Creek on the south east side of the Susitna River then would proceed east up the south side of the Susitna River to the Watana site via the north end of Stephan Lake and the west end of Fog Lakes. This alignment requires no new bridge across the Susitna River and only requires a railhead be constructed near Gold Creek from which to stage rail transport of goods and materials to the Watana dam site.

A railroad is considered desirable for access to the project for construction of the RCC dam because of the large quantities of bulk materials to be moved to the construction site and weights anticipated for large components such as gates, penstocks, turbines, generators and transformers and structural steel. Also a railroad would lessen the impact of project traffic and heavy haulage on the Alaska highway system. In addition, these material and equipment items will likely be brought to Alaska by barge, rail barge and/or ship from the source either via Seattle or other foreign or domestic port to Anchorage or Whittier for trans-loading onto railcars for movement to the Project site. Shipping possibilities include rail barge for most of the materials which would allow the loaded rail cars to pass through Whittier or Anchorage directly to the project site without transloading. Materials shipped in sea containers (CONEX's) could be offloaded from a container ship in Anchorage and loaded onto rail cars for hauling to the project site. Vehicles associated with the project can be moved via rail car to the Watana Project.

3.3 Airstrip

A permanent airstrip would be constructed at a suitable location near the main construction camp. The runway is assumed to be 6,000 feet in length based on the project final report and should be capable of accommodating the C-130 Hercules aircraft as well as small jet passenger aircraft. If construction personnel transport were to be done by using jet aircraft, such as the Boeing 737-400 or similar, the runway would require greater length and should be constructed to generally higher standards than that serving the C-130 aircraft. Roads will connect the airstrip to the camp, village, and dam site. A small building will be constructed to serve as a terminal and tower and a fuel truck/maintenance facility will be constructed. A helicopter pad will also be provided.

A temporary airstrip will be constructed to support the early phases of mobilization and construction. This temporary runway will be 2,500 feet in length and will be located in the vicinity of the main construction camp. The airstrip will be capable of supporting smaller aircraft.

The temporary airstrip would eventually be incorporated into one of the main haul roads after the permanent airstrip is in service.

4.0 Cost Estimates

Cost estimates were developed for the alternatives examined. The cost estimates are intended to extend the information provided previously (HDR 2009 and R&M 2009), and to be as comparable as possible to the previous options.

4.1 RCC Costs

Due to the significant influence of the dam costs in the total project costs, the RCC unit cost was developed further.

4.1.1 RCC Unit Cost Analysis for Watana Dam

The Watana dam RCC unit cost was analyzed utilizing the contractor estimating approach of itemizing labor, equipment and materials (L, E & M) costs. Furthermore the unit cost was analyzed with the L, E &M approach in respect to three phases; the aggregate production and pozzolan materials delivery; RCC placement; and RCC production. A detailed breakdown of RCC Unit Costs may be viewed in Appendix A.

In the 1985 Harza Ebasco study, Borrow Pit E was designated as the conventional concrete aggregate source (see Figure 4.1-1). Borrow Pit E is located approximately 2 miles west of the dam axis on the north bank of the river.

Since the proposed site access for the Low Watana Development is from the south and aggregate production is scheduled to commence 12 months prior to RCC production, other borrow pits were reviewed for possible RCC aggregate sources. In review of the Acres, "Susitna Hydroelectric Project – 1980-81 Geotechnical Report", Quarry Site A was of primary interest due to its close proximity to the dam and location on the south bank. The previous geotechnical reports indicate that Quarry Site A contains good quality rock. It has an estimated 23 million cubic yards (mcy) of weathered rock and 71 mcy of good quality rock above elevation 2300 ft. The geotechnical report described the rock as "very resistant to abrasion and mechanical breakdown, seldom losing strength or durability in the presence of water and demonstrating high resistance to breakdown by freeze-thaw." The requirements for RCC aggregates are different than for conventional concrete and effectively any moderately to slightly weathered, non-reactive rock can be assumed to be worthy of consideration until proven otherwise.

The Borrow Pit E source was considered the primary source for aggregate in the 1985 Harza Ebasco study, however there would likely be significant excavation below the Susitna River water line. Due to its close proximity to the dam on the south bank, good rock qualities and abundance of material, Quarry Site A appears to be a very attractive RCC aggregate source. Since Quarry Site A is well above the river level, permitting would likely be less complicated than with Borrow Pit E. Preliminary volume estimates for the Low Watana Gravity Dam indicate that approximately 7.6 mcy of roller compacted concrete would be required. The preliminary RCC mix design requires approximately 80% aggregate by volume, which results in a total required aggregate volume of 6.1 mcy.

Due to the limited scope of this study, a detailed cost estimate of an aggregate production facility at Quarry Site A was not done on an itemized basis, rather, the

costs developed in the 1982 Acres study were utilized and escalated to 2008 dollars. The 1982 unit cost for aggregate production and hauling were escalated using the USBR Construction Cost Index under the category "Concrete Dams". The 1982 study utilized Borrow Pit E as the aggregate source, and it was assumed that the crushing and screening facilities would be similar for Quarry Site A. The estimated production from Borrow Pit E was 6.2 mcy, while the required production at Quarry Site A is approximately 6.1 mcy or less depending on the selected alternative. The aggregate haul costs were similarly escalated to 2008 dollars, which may be conservative since the round trip distance for Borrow Pit E was 4 miles compared to an estimated 1 mile for Quarry Site A. Another source of conservatism is that Quarry Site A has a much deeper groundwater table and less overburden as compared to Borrow Pit E, which will decrease the dewatering and clearing costs.

The cementitous material costs \$180/ton (\$48.86/cy) as determined in the R&M 2009 study were used in this cost analysis1. Also it was assumed that 4 ARAN Modumix III (MM III) batch plants would be installed to produce an average of 1,000 cy/hr of RCC. The total installation cost of the batch plants was estimated to be \$20 million. Each of these assumptions is consistent with the Full Watana RCC Analysis. Other important assumptions used in the Full Watana RCC analysis that were utilized for determining labor and equipment costs are; RCC is mixed in 8 cy batches; each work day consists of two 10 hour shifts; the construction season is 5.5 months; and the total number of working days per season is 165.

As previously mentioned, RCC will be delivered to the dam via conveyors and chutes. Standard 10 cy (or larger) rear dump trucks will be used to transport the mixes to various placement locations. The estimated cycle times for dump trucks was calculated in order to determine the total number of trucks required for placement. In order to determine the total amount of placement crews required, the RS Means (RS Means 2010) estimation of cy of RCC placed per day per crew was adjusted to an hourly placement rate. In this manner the total number of haul trucks and placement crews was determined by the average RCC production rate of 1,000 cy/hr. Additional workers including laborers, foreman, operators, and mechanics, etc., were estimated based on total number of crews and trucks. Hourly labor rates for each trade were taken from the RS Means data. This hourly rate was then prorated to include the overtime for a 10 hr work day and multiplied by the city cost index for Fairbanks.

The total pieces of equipment was based on the number of placement crews and batch plant operations. The RS Means (RS Means 2010) Hourly Operational Costs and Monthly Rental Rates were utilized for the analysis. Each was multiplied by the Fairbanks City Cost Index. Using the average production rate, a total number of required work days for placement was determined, which resulted in 3 construction seasons. The overall rental rates were then calculated for operational time and idle time. Based on previous experience, it was assumed that the total equipment operational cost of the batch plant was equal to the total cost of supply of the batch plant, which has been estimated to be approximately \$20 million.

¹ Note that this cost is based on the assumption that all supplementary cementitious materials (pozzolan, fly ash, etc) used in the mix are imported. If suitable sources of pozzolanic materials are identified within Alaska, substantial reductions in this unit price may well be possible.

The detailed breakdown of the RCC unit cost resulted in a total per cubic yard cost of \$97.21, which compares very well to the previous RCC unit cost of \$100/cy used in for the Full Watana alternative (R&M 2009). Further analysis of the aggregate production plant and RCC batch plants may show additional reductions in costs, but for the scope of this analysis an RCC unit cost of \$100/cy appears valid.

4.1.2 Sizing of RCC Batching Plant

The abutments at the Watana Site are ideal for the transportation of the RCC to the dam surface using a 'vacuum chute'. The RCC can be lowered 250 to 350 feet for placement without difficulty. Therefore, based on potential quarry location and using any of the above-mentioned transportation methods, the most appropriate location for the RCC batching plant for Low Watana would appear to be at the intake approach channel. This area is already planned to be excavated for the intake, therefore a separate excavation for a batch plant would not be required. It would also be approximately two-thirds the height of the dam and allow for transport of material to the placement elevations above and below the intake. For the bottom half of the dam, a fixed conveyor could run downwards from the plant to a hopper at about half height near the axis of the dam. This hopper could feed a chute that would load the trucks on the dam surface. As the dam increased in height, sections of the chutes/pipes would be removed. For the placement of RCC in the upper half of the dam, the fixed conveyor could run from the concrete batching plant upwards to a hopper just above the crest of the dam that would then feed a chute for final conveyance to the trucks on the dam surface. This RCC transportation scheme would provide a very simple and reliable (and inexpensive) method that has the potential for reducing the unit costs estimated.

4.2 Camp Cost

The 1982 Acres Feasibility Study cost estimate had assumed for the Watana embankment dam a camp for 3,600 workers, a project village, and support facilities. The 2009 HRD report indicated a much smaller camp than anticipated in 1982.

When comparing the ICRD to the RCC dam alone, the smaller volume of the RCC dam would logically reduce the workforce required. However is anticipated to be 24/7 for 5.5 months. Embankment fill placement for the ICRD is presumably daylight hours for 8-9 months. For RCC, crews are smaller (more highly mechanized operation) but there are more of them. We have assumed the camp for the RCC dam construction costing about 20 percent less than that for the embankment dam concept (factor of 18.75% was used in calculations).

4.3 **Project Access Cost**

It has been assumed that the rail line can be installed at the average rate of \$4.7 million per mile based on Alaska Railroad estimating guidelines.

4.4 Cost Summary

A comparison table of the Low Watana options is presented as Table 4.4-1. Detailed cost estimates are presented in Appendix B.

Table 4.4-1: Cost Comparison of Selected Low Watana ICRD and	RCC Alternatives
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	Line Item Name	N	Low Watana Ion-Expandable ICRD (1)	Exp	Low Watana bandable ICRD (1)	ow Watana RCC - Non-Expandable	L	ow Watana RCC - Expandable	Low Watana RCC Gravity Arch	(1) Fr HDR
	Total Estimated Const. Costs (Billions \$)		4.50		5.00	3.90		4.20	3.60	
FERC Line #	Line Item Name	N	Low Watana Ion-Expandable ICRD (1)	Exp	Low Watana bandable ICRD (1)	 ow Watana RCC - Non-Expandable	L	ow Watana RCC - Expandable	Low Watana RCC Gravity Arch	
71A	Engineering, Env, and Regulatory (7%)	\$	236,000,000	\$	259,000,000	\$ 203,200,000	\$	217,900,000	\$ 186,600,000	
330	Land and Land Rights	\$	121,000,000	\$	121,000,000	\$ 120,900,000	\$	120,900,000	\$ 120,900,000	
331	Power Plant Structure Improvements	\$	115,000,000	\$	159,000,000	\$ 121,219,000	\$	161,389,000	\$ 121,219,000	
332.14	Reservoir, Dams and tunnels	\$	1,537,690,000	\$	1,718,000,000	\$ 1,425,110,000	\$	1,472,944,000	\$ 1,220,892,000	
332.59	Waterways	\$	590,000,000	\$	677,000,000	\$ 276,342,000	\$	387,367,000	\$ 242,655,000	
333	Waterwheels, Turbines and Generators	\$	297,000,000	\$	297,000,000	\$ 297,000,000	\$	297,000,000	\$ 297,000,000	
334	Accessory Electrical Equipment	\$	41,000,000	\$	41,000,000	\$ 40,000,000	\$	40,000,000	\$ 40,000,000	
335	Misc Power Plant Equipment	\$	21,000,000	\$	32,000,000	\$ 21,000,000	\$	32,000,000	\$ 32,000,000	
336	Roads, Rails and Air Facilities	\$	232,000,000	\$	232,000,000	\$ 254,700,000	\$	254,700,000	\$ 254,700,000	
350-390	Transmission Features	\$	224,000,000	\$	224,000,000	\$ 207,362,000	\$	207,362,000	\$ 207,362,000	
63	Main Construction Camp	\$	180,000,000	\$	180,000,000	\$ 123,800,000	\$	123,800,000	\$ 123,800,000	
399	Other Tangible Property	\$	16,000,000	\$	16,000,000	\$ 15,800,000	\$	15,800,000	\$ 15,800,000	
71B	Construction Management (4%)	\$	135,000,000	\$	148,000,000	\$ 116,100,000	\$	124,500,000	\$ 106,600,000	
Total Subtotal	Subtotal	\$	3,745,690,000	\$	4,104,000,000	\$ 3,222,533,000	\$	3,455,662,000	\$ 2,969,528,000	
Total Contingency	Contingency (20%)	\$	749,138,000	\$	821,005,200	\$ 644,506,600	\$	691,132,400	\$ 593,905,600	
Total	Total Estimated Const. Costs (Million \$)		\$4,500		\$5,000	\$3,900		\$4,200	\$3,600	1

5.0 **Project Schedule**

The ICRD configuration has two basic construction fronts; dam and powerhouse, which are relatively independent of each other. With a surface powerhouse near an RCC gravity or gravity arch, the construction area is less independent and a higher level of coordination would be required during construction operations.

5.1 Dam

The anticipated construction season for RCC or conventional concrete construction is 5.5 months, with a maximum of 165 working days. Certain activities such as aggregate production and underground work may be continuous, year-round operations. The ICRD dam configuration has two basic construction fronts; dam and powerhouse, which are relatively independent of each other. With a surface powerhouse near an RCC gravity or gravity arch, the construction area is less independent and a higher level of coordination would be required during construction.

Previous studies (R&M 2009) for the Full Watana RCC option have assumed an average daily placement rate of 20,000 cy/day, which equates to an average monthly placement rate of 600,000 cy/mn. Currently the maximum peak placement observed rate of RCC placement is 525,000 cy/mn (MD&A figures for a single production plant). The significantly higher monthly placement rate for the Watana Dam is due to the plan of installing two separate large RCC production facilities. In order to optimize the RCC construction during the short construction season at the site, significant production facilities will be needed. The nominal production capacity of each of the two RCC plants will be similar to existing recent projects. The Watana site is expected to benefit from aggregate production for more than the 5.5 months assumed for dam placement as well as advantageous location of the Site A quarry. Aggregate production will commence at least 12 months prior to the start of RCC placement. Production are estimated to be double shifts, 6 days per week for 8 to 9 months per year and must be planned to ensure that aggregate production rates will be approximately 2. By factoring the volume of the dam and using average production rates ranging between 20,000–15,000 cy/day, the approximate dam construction time is shown below in Table 5.1

Alternative	Volume (million)	Time to place material
Full Watana	15.0	4.5 to 6 years
Low Watana Gravity	8	2.4 to 3.2 years
Low Watana Gravity Arch	6.5	2 to 2.6 years

Table 5.1-1 Time Required for RCC Dam Placement

5.2 Powerhouse

A surface powerhouse would be more subject to climatic constraints than an underground powerhouse and therefore the construction season for exterior work involving concrete placement would have similar limitations to dam placement. Once the powerhouse shell is completed, equipment installation could continue through the winter season.

The underground powerhouse is subject to greater geotechnical uncertainty which could result in modifications to design plans and potential project delays.

The powerhouse excavation for the surface powerhouse may begin prior to diversion tunnel and cofferdam completion (potentially providing material for the pre-cofferdam and cofferdam). Similarly the south abutment excavation and grouting may be performed concurrently with the diversion construction. Through careful scheduling, it may be possible for the excavation above river level on the south abutment and excavation for the surface powerhouse to be completed at approximately the same time as the diversion completion. After diversion, the dam and surface powerhouse foundation excavation and treatment may continue. The diversion cofferdams may also function for river crossing such that the north abutment excavation and treatment may begin.

Once the powerhouse shell is completed, equipment installation could continue through the winter season. Therefore the completion of the surface powerhouse shell is a significant project milestone, such that it should have a target completion date that will not cause it to be a critical path item.

5.3 Combined Dam and Powerhouse Schedule

The schedule for the ICRD Low Watana dam (HDR 2009) shows similar time for dam construction and powerhouse/transmission lines. More detailed review is required to determine which element is on the critical path. The RCC dam is expected to be constructed in less time than the ICRD dam, which will place the powerhouse onto the critical path for construction.

At this point, given the current level of design and schedule we are not able to demonstrate significant schedule advantage for the overall project with the RCC scheme. However it should be noted that other projects using RCC dams that allowed early completion of the dam construction and impoundment of the reservoir, found the benefit of early generation revenue and availability of additional construction and management resources combined to allow powerhouse construction and equipment installation to be significantly accelerated to significant economic advantage.

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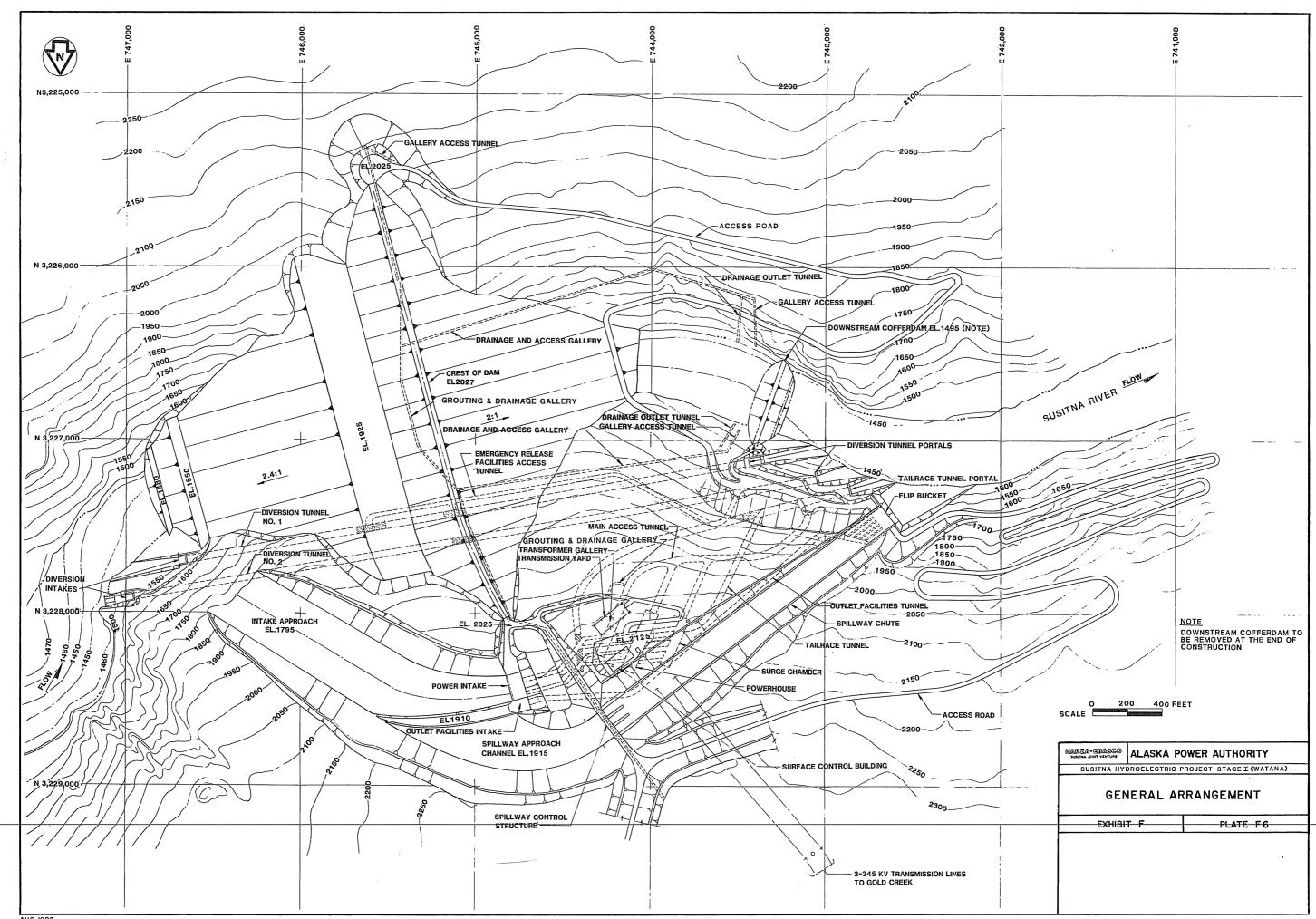
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Figures

NOTICE TO READER - Some of the Figures have been taken from previous Susitna Project reports and the conventions for cardinal direction are inconsistent from report to report in many cases, i.e. North is the top of the page on some figures and the bottom of the page on others. The Figures were not re-drawn for this report. New figures use the convention of North at the top of the sheet. Many old figures use the convention of stream flow from left to right; the Susitna River in the area of the Susitna project flows from east to west.

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FIGURE 2.2-1 LOW WATANA ICRD EXPANDABLE PLAN

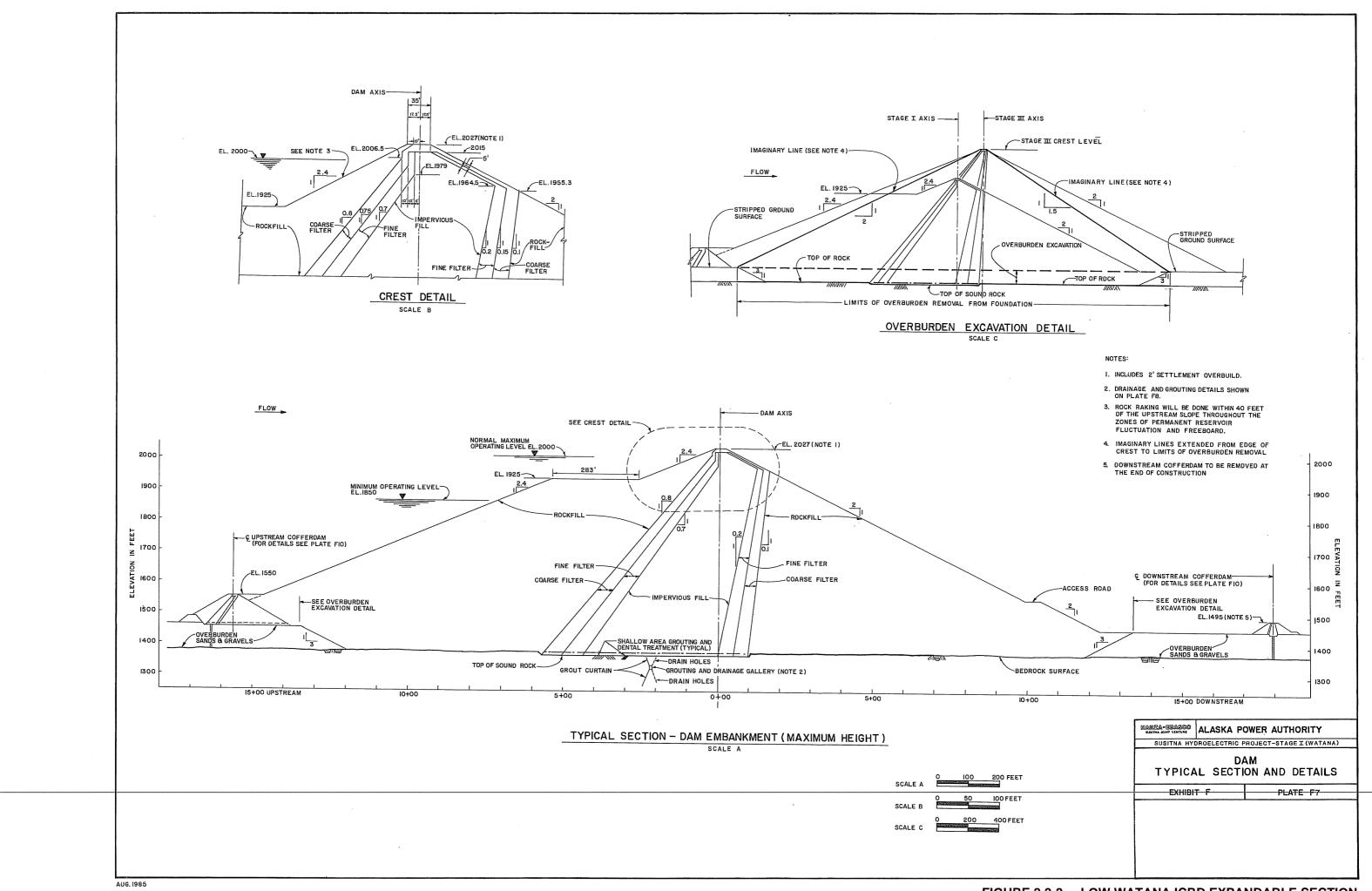
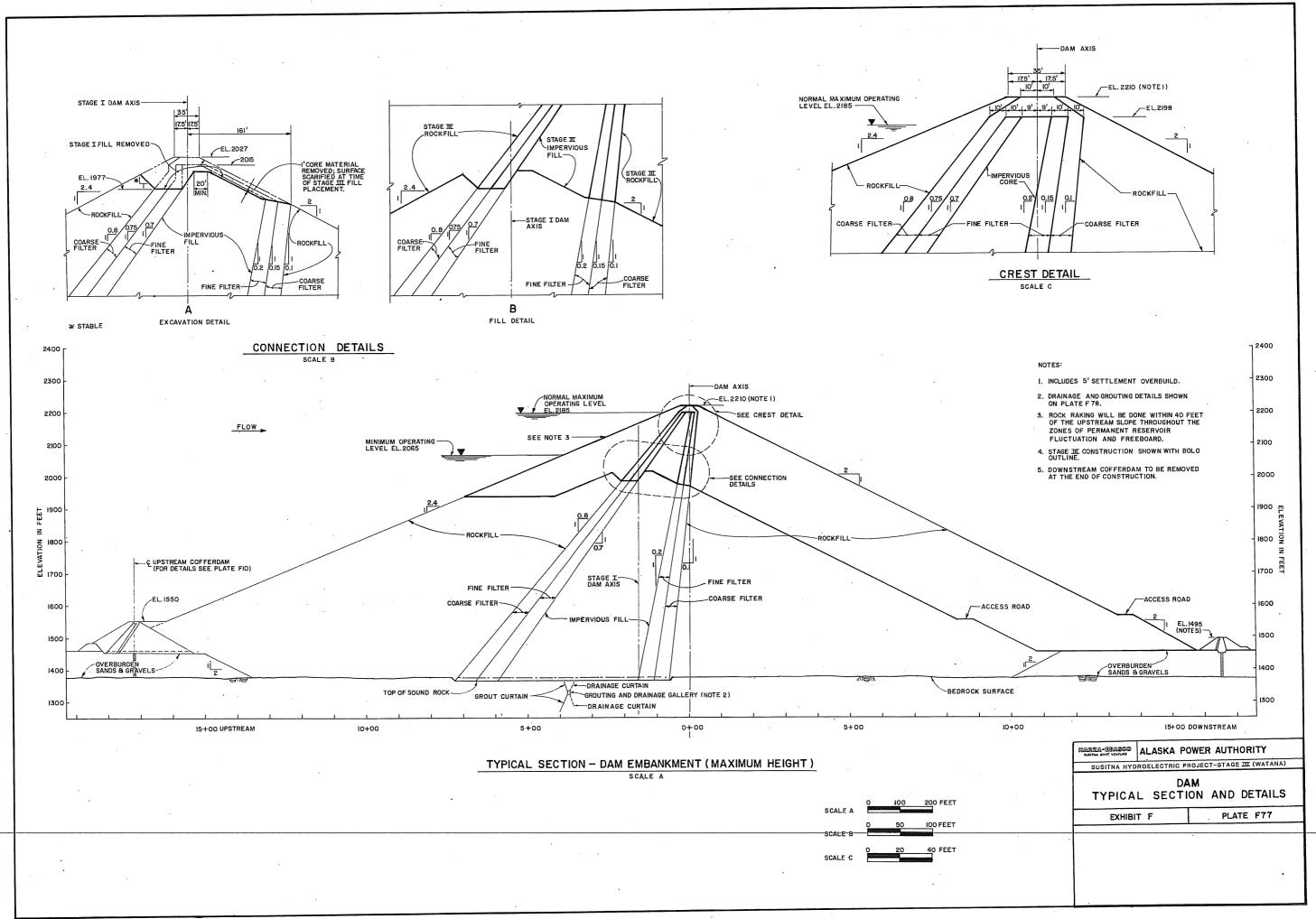
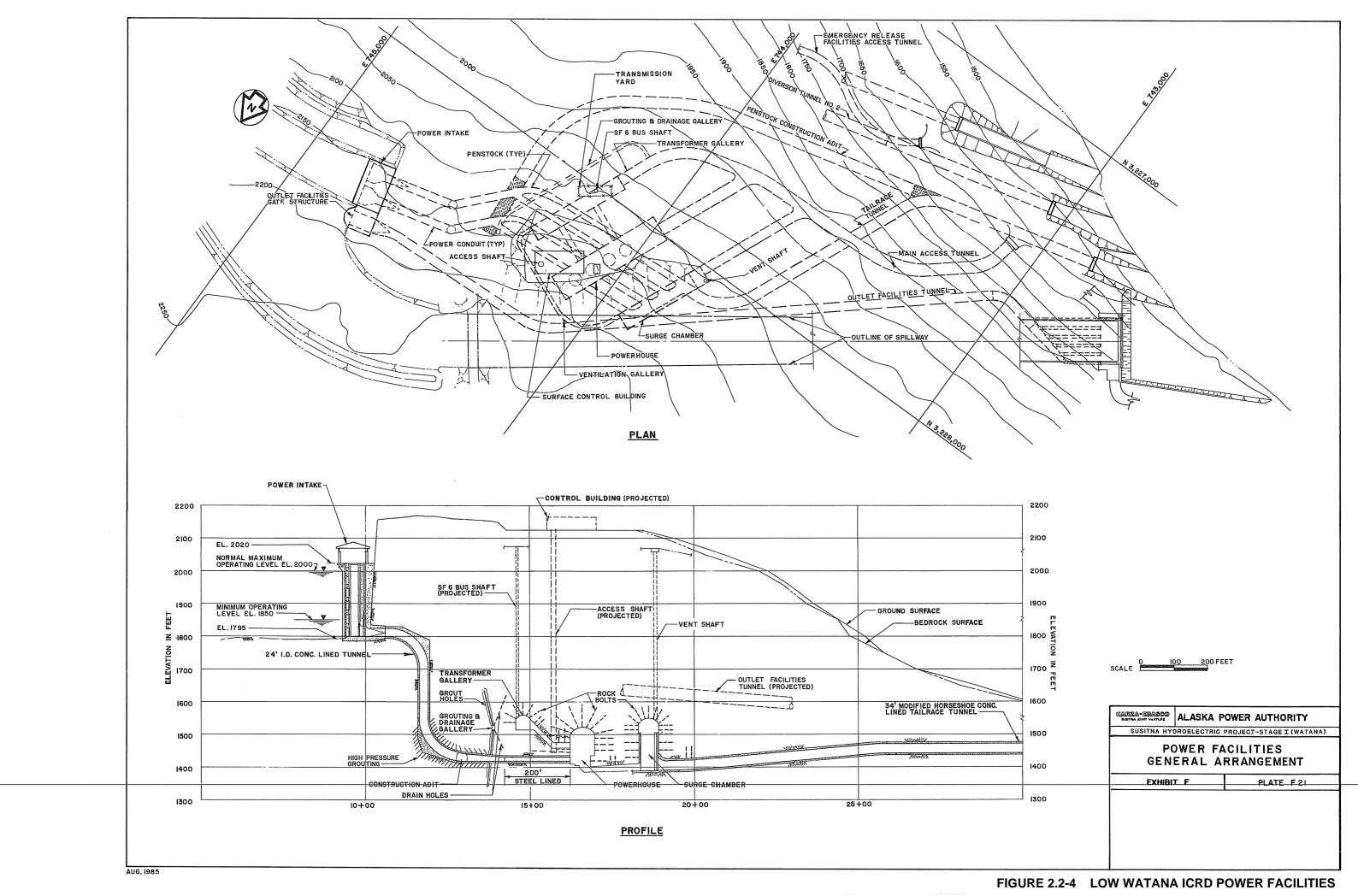


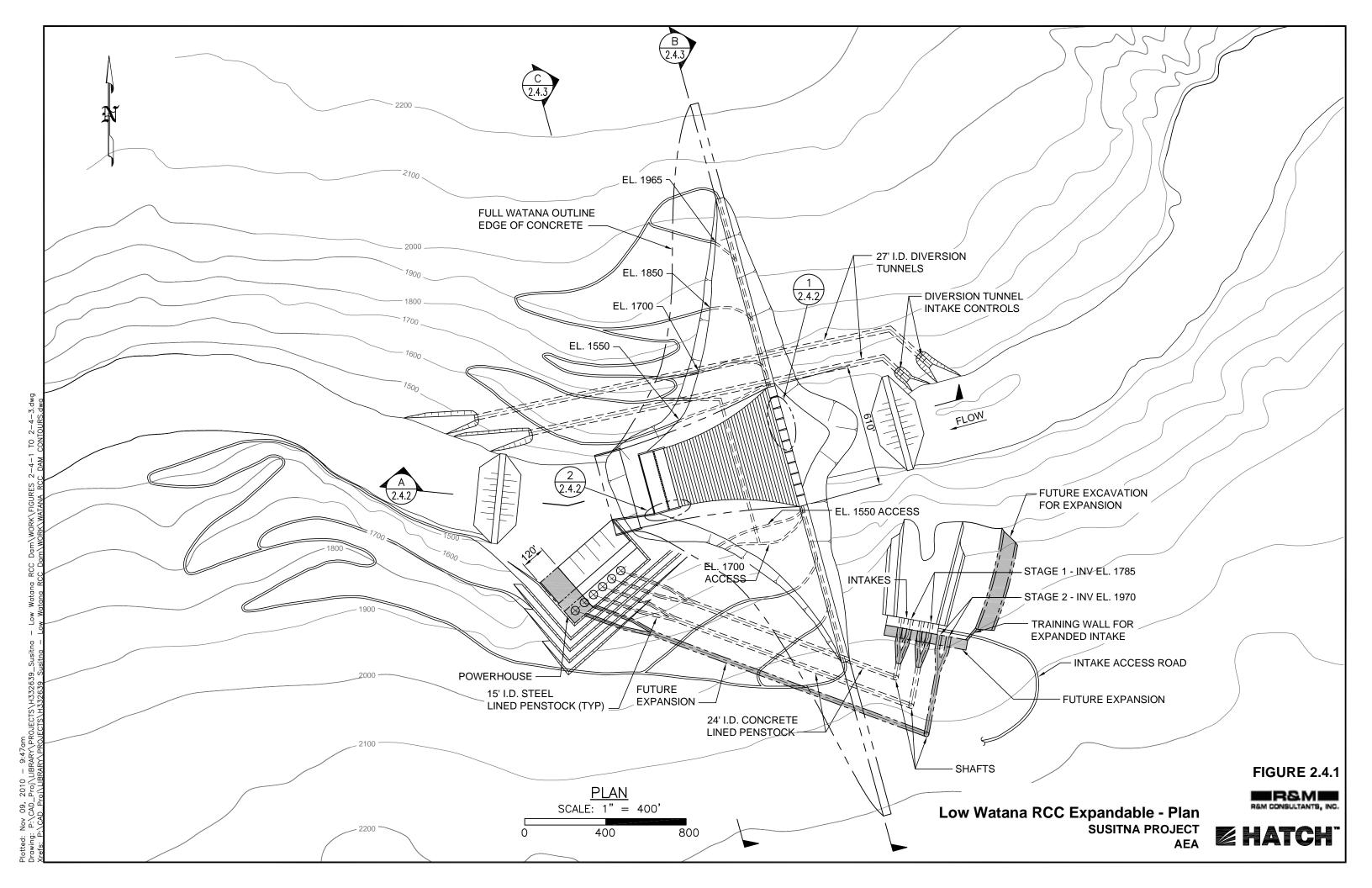
FIGURE 2.2-2 LOW WATANA ICRD EXPANDABLE SECTION

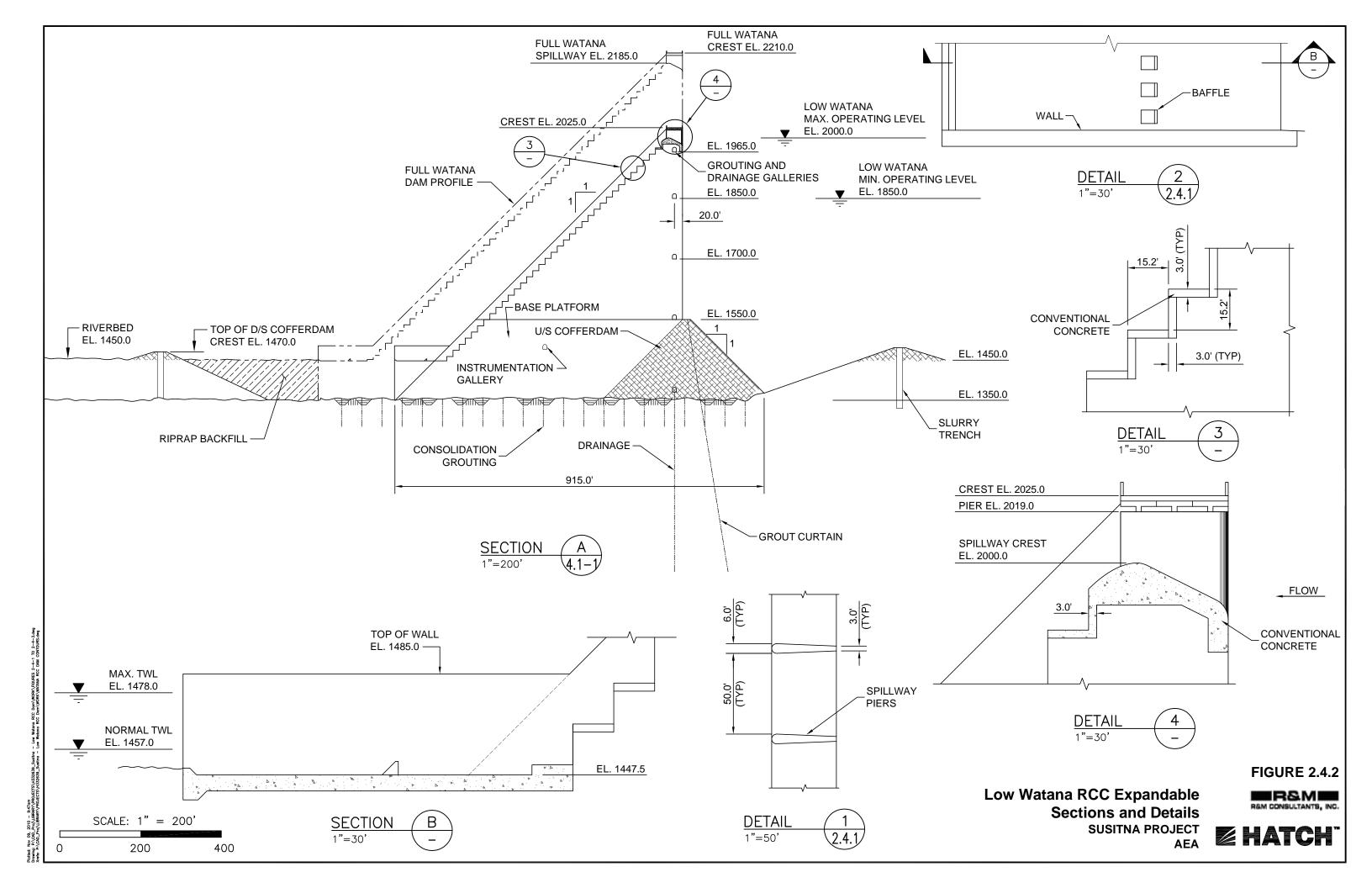


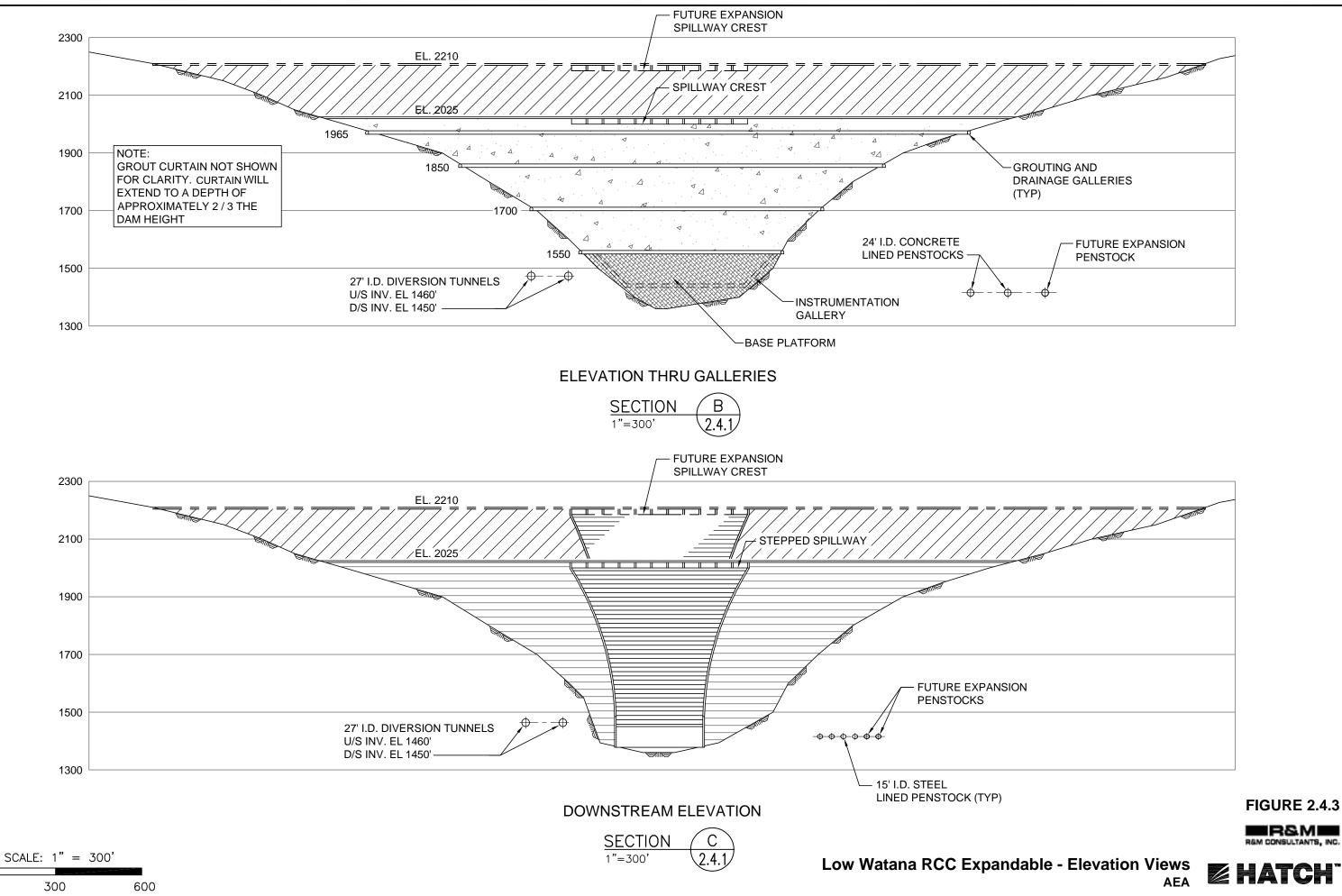
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FIGURE 2.2-3 LOW WATANA ICRD EXPANDABLE STAGE 2 SECTION

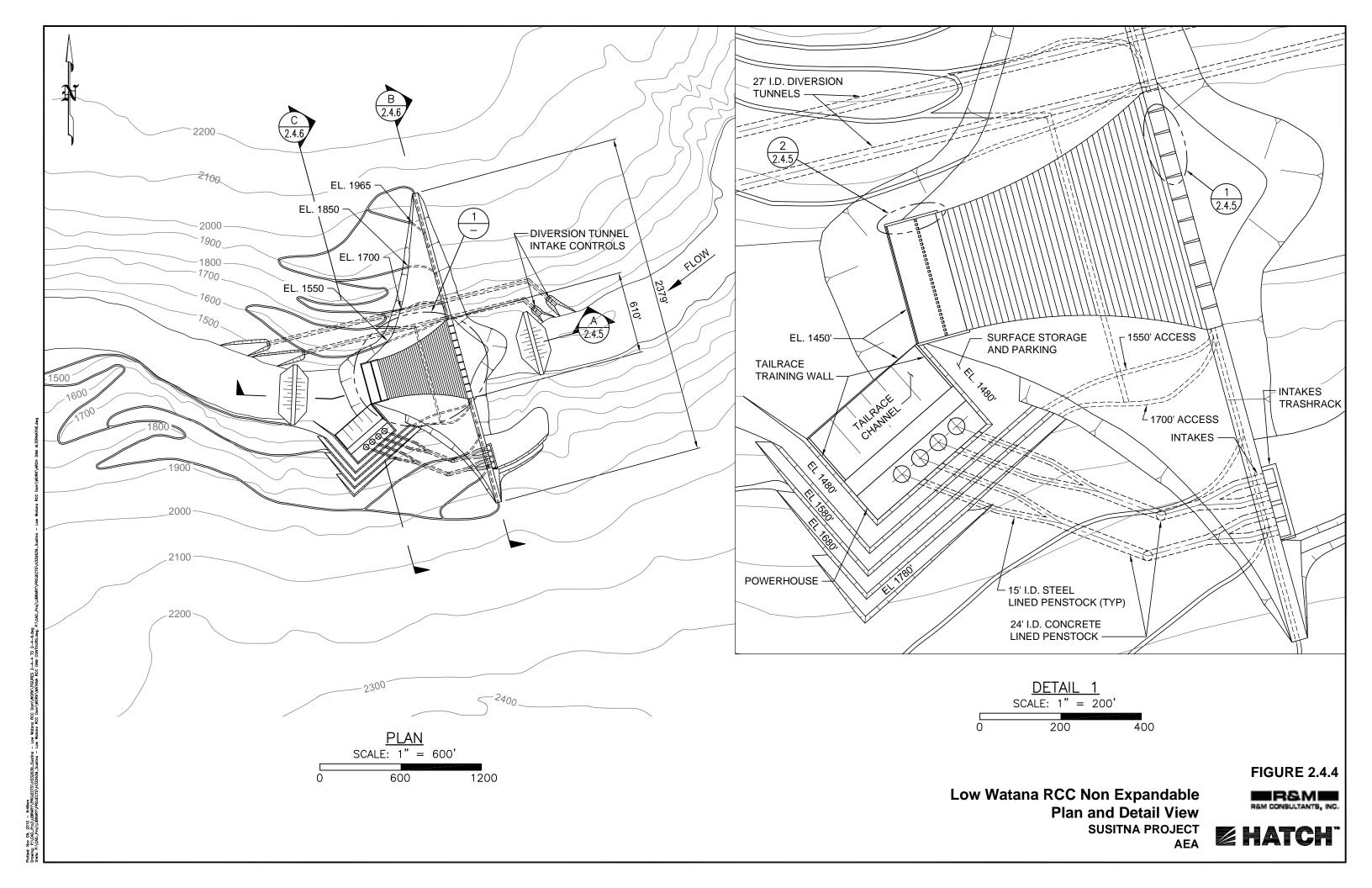


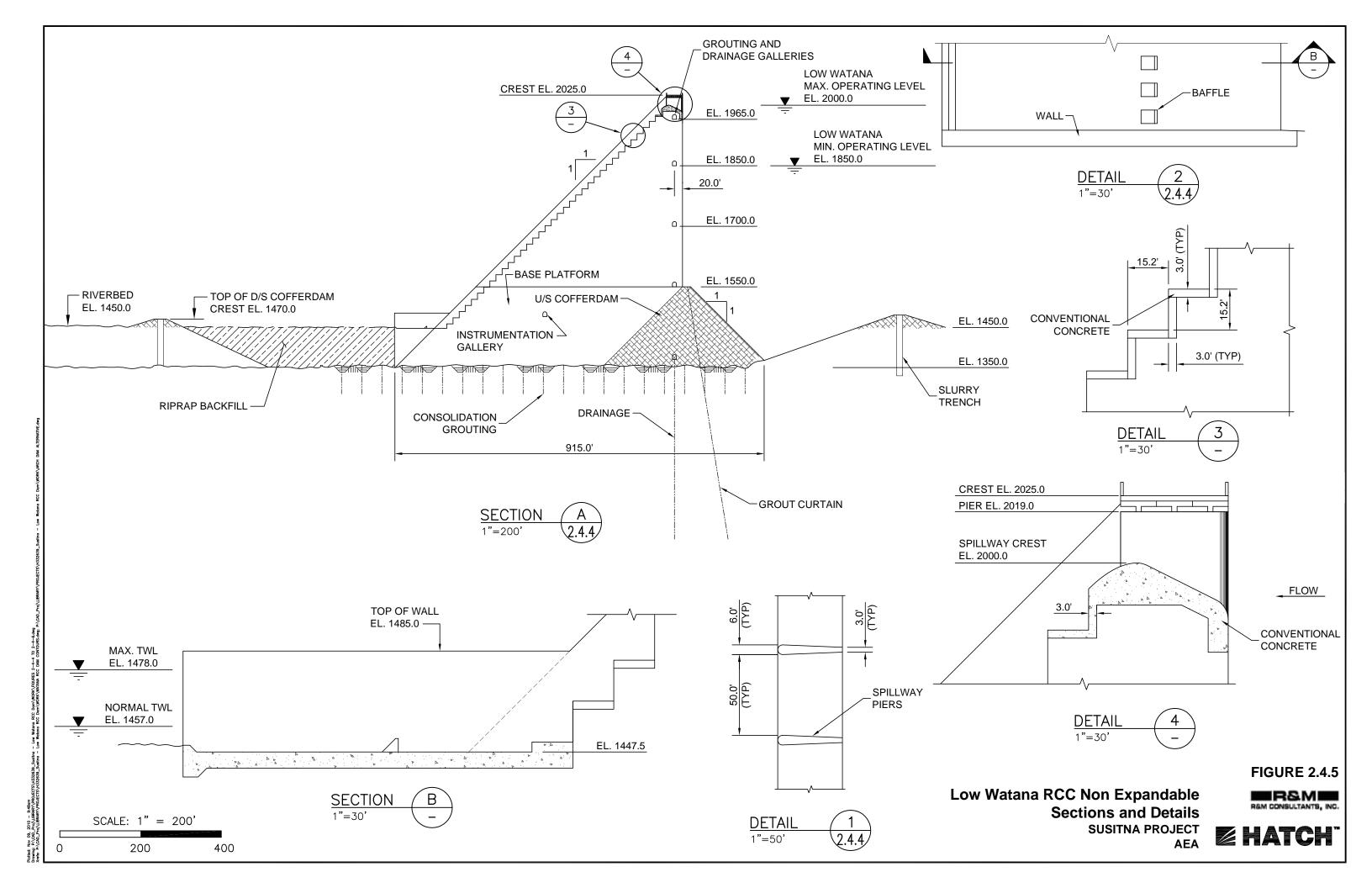


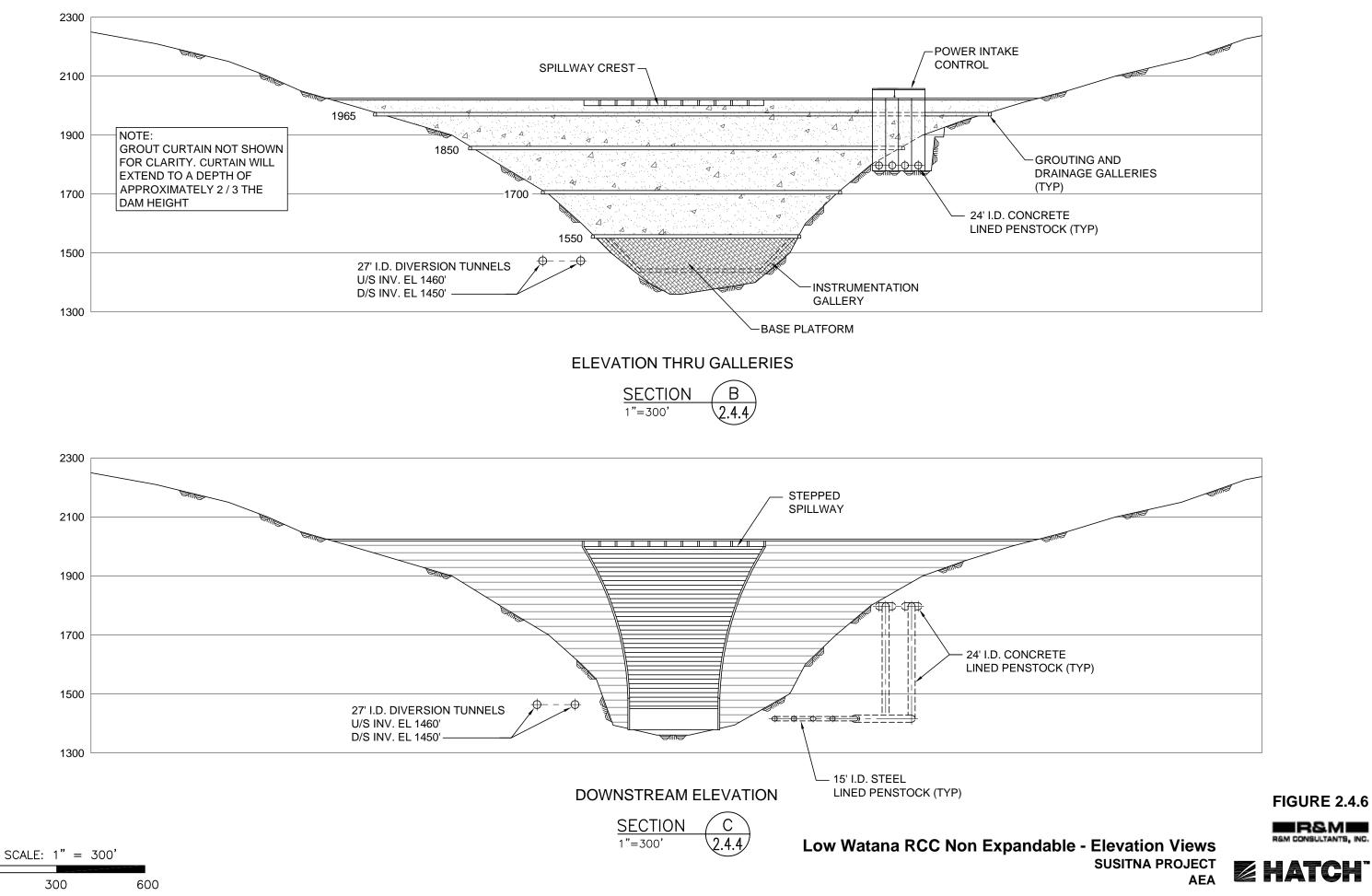




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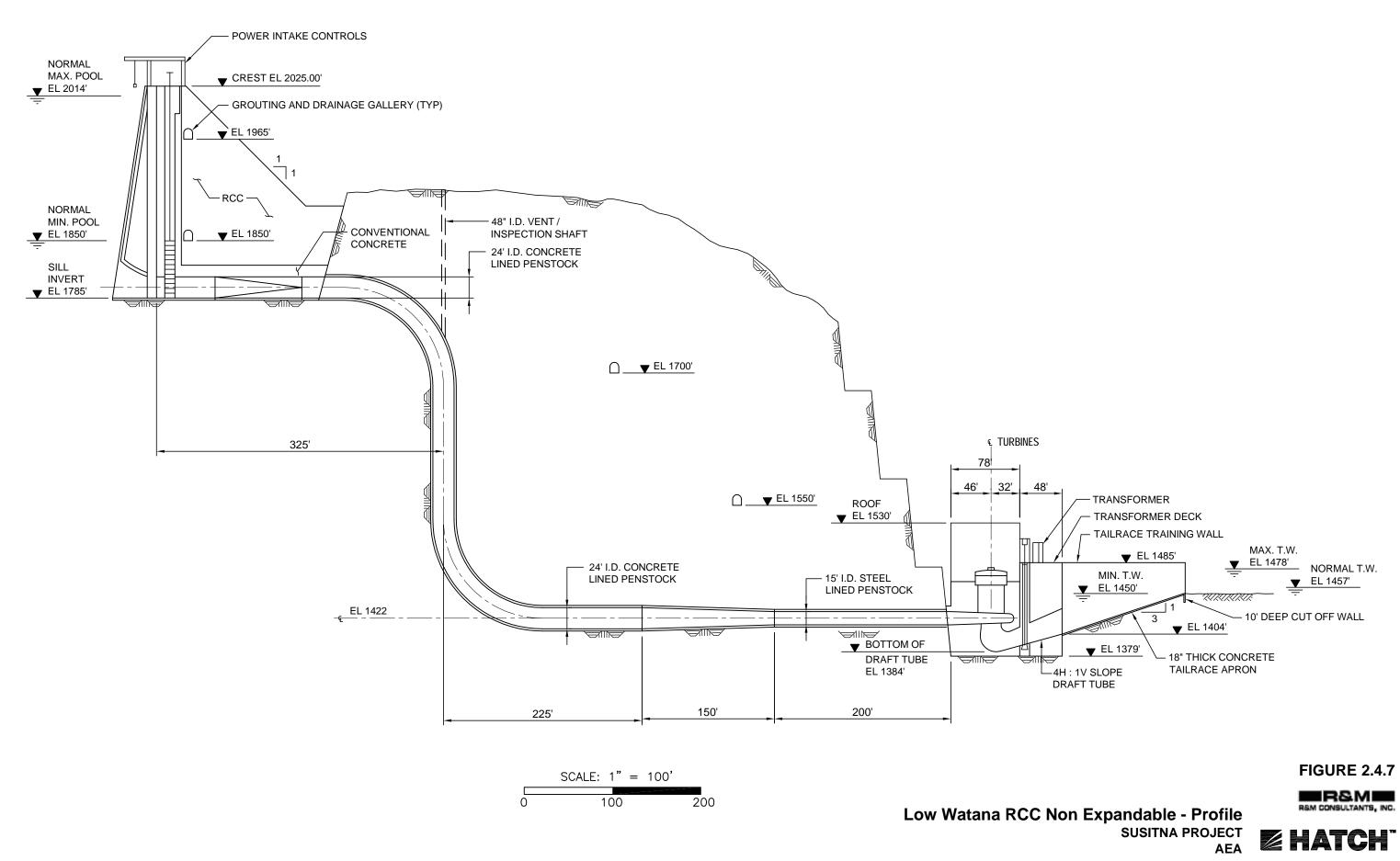


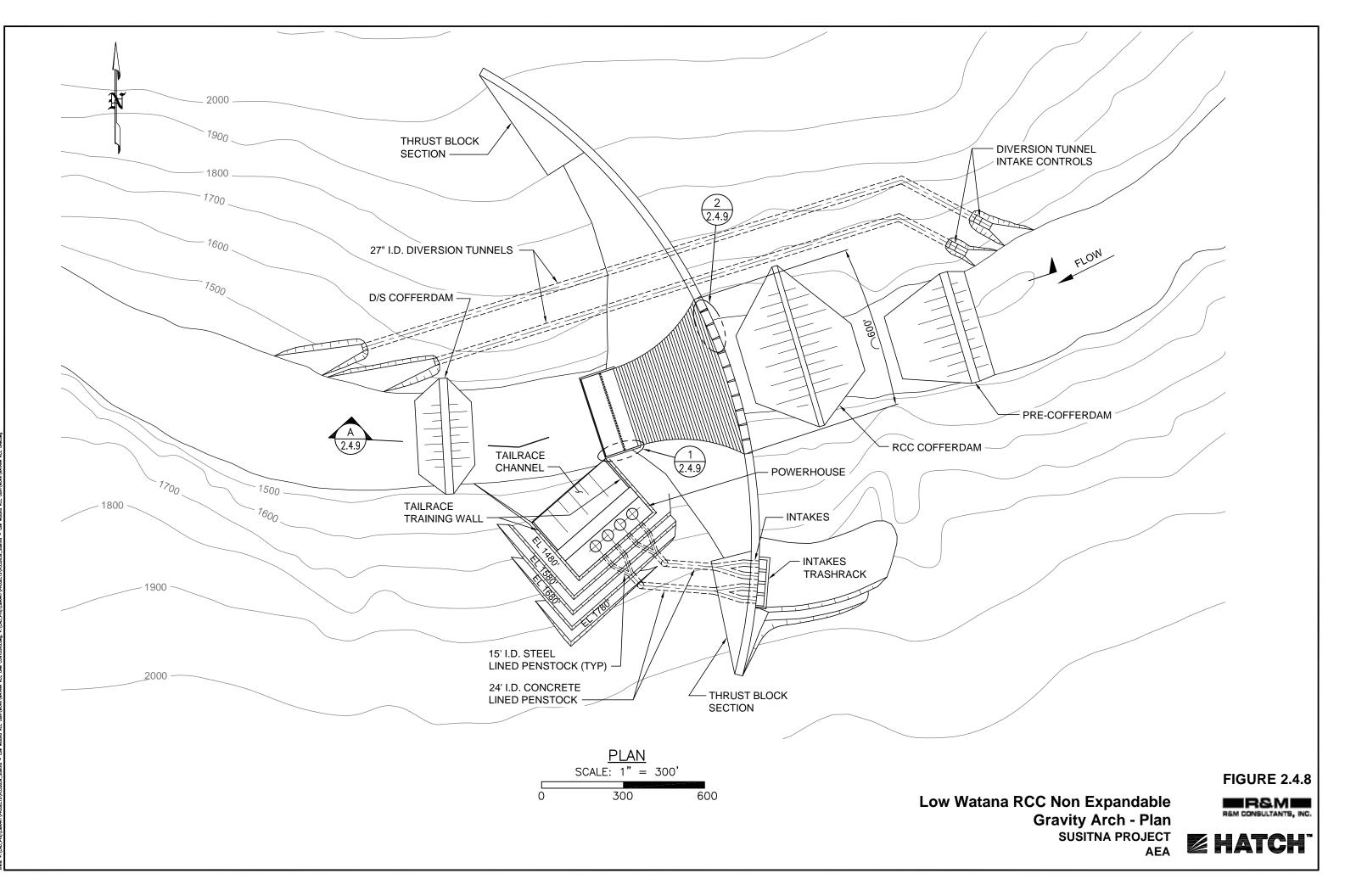


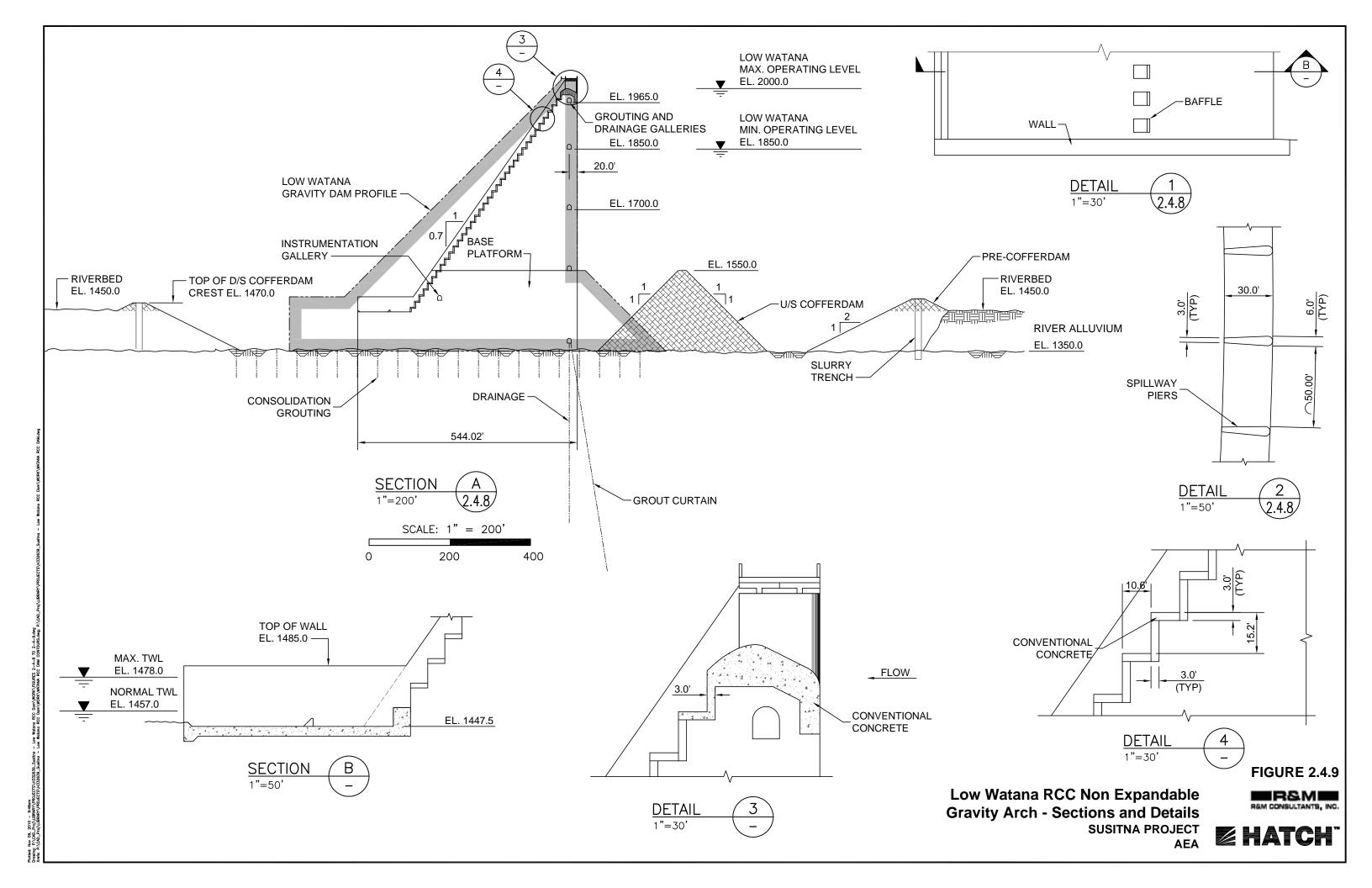


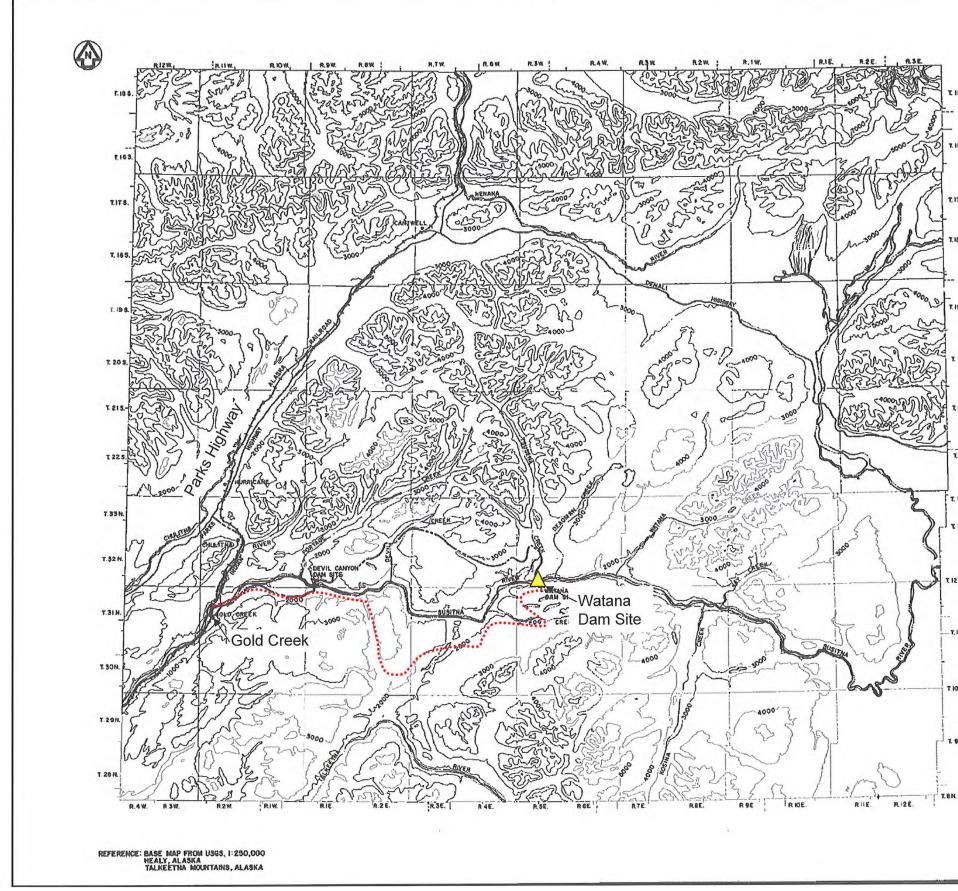
0





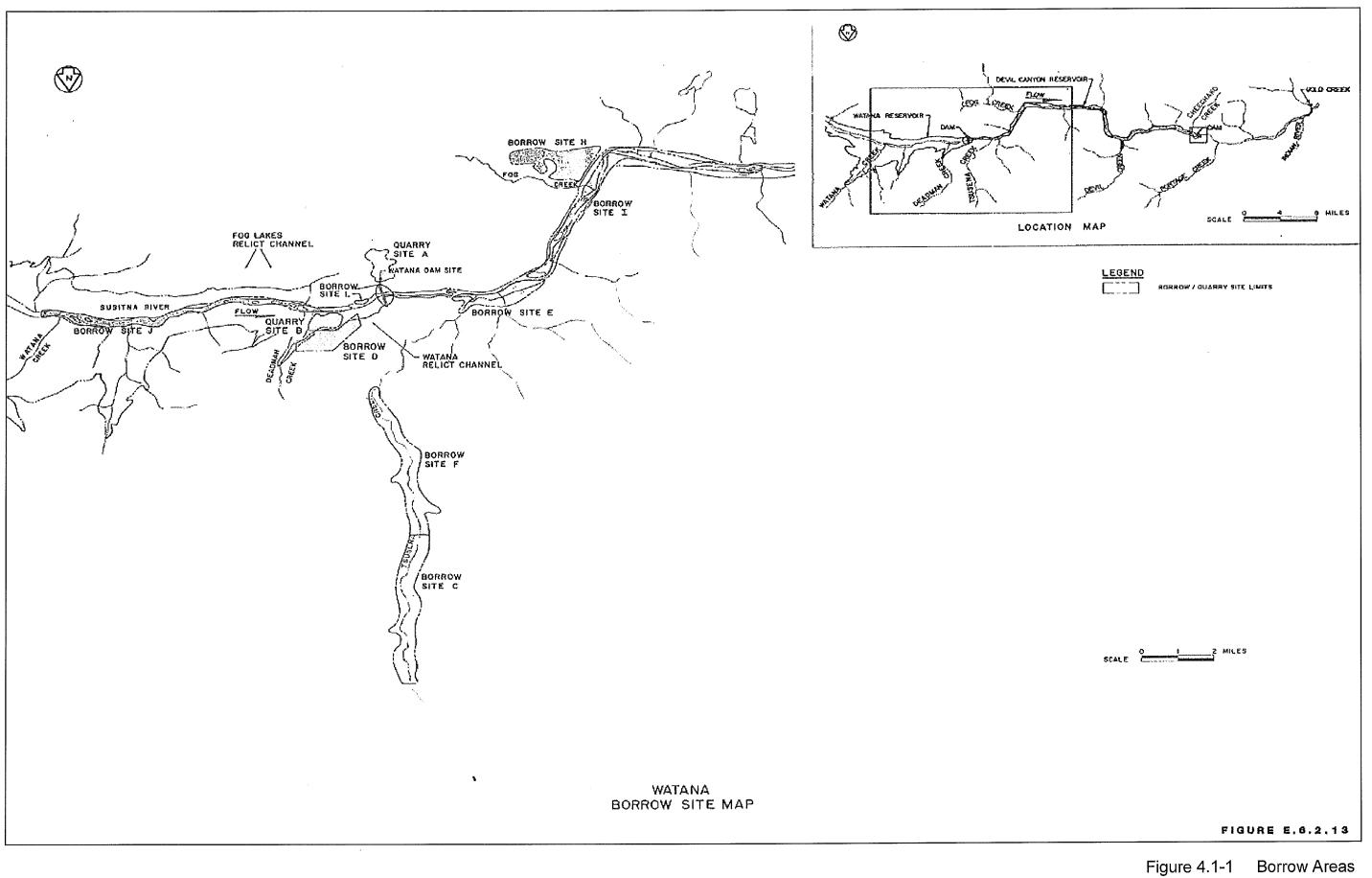






LEGEN	P RECOMMENDED ROU	TE	
Logondi			-
Legend:	Railroad Align	ment	
\wedge	Dam Sites	ment	
SCALE	0 4 B Mil	.ES	
SGALE	0 4 6 Mi	ES	
[Les DWER AUTHO	RIT
SCALE	ALASKA PO		_
[ALASKA PO SUSITNA HYD	OWER AUTHO	_
ACRE	ALASKA PO SUSITNA HYD	OWER AUTHO	_

Figure 3.2-1 Low Watana Rail Access



Appendix A

Breakdown of Unit Cost Analysis for RCC

Low Watana RCC Dam RCC Unit Cost Analysis November 3, 2010

Low Watana RCC Assumptions/Totals	
Total RCC Volume (cyd)	7,600,000
Percent of Aggregate by Volume	80.3%
Total Required Aggregate Volume (cyd)	6,102,800
Est. Round Trip Haul Dist. From Borrow Pit A to Processing (mi.)	1
Low Watana Embankment 1982 Assumptions/Totals (Book B - De	velopment of Unit Costs)
Total Volume (cyd)	6,200,000
Total Production Hours (hr)	13,000
Avg Production Rate (cyd/hr) (Not in Book B)	476.92
Est. Round Trip Haul Dist. From Borrow Pit E to Processing (mi.)	4

USBR Construction Cost Index						
USBR Category	Concrete Dams					
Jan 1982 Factor	128					
Oct 2008 Factor	334					
Jul 2010 Factor	325					

*Costs used for 1982 Aggregate Production will be escalated to 2010 costs. Total aggregate volumes are very similar. Also the haul costs will be conservative since haul distance to Borrow Pit A is less than Borrow Pit E.

Description	Labor	Materials	Equipment	Total
Aggregate Processing	\$ 16,584,230.00	\$ 2,930,400.00	\$ 36,322,000.00	\$ 55,836,630.00
Install & Removal of Plant	\$ 1,650,000.00	\$ -	\$ -	\$ 1,650,000.00
Total Aggregate Processing Cost (\$/cyd)	\$ 18,234,230.00	\$ 2,930,400.00	\$ 36,322,000.00	\$ 57,486,630.00
Aggregate Processing Unit Cost (\$/cyd)	2.941	0.473	5.858	9.272
Aggregate Hauling Unit Cost (\$/cyd)	1.104	0.01	3.583	4.697
Total Aggregate Production Cost (\$/cyd)	\$ 4.05	\$ 0.48	\$ 9.44	\$ 13.97
USBR Ratio Jul 2010:Jan 1982	2.54	2.54	2.54	2.54
Jul 2010 Total Agg Production Cost (\$/cyd)	\$ 10.27	\$ 1.23	\$ 23.97	\$ 35.47

Total Cost of 4 ARAN Modumix III Batch Plants incl Installation	\$ 20,000,000.00	
Total Batch Plant Unit Cost (\$/cyd)	\$ 2.63 \$	2.63

Cement & Fly Ash Cost (\$/cyd)	\$ - \$	48.86 \$	- \$	48.86
RCC Placement Cost (\$/cyd)	\$ 1.22 \$	- \$	3.22 \$	4.44
RCC production Cost (\$/cyd)	\$ 0.75 \$	- \$	5.05 \$	5.81
Final RCC Unit Cost (\$/cyd)	\$ 12.24 \$	50.09 \$	34.88 \$	97.21

RCC Labor Costs

City Cost Index for Fairbanks, AK					
Division	Installation Index				
0241, 31-34 Site & Infrastructure, Demolition	131.5				
03 Concrete	115.3				

Adjustment Factor for Overtime					
RS Means Work Day (hr)	8				
Low Watana RCC Work Day (hr)	10				
Pay Rate Increase for Overtime	1.5				
Ajustment Factor	1.375				

	# of Workers	Trade	Т	S Means 2010 - otal Hourly Rate Icl. O & P (\$/hr)	Overtime Adjustment	otal Hourly Rate incl Overtime	City Cost Index	otal Hourly e at Watana (\$/hr)
	7	Equipment Operator (med.) - Dozer	\$	64.30	1.375	\$ 88.41	131.5	\$ 116.26
Dam		Equipment Operator (light.) - Roller	\$	61.85	1.375	\$ 85.04	131.5	111.83
	7	Laborers - RCC Placement	\$	48.45	1.375	\$ 66.62	131.5	\$ 87.60
uo	7	Foreman Average, Outside	\$	68.55	1.375	\$ 94.26	131.5	\$ 123.95
ant .	5	Laborers - Flagman (Directing Truck Traffic)	\$	48.45	1.375	\$ 66.62	131.5	\$ 87.60
Placement	4	Mechanic - Trucks, Dozers & Rollers	\$	66.75	1.375	\$ 91.78	131.5	\$ 120.69
Ice	1	Electrician - Converyors & Equipment	\$	72.85	1.375	\$ 100.17	131.5	\$ 131.72
Ыа	25	Truck Drivers (Light) - 8 cyd Rear Dump	\$	49.20	1.375	\$ 67.65	131.5	\$ 88.96
Ω.	2	Truck Drivers (Light) - Fuel Trucks	\$	49.20	1.375	\$ 67.65	131.5	\$ 88.96
RCC	2	Equipment Operator (light.) - Skid Steer Loader	\$	61.85	1.375	\$ 85.04	131.5	\$ 111.83
	1	Site Supervisor	\$	82.26	1.375	\$ 113.11	131.5	\$ 148.74
	68	Total Hourly Wages						\$ 1,218.15
		Average RCC Production Rate (cyd/hr)						1000
		Total Labor Costs per Unit (\$/cyd)						\$ 1.22
ior	4	Batch Plant Operator	\$	82.26	1.375	\$ 113.11	131.5	\$ 148.74
Production	8	Equipment Operator (med.) - Front End Loader	\$	64.30	1.375	\$ 88.41	131.5	\$ 116.26
po	2	Mechanic - Batch Plant	\$	66.75	1.375	\$ 91.78	131.5	\$ 120.69
	1	Electrician - Batch Plants	\$	72.85	1.375	\$ 100.17	131.5	\$ 131.72
RCC	7	Laborers - Flagman (At Dishcarge Chutes)	\$	48.45	1.375	\$ 66.62	131.5	\$ 87.60
Я	1	Site Supervisor	\$	82.26	1.375	\$ 113.11	131.5	\$ 148.74
	23	Total Hourly Wages				 		\$ 753.75
		Average RCC Production Rate (cyd/hr)						 1000
		Total Labor Costs per Unit (\$/cyd)						\$ 0.75

91

Total # of Workers, assumes (2) - 10hr Shifts

RCC Equipment Costs

City Cost Index for Fairbanks, AK					
Division Installation Inde					
0241, 31-34 Site & Infrastructure, Demolition	131.5				
03 Concrete	115.3				

Assumptions / Variables	
Shift Duration (hr)	10
Shifts per Day	2
Work Hours per Day	20
Average Production RCC Production Rate (cyd/hr)	1,000
Average RCC Production Per Day (cyd/day)	20,000
Total RCC Volume (cyd)	7,600,000
Required Days of Production	380
Construction Season (Months/Yr)	5.5
Construction Season (Days/Yr)	165
Minimum Construction Seasons	2.30
Total Number of Construction Season	3

Rental Rate Adjustment Factor for Unit Down Time					
Total Months in Operation per Year	5.5				
Idle Equipment Cost vs Operation	75%				
Total RCC Construction Seasons	3				
Total Months of Operation	16.5				
Total Months Idle	13.0				

					Daily Opera	tion Costs			E	Equipment Re	ental Costs				
	# of Units	Trade	RS Mear Total Hou incl. O &	urly Rate	Hours of Operation per Day	Total Production Days	Equipment Operation Cost per Unit	Operation Rental Months	Mo	nthly Rental Rate	Idle Rental Months	Total Equipment Rental Cost per Unit	Total Operation + Rental Cost per Unit	Total All Units	Total Incl Cost Index
	7	Dozer 200 hp	\$	68.60	20	380	\$ 521,360.00	16.5	\$	9,650.00	13.0	\$ 253,312.50	\$ 774,672.50	\$ 5,422,707.50	\$ 7,130,860.36
	7	Vibratory Roller 35 hp	\$	10.40	20	380	\$ 79,040.00	16.5	\$	2,275.00	13.0	\$ 59,718.75	\$ 138,758.75	\$ 971,311.25	\$ 1,277,274.29
۶	25	Truck, Dump, 2-axle, 12 ton, 8 cy payload	\$	33.35	20	380	\$ 253,460.00	16.5	\$	2,025.00	13.0		\$ 306,616.25	\$ 7,665,406.25	\$ 10,080,009.22
Dam	2	Fuel Truck (Used RS Means Water Truck Data)	\$	84.65	20	380	\$ 643,340.00	16.5	\$	7,250.00	13.0		\$ 833,652.50	\$ 1,667,305.00	\$ 2,192,506.08
on [1	Forklift, straight mast, 21' lift, 4WD	\$	20.20	20	380	\$ 153,520.00	16.5		2,225.00	13.0			\$ 211,926.25	
ito	2	Skid Steer Loader, 1 cyd, 78 hp	\$	19.00	20	380	\$ 144,400.00	16.5	\$	2,075.00	13.0			\$ 397,737.50	
Jen	13	Pickup Truck, 4WD	\$	13.50	20	380	\$ 102,600.00	16.5	\$	645.00	13.0	\$ 16,931.25	\$ 119,531.25	\$ 1,553,906.25	\$ 2,043,386.72
eπ	7	Laser Level - Grading	\$	1.17	20	380	\$ 8,892.00	16.5	\$	700.00	13.0	\$ 18,375.00	\$ 27,267.00	\$ 190,869.00	\$ 250,992.74
lac	10	Floodlights, trailer mounted w generator - (4) 300 watts	\$	4.20	10	380	\$ 15,960.00	16.5	\$	795.00	13.0	\$ 20,868.75	\$ 36,828.75	\$ 368,287.50	\$ 484,298.06
СР	3	Misc Hand Tools	\$	5.00	20	380	\$ 38,000.00	16.5	\$	850.00	13.0	\$ 22,312.50	\$ 60,312.50	\$ 180,937.50	\$ 237,932.81
RCC	77												Total Placement	Equipment Costs	\$ 24,498,968.11
£														Total RCC cyd	7,600,000
												Total Placement E	quipment Cost per	Unit RCC (\$/cyd)	\$ 3.22
	8	Front End Loader, 10 cyd, 620 hp	\$	129.55	20	380	\$ 984,580.00	16.5	\$	23,500.00	13.0	\$ 616,875.00	\$ 1,601,455.00	\$ 12,811,640.00	\$ 16,847,306.60
	2	Forklift, straight mast, 21' lift, 4WD	\$	20.20	20	380	\$ 153,520.00	16.5	\$	2,225.00	13.0	\$ 58,406.25	\$ 211,926.25	\$ 423,852.50	\$ 557,366.04
uo	8	Pickup Truck, 4WD	\$	13.50	20	380	\$ 102,600.00	16.5	\$	645.00	13.0	\$ 16,931.25	\$ 119,531.25	\$ 956,250.00	\$ 1,257,468.75
Icti	8	Floodlights, trailer mounted w generator - (4) 300 watts	\$	4.20	10	380	\$ 15,960.00	16.5	\$	795.00	13.0	\$ 20,868.75	\$ 36,828.75	\$ 294,630.00	\$ 387,438.45
Production	2	Misc Hand Tools	\$	5.00	20	380	\$ 38,000.00	16.5	\$	850.00	13.0	\$ 22,312.50	\$ 60,312.50	\$ 120,625.00	\$ 158,621.88
Pro	28														\$ 19,208,201.71
^C	LS	Total sum of all Batch Plants and Conveyence Systems (A	ssume Equa	I to all othe	er Production E	Equipment Costs)								\$ 19,208,201.71
RCC													Tota	al Equipment Costs	\$ 38,416,403.43
														Total RCC cyd	7,600,000
												Total Production E	quipment Cost per	Unit RCC (\$/cyd)	\$ 5.05

RCC PRODUCTION

	Ful	ll Watana	RCC			Low W	atana RCC
Parameter	US Standard		Metric		US Standar	ď	Metric
Quantity	15,000,000	Су	11,468,300	M ³	7,600,000	Су	11,468,300 M ³
Construction season (months/year)	5.5	Mn/Yr	5.5	Mn/yr	5.5	Mn/Yr	5.5 Mn/yr
Construction seasons	5	Yr	5	Yr	3.00	Yr	5 Yr
Placing days/year	165	Yr	160	Yr	165	Yr	160 Yr
Total required placing days based on avg daily placing rate	825	Dy	800	Dy	380	Dy	800 Dy
Total placing days	825	Dy	800	Dy	495	,	800 Dy
Σ months	25	Mn	25	Mn	12.66666667	Mn	25 Mn
Nominal monthly capacity	600,000	Су	458,732	M ³	600,000	Су	458,732 M ³
Average daily placing rate	20,000	Су	15,291	M ³	20,000	Су	15,291 M ³
Required daily average capacity	44,920	Су	34,344	M ³	44,920	Су	34,344 M ³
Required maximum month	1,200,000	Су	917,464	M ³	1,200,000	Су	917,464 M ³
Required nominal capacity	15,000,000	Су	11,468,300	M ³	7,600,000	Су	11,468,300 M ³
Mixer capacity,	8	Су	6	M ³	8	Су	6 M ³
Total mix time - start charge to complete discharge, min	2	Min	2	Min	2	Min	2 Min
batches/mixer/hour	30	Per Hr	30	Per hr	30	Per Hr	30 Per hr
Vol/mixer/hour	235	Су	180	M ³	235	Су	180 M ³
Total # of mixers	10	Ea	10	Ea	10	Ea	10 Ea
Nominal hourly production	2,350	Су	1,800	M ³	2,350	Су	1,800 M ³
Daily hours	20	Hr	20	Hr		Hr	20 Hr
Nominal daily production	47,000	Су	36,000	M ³	47,000	Су	36,000 M ³
Nominal monthly	1,175,000	Су	900,000	M ³	1,175,000	Су	900,000 M ³
Ratio nominal to average	1.96		1.96		1.96		1.96
Long term average monthly	600,000	Су	458,732	M ³	600,000	Су	458,732 M ³
Total RCC placed	15,000,000	Су	11,468,300	M ³	7,600,000	Су	11,468,300 M ³

Appendix B Detailed Cost Estimate

SUSITNA PROJECT - LOW WATANA DAM OPTIONS COST SUMMARY

Table 4.4-1: Cost Comparison of Selected Low Watana ICRD and RCC Alternatives

	Line Item Name	 ow Watana pandable ICRD (1)	Low Watana pandable ICRD (1)	ow Watana RCC - Non-Expandable	L	ow Watana RCC - Expandable		Low Watana RCC Gravity Arch	(1) From HDR 20
	Total Estimated Const. Costs (Billions \$)	4.50	5.00	3.90		4.20		3.60	
FERC Line #	Line Item Name	 ow Watana pandable ICRD (1)	Low Watana pandable ICRD (1)	ow Watana RCC - Non-Expandable	L	ow Watana RCC - Expandable		Low Watana RCC Gravity Arch	
71A	Engineering, Env, and Regulatory (7%)	\$ 236,000,000	\$ 259,000,000	\$ 203,200,000	\$	217,900,000	\$	186,600,000	1
330	Land and Land Rights	\$ 121,000,000	\$ 121,000,000	\$ 120,900,000	\$	120,900,000	\$	120,900,000	
331	Power Plant Structure Improvements	\$ 115,000,000	\$ 159,000,000	\$ 121,219,000	\$	161,389,000	\$	121,219,000	
332.14	Reservoir, Dams and tunnels	\$ 1,537,690,000	\$ 1,718,000,000	\$ 1,425,110,000	\$	1,472,944,000	\$	1,220,892,000	
332.59	Waterways	\$ 590,000,000	\$ 677,000,000	\$ 276,342,000	\$	387,367,000	\$	242,655,000	
333	Waterwheels, Turbines and Generators	\$ 297,000,000	\$ 297,000,000	\$ 297,000,000	\$	297,000,000	\$	297,000,000	
334	Accessory Electrical Equipment	\$ 41,000,000	\$ 41,000,000	\$ 40,000,000	\$	40,000,000	\$	40,000,000	
335	Misc Power Plant Equipment	\$ 21,000,000	\$ 32,000,000	\$ 21,000,000	\$	32,000,000	\$	32,000,000	
336	Roads, Rails and Air Facilities	\$ 232,000,000	\$ 232,000,000	\$ 254,700,000	\$	254,700,000	\$	254,700,000	
350-390	Transmission Features	\$ 224,000,000	\$ 224,000,000	\$ 207,362,000	\$	207,362,000	\$	207,362,000	
63	Main Construction Camp	\$ 180,000,000	\$ 180,000,000	\$ 123,800,000	\$	123,800,000	\$	123,800,000	
399	Other Tangible Property	\$ 16,000,000	\$ 16,000,000	\$ 15,800,000	\$	15,800,000	\$	15,800,000	
71B	Construction Management (4%)	\$ 135,000,000	\$ 148,000,000	\$ 116,100,000	\$	124,500,000	\$	106,600,000	
Total Subtotal	Subtotal	\$ 3,745,690,000	\$ 4,104,000,000	\$ 3,222,533,000	\$	3,455,662,000	\$	2,969,528,000	1
Total Contingency	Contingency (20%)	\$ 749,138,000	\$ 821,005,200	\$ 644,506,600	\$	691,132,400	\$	593,905,600	
Total	Total Estimated Const. Costs (Million \$)	\$4,500	\$5,000	\$3,900		\$4,200	Ī	\$3,600	1

HDR/AEA Susitna Hydroelectric Project Cost Estimates based on 1982 quantities By: HDR By: Leanne Andruszkiewicz, E.I.T. Checked By: Kellen Roberts, E.I.T.

Date: 10/15/2009

2008 Dollars

	ow watana	(Non-Expandable)	(4 Turbines)
Description			Quantity

FEDO L'AN	0 + 0			Low Watana (Non-Expa		11.9.			1.54 - 15		Tatal	
FERC Line #	Sub Ca 330	ategories	Land and La	Description	Quantity	Units	200	08 Unit Price	Line Pr	ice	Total	
	<u>330</u> 0.1			and Rights		1 LS	¢	120,870,000.00	\$	120,870,000		
	0.1			ind Rights		1 13	φ	120,870,000.00	φ \$	120,870,000		
	0.2			isc Charges in Credit Above					э \$	-		
	0.5		IVII	se onarges in credit Above					у \$		\$	121,000,000
									\$	_	Ψ	121,000,000
	<u>331</u>		Powernlant	Structure Improvements					φ \$	-		
	0.1		-	owerhouse					Ф \$	_		
	0.1	0.11	10	Powerhouse and Draft Tube					\$	-		
		0.11	0.111	Excavation					\$	-		
			0	Powerhouse Vault Rock	81	,667 CY	\$	90.12	\$	7,360,000		
				Draft Tube Rock		,800 CY	\$	90.12		1,510,000		
			0.113	Surface Preparation/ Grouting		0	Ŷ	00112	ŝ	-		
				Powerhouse	66	,000 SF	\$	3.33	ŝ	220,000		
Total	Total E	Estimated	Const. Costs	s (Million \$) Draft Tube		,000 SF	\$	3.33		170,000		
				Grout Curtain- Drill holes		,200 LF	\$	27.63		810,000		
				Grout Curtain- Cement		,667 CF	\$	81.10		950,000		
			0.114	Concrete and Shot Crete		0	·		\$	-		
				Powerhouse Concrete	21	,733 CY	\$	692.87	\$	15,060,000		
				Powerhouse Concrete Overbreak		,600 CY	\$	447.21		720,000		
				Powerhouse Reinforcing Steel	1	,087 TON	\$	2,858.29	\$	3,110,000		
				Powerhouse 4" Shotcrete	27	,333 SF	\$	10.14	\$	280,000		
				Draft Tube Concrete	8	,000 CY	\$	692.87	\$	5,540,000		
				Draft Tube Concrete Overbreak	1	,667 CY	\$	447.21	\$	750,000		
				Draft Tube Reinforcing Steel		660 TON	\$	2,858.29	\$	1,890,000		
				Draft Tube 2" Shotcrete	4	,067 SF	\$	5.45	\$	20,000		
			0.115	Support and Anchors		0			\$	-		
				Powerhouse Rockbolts 1" @ 25' Hy		647 EA	\$	1,234.86	\$	800,000		
				Powerhouse Rockbolts 1" @ 15'	1	,313 EA	\$	735.81	\$	970,000		
				Powerhouse Steel Mesh	29	,733 SF	\$	5.81	\$	170,000		
				Powerhouse Steel Support		91 TON	\$	12,671.94	\$	1,160,000		
				Draft Tube Rockbolts 1" @ 25' Hy		100 EA	\$	1,234.86		120,000		
				Draft Tube Rockbolts 1" @ 12'		260 EA	\$	528.34		140,000		
				Draft Tube Rockbolts 1" @ 9'		127 EA	\$	432.12		50,000		
				Draft Tube Steel Mesh		,600 SF	\$	6.55	-	80,000		
			0.117	Holes (U/S of Powerhouse)		,000 LF	\$	51.32		510,000		
				Holes (Powerhouse Crown)	19	,000 LF	\$	51.32		980,000		
			0.118	Structural- Misc Steelwork		410	•	40.070.000.00	\$	-		
			0.440	Powerhouse and Draft Tube- Steel Crane Rails		1 LS	\$	10,276,309.00		10,280,000		
			0.119	Architectural- Powerhouse		1 LS	\$	2,927,898.00		2,930,000		
			0.11c	Mechanical		4 0570	~	407 000 00	\$	-		
				Draft Tube Gates		4 SETS	\$	427,880.00		1,710,000		
				Draft Tube Gate Guides Draft Tube Crane		4 SETS 1 LS	\$ \$	202,680.00		810,000		
		0.12		Access Tunnels and Portals		1 6	Φ	1,140,000.00	5 5	1,140,000		
		0.12	0.121	Excavation					ծ Տ	-		
			0.121	Excavation Main Tunnel		,500 CY	¢	97.45	Ψ	3 260 000		
				Transformer Gallery Tunnel		,500 C Y ,833 CY	\$ \$	97.45 97.45		3,260,000 1,150,000		
				Grouting Gallery Tunnel		,033 C f ,267 CY	э \$	396.04		500,000		
				Surge Chamber Access Tunnel		,267 C f	э \$	145.22		700,000		
				Penstock Access Tunnel		,000 CY	э \$	145.22		5,950,000		
					41	,000 01	φ	140.22	φ	5,950,000		

ERC Line #	Sub Categories	Description	Quantity	Units	2008	Unit Price	Line Price		Total
		Penstock Elbow Access Tunnel	10,00	0 CY	\$	145.22	\$	1,450,000	
		Access Shaft Tunnel	86	7 CY	\$	145.22	\$	130,000	
		Connector Tunnel	1,26	7 CY	\$	379.26	\$	480,000	
		Portals Overburden	4,00	0 CY	\$	17.14	\$	70,000	
		Portals Rock		0 CY	\$	49.31	\$	100,000	
	0.123	Surface Preparation					\$	· _	
		Main Tunnel Slab	35,40	0 SF	\$	2.21	\$	80,000	
		Penstock Access Slab	43,46		\$	2.21		100,000	
		Horizontal Portal	,	3 SF	\$	2.30	\$	-	
		Inclined Portal		0 SF	\$	3.33		-	
	0.124	Concrete and Shot Crete	1,10		Ψ	0.00	\$	-	
	0.124	Main Portal					\$	_	
		Concrete Slab	2	0 CY	\$	406.27	Ψ \$	10,000	
		Concrete Walls		0 CY	\$	406.27		150,000	
		Concrete Overbreak		3 CY	\$	368.48		10,000	
		Reinforcing Steel	2	7 TON	\$	2,887.51		80,000	
				0.01/	•		\$	-	
		Concrete Slab Main Tunnel	,	0 CY	\$	503.90		660,000	
		Concrete Plugs Penstock Elbow ACC	10,00		\$	755.86		7,560,000	
		Concrete Overbreak Main Tunnel 6"		7 CY	\$		\$	230,000	
		Reinforcing Steel		7 TON	\$	2,887.51		130,000	
		2 " Shotcrete Main Tunnel	13,40		\$		\$	70,000	
		2 " Shotcrete Transformer Gal		3 SF	\$	5.26		20,000	
		2 " Shotcrete Surge Chamber Acc	2,60	0 SF	\$	5.26	\$	10,000	
		2 " Shotcrete Penstock Access	16,46	7 SF	\$	5.26	\$	90,000	
		2 " Shotcrete Penstock Elbow Acc	4,73	3 SF	\$	5.26	\$	20,000	
		2 " Shotcrete Access Shaft	20	0 SF	\$	5.26	\$	-	
		2 " Shotcrete Grout Gallery	53	3 SF	\$	5.26	\$	-	
		2 " Shotcrete Connector Tunnel	53	3 SF	\$	5.26	\$	-	
	0.125	Support and Anchors					\$	-	
		Main Tunnel					\$	-	
		Rockbolts 1" @12'	80	0 EA	\$	528.34	\$	420,000	
		Rockbolts 1" @ 9'		7 EA	\$	432.12		70,000	
		Steel Mesh	42,00		\$	6.37		270,000	
		Steel Support	,	4 TON	\$	12,801.49		560,000	
		Main Tunnel Portal			Ŷ	12,001110	\$	-	
		Rockbolts 1" @15'	3	3 EA	\$	735.79	+	20,000	
		Transformer Gallery Tunnel	5		Ψ	100.10	\$	20,000	
		Rockbolts 1" @12'	70	3 EA	\$	528.34	ծ Տ	- 140,000	
		Rockbolts 1 @ 9'		3 EA 7 EA	ъ \$	528.34 432.12			
								20,000	
		Steel Mesh	15,00		\$ \$	5.89		90,000	
		Steel Support	1	6 TON	Φ	12,801.49		200,000	
		Grouting Gallery Tunnel		7 6 4	•	00 7 / -	\$	-	
		Rockbolts 3/4" @ 6'		7 EA	\$	327.15		30,000	
		Steel Mesh		7 SF	\$	6.37		-	
		Steel Support		2 TON	\$	12,801.49		30,000	
		Surge Chamber Access Tunnel					\$	-	
		Rockbolts 1" @12'		3 EA	\$	528.34	\$	80,000	
		Rockbolts 1" @ 9'		3 EA	\$	432.12		10,000	
		Steel Mesh	8,03	3 SF	\$	6.37	\$	50,000	
		Steel Support		9 TON	\$	12,801.49	\$	120,000	
		Penstock Access Tunnel					\$	-	
		Rockbolts 1" @12'	95	3 EA	\$	528.34	\$	500,000	
		Rockbolts 1" @ 9'		0 EA	\$	432.12		70,000	
		Steel Mesh	51,66		\$	6.37		330,000	
		Steel Support		9 TON	\$	12,801.49		490,000	
		Penstock Elbow Access Tunnel	0		Ψ	12,001.40	φ \$		
		Rockbolts 1" @12'	00	0 EA	\$	528.34	+	- 150,000	
			20			JZ0.34	Ψ	100.000	

FERC Line #	Sub Categories	Description	Quantity	Units	2008	Unit Price	Line Price		Total
	Sub Galogonos	Rockbolts 1" @ 9'	Quantity	80 EA	\$	432.12		30,000	
		Steel Mesh	15.0	000 SF	\$	6.37		100,000	
		Steel Support		20 TON	\$	12,801.49	-	260,000	
		Access Shaft Tunnel		20 1011	Ψ	12,001.10	\$	-	
		Rockbolts 1" @12'		13 EA	\$	528.34	\$	10,000	
		Rockbolts 1" @ 9'		13 EA	\$	432.12	\$	10,000	
		Steel Mesh		620 SF	\$	6.37	\$	-	
		Steel Support		5 TON	\$	12,801.49		70,000	
		Connector Tunnel		5 101	Φ	12,001.49	э \$	70,000	
					¢	207.45	-	-	
		Rockbolts 3/4" @ 6'		107 EA	\$	327.15	\$	30,000	
		Steel Mesh		107 SF	\$	6.37	-	-	
		Steel Support		2 TON	\$	12,801.49		30,000	
	0.129	Architectural- Main Portal Doors		2 SETS	\$	158,371.90	\$	320,000	
	0.12c	Mechanical Ventilation System					\$	-	
	0.13	Access Shaft					\$	-	
	0.131	Excavation Rock	,	133 CY	\$	227.67		2,080,000	
	0.133	Surface Preparation Shaft	42,	667 SF	\$	3.33	\$	140,000	
	0.134	Concrete and Shot Crete					\$	-	
		Concrete Lining	2,2	233 CY	\$	944.82	\$	2,110,000	
		Concrete Overbreak 6"	8	813 CY	\$	551.14	\$	450,000	
	0.135	Support and Anchors - Rockbolts 3/4" @ 6'	-	700 EA	\$	327.15	\$	230,000	
	0.138	Structural Misc Steelwork		33 TON	\$	7,395.00	\$	250,000	
	0.139	Architectural- control Building				,	\$	-	
	0.13c	Mechanical Elevators		1 LS	\$	2,368,815.00	\$	2,370,000	
	0.14	Fire Protection Head Tank			•	,,	\$	-	
	0.141	Excavation		767 CY	\$	588.80	•	450,000	
	0.143	Surface Preparation		867 SF	\$	2.30	\$	-	
	0.143	Concrete & Shotcrete	1,		Ψ	2.00	\$ \$	-	
	0.144	Concrete		167 CY	\$	963.72		160,000	
		Concrete Overbreak 6"		30 CY	Ψ \$	406.27	-	10,000	
		Reinforcing Steel		7 TON	э \$	2,858.29			
	0.445			TUN	Φ	2,000.29		20,000	
	0.145	Support and Anchors		17 5 4	•	500.04	\$	-	
		Rockbolts 1" @12'		17 EA	\$	528.34	\$	10,000	
		Rockbolts 1" @ 9'		7 EA	\$	432.12		-	
		Steel Mesh	1	800 SF	\$	6.30		10,000	
		Steel Support		2 TON	\$	12,671.95		30,000	
	0.148	Misc Steelwork		1 LS	\$	73,297.50	\$	70,000	
	0.14c	Mechanical Piping/Valves					\$	-	
	0.15	Bus Tunnels (totals for 3 Bus Tunnels)					\$	-	
	0.151	Excavation					\$	-	
		Rock Horizontal	1,8	800 CY	\$	213.70	\$	380,000	
		Rock Inclined	1	867 CY	\$	601.04	\$	520,000	
	0.153	Surface Preparation- Tunnels	4,	733 SF	\$	3.33	\$	20,000	
	0.154	Concrete and Shotcrete					\$	-	
		Concrete Slab	:	233 CY	\$	818.84	\$	190,000	
		Concrete Overbreak 12"		167 CY	\$	472.41	\$	80,000	
		Reinforcing Steel		12 TON	\$	2,858.29	\$	30,000	
		2" Shotcrete	1.4	467 SF	\$	5.26	\$	10,000	
	0.155	Supports and Anchors	.,	-	·		\$	-	
	0.100	Rockbolts 1" @ 25'		40 EA	\$	1,234.86	\$	50,000	
		Rockbolts 1" @ 12'		93 EA	\$	528.34	\$ \$	50,000	
		Rockbolts 1" @ 9'		33 EA 33 EA	φ \$	432.12	-	10,000	
		Steel Mesh	A 1	533 EA 533 SF	э \$	432.12	ъ \$	30,000	
			4,:						
	0.40	Steel Support		7 TON	\$	12,671.94		90,000	
	0.16	Transformer Gallery Tunnel			¢	0 7 / /	\$	-	
	0.161	Excavation- Rock	,	867 CY	\$	87.44		1,560,000	
	0.163	Surface Preparation	16.	400 SF	\$	2.30	5	40,000	

FERC Line #	c,	ih Cat	egories		Low Watana (Non-Expandable) (Description	<u>4 Turbines)</u> Quantity	Units	200	8 Unit Price	Line Price	Total
FERG LINe #	31		egones	0.164	Concrete and Shotcrete	Quantity	Units	200		\$ -	Total
				0.104	Concrete Base Slab	1	600 CY	\$	1,228.27	•	
					Concrete Overbreak 12"H/6"V	,	513 CY	\$	377.93		
					Reinforcing Steel		80 TON	\$	2,858.29	. ,	
				0.165	Support and Anchors		00 101	Ψ	2,000.20	\$ -	
				0.105	Rockbolts 1" @ 25'		400 EA	\$	1,234.86	\$ 490.000	
					Rockbolts 1" @ 15'		180 EA	\$	735.81	. ,	
					Steel Mesh		800 SF	\$	5.81		
					Steel Support	13,	19 TON	э \$	12,671.94	. ,	
				0.167	Drainage Holes	5	533 LF	э \$	47.95	\$ 270,000	
			0.17	0.107	Cable Shafts	5,	555 LF	φ	47.95	\$ 270,000 \$ -	
			0.17	0.171		2	267 CY	¢	601.04	•	
				0.171	Excavation Rock	,	207 C 1 600 SF	\$			
					Surface Preparation Shafts	27,	600 SF	\$	3.33		
				0.174	Concrete and Shotcrete			¢	4 700 00	\$ -	
					Concrete Lining		693 CY	\$	1,763.66	\$ 1,220,000	
				0.475	Concrete Overbreak 6"		533 CY	\$	881.83		
				0.175	Supports and Anchors- Rockbolts 3/4" @ 6'		433 EA	\$	327.15	. ,	
				0.178	Structural Misc Steelwork		12 TON	\$	15,602.00	. ,	
				0.179	Architectural- Enclosures		1 LS	\$	199,317.00	\$ 200,000	
				0.17c	Mechanical Hoist		2 EA	\$	476,960.00	\$ 950,000	
			0.18		Dewatering (during Construction)					\$ -	
				0.181	Dewatering (Power Facilities)		1 LS	\$	1,336,798.50		
			0.19		Instrumentation					\$ -	
				0.191	Instrumentation		1 LS	\$	1,714,813.50		
		0.2			Misc Buildings (Control Buildings)		1 LS	\$	4,433,085.00	\$ 4,430,000	
		0.3			Permanent Town	(included	in 63.5)				
										\$-	\$ 115,000,000
	<u>332</u>				Reservoir, Dams and Waterways					\$ -	
		0.1			Reservoir					\$-	
			0.11		Reservoir Clearing	23,	000 ACRE	\$	3,005.85	\$ 69,130,000	
		0.2			Diversion Tunnels /Cofferdams					\$-	
			0.21		Diversion Tunnels /Portals					\$-	
				0.211	Excavation					\$-	
					Upper Tunnel					\$-	
					Rock	221,	000 CY	\$	92.33	\$ 20,400,000	
					Lower Tunnel					\$-	
					Rock	208,	000 CY	\$	92.33	\$ 19,200,000	
					Excavate Concrete for Plug		700 CY	\$	96.92	\$ 70,000	
					Upstream Upper Portal					\$-	
					Rock Usable (Face Only)	11,	200 CY	\$	49.16	\$ 550,000	
					Upstream Lower Portal (Including Most Exc for Upper Portal)					\$-	
					Rock Usable	108,	000 CY	\$	49.16	\$ 5,310,000	
					Rock Waste	21,	750 CY	\$	49.16	\$ 1,070,000	
					Downstream Portals					\$-	
					Overburden	17,	000 CY	\$	17.14	\$ 290,000	
					Rock Usable	120,	000 CY	\$	49.16	\$ 5,900,000	
					Rock Waste	28,	000 CY	\$	49.16	\$ 1,380,000	
					Emergency Release Chambers					\$ -	
					Excavate Concrete for Plugs	1,	800 CY	\$	101.98	\$ 180,000	
					Gate Chamber	4,	700 CY	\$	110.73	\$ 520,000	
					Access Tunnel to Gate Chamber					\$ -	
					Rock	19,	100 CY	\$	97.15	\$ 1,860,000	
				0.212	Fill- Temp for Coffer Dam to Construct Upstream Portals		000 CY	\$	11.66	\$ 270,000	
				0.213	Surface Preparation \ grouting	,				\$ -	
										\$-	
					Horizontal	3.	200 SF	\$	2.30	\$ 10,000	
					Inclined	,	600 SF	\$	3.33	• -,	
					Upstream Lower Portal	-,		•		\$ -	
					Upstream Upper Portal Horizontal Inclined	,		\$ \$		\$ - \$ 10,000 \$ 30,000	

RC Line #	Sub Categories	Line-enter	Quantity	Units		nit Price	Line Pric		Total
		Horizontal	1,3	00 SF	\$	2.30	\$	-	
		Inclined	14,9	00 SF	\$	3.33	\$	50,000	
		Downstream Upper Portal					\$	-	
		Horizontal	6,1	00 SF	\$	2.30	\$	10,000	
		Inclined	,	00 SF	\$	3.33	\$	70,000	
		Downstream Lower Portal	- , -		•		\$	-	
		Horizontal	6	00 SF	\$	2.30	\$	-	
		Inclined		00 SF	\$	3.33	\$	20,000	
		Grout Upper Tunnel Plugs	0,0	00 01	Ψ	0.00	\$	-	
		Drill Holes	4 1	00 LF	\$	26.76	\$	110,000	
		Cement	,	20 CF	\$	81.10	\$	70,000	
		Grout Lower Tunnel Permanent Plugs	d	20 01	ψ	01.10	\$ \$	70,000	
		Drill Holes	2.0	50 LF	\$	26.76	\$ \$	50,000	
		Cement		10 CF	э \$	20.70	ъ \$,	
	0.014		4	IU CF	Ф	81.10		30,000	
	0.214	Concrete and Shotcrete					\$	-	
		Upper Tunnel		~ ~ ~	•		\$	-	
		Concrete Lining	,	00 CY	\$	566.89	\$	24,040,000	
		Concrete Lining Overbreak 6"	,	00 CY	\$	314.94		3,210,000	
		Reinforcing Steel		24 TON	\$	2,887.51		70,000	
		2" Shotcrete	56,0	00 SF	\$	5.26	\$	290,000	
		Lower Tunnel					\$	-	
		Concrete Lining		00 CY	\$	566.89		21,320,000	
		Concrete Lining for Plug	,	00 CY	\$	428.32		2,660,000	
		Concrete Lining Overbreak 6"	10,0	00 CY	\$	314.94		3,150,000	
		Reinforcing Steel		24 TON	\$	2,887.51	\$	70,000	
		2" Shotcrete	57,9	00 SF	\$	5.26	\$	300,000	
		Upstream Upper Portal					\$	-	
		Concrete Headwall	3,2	00 CY	\$	651.93	\$	2,090,000	
		Concrete Lining	1,3	00 CY	\$	651.93	\$	850,000	
		Concrete Slab	7	50 CY	\$	651.93	\$	490,000	
		Concrete Piers	8	00 CY	\$	651.93	\$	520,000	
		Concrete Overbreak 12" H/6"V	3	00 CY	\$	472.41		140,000	
		Reinforcing Steel	4	00 TON	\$	2,887.51	\$	1,160,000	
		Upstream Lower Portal			•	,	\$	-	
		Concrete Headwall	4.5	00 CY	\$	651.93	\$	2,930,000	
		Concrete Lining		00 CY	\$	651.93	-	1,960,000	
		Concrete Slab		00 CY	\$	651.93		200,000	
		Concrete Piers		00 CY	\$	651.93		460,000	
		Concrete Overbreak 12" H/6"V		50 CY	э \$	472.41	э \$	400,000	
		Reinforcing Steel		00 TON	э \$	2,887.51		1,730,000	
		Downstream Upper Portal	ŭ		Ψ	2,007.01	э \$	1,730,000	
		Concrete Headwall	E	00 CY	\$	651.93		- 330,000	
		Concrete Slab		00 CY	\$	651.93		70,000	
		Concrete Overbreak 12" H/6"V		00 CY	\$	472.41	\$	50,000	
		Reinforcing Steel		40 TON	\$	2,887.51		120,000	
		Downstream Lower Portal			•		\$	-	
		Concrete Headwall	,	00 CY	\$	651.93	\$	1,630,000	
		Concrete Slab		00 CY	\$	651.93	\$	70,000	
		Concrete Overbreak 12" H/6"V		50 CY	\$	472.41		70,000	
		Reinforcing Steel	1	70 TON	\$	2,887.51	\$	490,000	
		Downstream Flip Bucket					\$	-	
		Concrete Slab	8	00 CY	\$	651.93	\$	520,000	
		Concrete Walls	2,3	00 CY	\$	651.93	\$	1,500,000	
		Concrete Invert	1,2	00 CY	\$	651.93	\$	780,000	
		Concrete Overbreak 12" H/6"V	4	10 CY	\$	42.41	\$	20,000	
		Reinforcing Steel	2	80 TON	\$	2,887.51	\$	810,000	
		Downstream Retaining Wall				-	\$	-	
		Concrete Slab		00 CY	\$	651.93		130,000	

C Line #	Sub Categories	Description	Quantity	Units	<u> 2</u> 008	Unit Price	Line Price	Total
		Concrete Walls	2,000	CY	\$	651.93	\$ 1,300,000	
		Concrete Overbreak 12" H/6"V	110 (CY	\$	472.41	\$ 50,000	
		Reinforcing Steel	90 -	TON	\$	2,887.51		
		Emergency Release Chambers					\$ -	
		Concrete Plug	15,300	CY	\$	755.86	\$ 11,560,000	
		4" Shotcrete	2,790 \$	SF	\$	10.13	\$ 30,000	
		Access Tunnel to Gate Chamber	,		•		\$ -	
		2" Shotcrete	12,800	SF	\$	5.26	\$ 70,000	
	0.215	Supports and Anchors	12,000	0.	Ŷ	0.20	\$ -	
	0.210	Lower Tunnel					\$ -	
		Rockbolts 1" @ 12'	3,650	FΔ	\$	528.34	\$ 1,930,000	
		Rockbolts 1" @ 9'	620		\$	432.12		
		Steel Mesh	217,100		Ψ \$	6.37	. ,	
		Steel Support	217,100 - 220 -		ф \$	12,801.49		
			220	ION	Φ	12,001.49	\$ 2,820,000 \$ -	
		Upper Tunnel	2 5 2 0 1	- ^	¢	500.04	•	
		Rockbolts 1" @ 12'	3,530		\$	528.34		
		Rockbolts 1" @ 9'	600		\$	432.12		
		Steel Mesh	210,200		\$	6.37		
		Steel Support	213	TON	\$	12,801.49		
		Upstream Lower Portal			•		\$ -	
		Rockbolts 1" @ 15'	240		\$	735.81		
		Anchors 1" @ 25'	290	EA	\$	1,234.86	\$ 360,000	
		Upstream Upper Portal					\$-	
		Rockbolts 1" @ 15'					\$-	
		Anchors 1" @ 25'	130	EA	\$	735.81	\$ 100,000	
		Downstream Lower Portal					\$-	
		Rockbolts 1" @ 15'	200	EA	\$	735.81	\$ 150,000	
		Downstream Upper Portal					\$-	
		Rockbolts 1" @ 15'	100	EA	\$	735.81	\$ 70,000	
		Retaining Wall Anchors 1" @25'	100	EA	\$	1,234.86	\$ 120,000	
		Emergency Release Chambers					\$ -	
		Rockbolts 1" @ 25'	100	EA	\$	1,234.86	\$ 120,000	
		Rockbolts 1" @ 15'	125		\$	735.77		
		Steel Mesh	3,600		\$	6.37		
		Steel Support		TON	\$	12,801.49		
		Metal to Roof Anchors 3/4" @ 6'	20		\$	342.42		
		Access Tunnel to Gate Chamber	201		Ψ	542.42	\$ 10,000 \$ -	
		Rockbolts 1" @ 12'	775		\$	528.34	\$ 410,000	
		Rockbolts 1 @ 12 Rockbolts 1" @ 9'	240		ъ \$	528.34 432.12		
		Steel Mesh	39,900		э \$	432.12		
	0.218	Steel Support Structural- Misc Steelwork		TON	\$	12,801.49		
			2,775	ər	\$	93.61		
	0.21c	Mechanical					\$ -	
		Upstream Lower Gates			•		\$ -	
		Gate Equipment	21	EA	\$	5,073,120.00	\$ 10,150,000	
		Upstream Upper Gates					\$ -	
		Gate Equipment	2		\$	2,840,080.00		
		Trashracks	1	LS	\$	1,777,500.00	\$ 1,780,000	
		Downstream Lower Outlet					\$-	
		Stoplog Guides	1	LS	\$	142,200.00		
		Stoplogs includes follower	1	LS	\$	1,967,100.00	\$ 1,970,000	
		Downstream Upper Outlet					\$ -	
		Stoplog Guides	1	LS	\$	82,950.00	\$ 80,000	
		Low Level Release				- ,	\$ -	
		Slide Gates Include Steel Liner	91	EA	\$	3,517,470.00	\$ 31,660,000	
						.,. ,	\$ -	
	0.22	Upstream Cofferdam					\$-	
	0.22	oporodini conordani					\$ -	

FERC Line #	Sub Categories		Description	andable) (4 Turbines) Quantity	Units	200	8 Unit Price	Line Price	Total
	Sub Galegolles		Overburden Removal		000 CY	\$	11.56	\$ 10,000	10101
		0.222	Fill	.,.		•		\$ -	
			Rock Fill	38,4	400 CY	\$	10.90	\$ 420,000	
			Fine Filter	16,6	600 CY	\$	36.84	\$ 610,000	
			Coarse Filter	15,9	900 CY	\$	30.05		
			Rock Shell		500 CY	\$	10.50	\$ 2,060,000	
			Closure Dike		500 CY	\$	10.90	\$ 640,000	
			Rip Rap	,	200 CY	\$		\$ 510,000	
		0.223	Cutoff Slurry Wall	21,2	200 01	Ψ	21.20	\$ -	
		0.225	excavation	4.5	850 CY	\$	4.88	\$ 20,000	
			slurry wall	,	600 SF	\$	72.44	\$ 3,160,000	
		0.22d	Dewatering	43,0	000 SF	φ	72.44	\$ 3,100,000	
		0.220			110	¢	E 007 COE 00	Ŷ	
			Initial Dewatering		1 LS	\$	5,807,685.00	\$ 5,810,000	
	0.00		Dewatering Maintenance		1 LS	\$	22,377,990.00	\$ 22,380,000	
	0.23		Down Stream Cofferdam					\$ -	
		0.231	Excavation					\$ -	
			overburden		000 CY	\$	11.56	\$ 60,000	
			Rock		500 CY	\$	9.91	\$ -	
			Removal of Cofferdam	14,5	500 CY	\$	13.48	\$ 200,000	
		0.232	Fill					\$-	
			Rip Rap	1,8	800 CY	\$	24.26	\$ 40,000	
			Closure Dike	15,2	200 CY	\$	10.90	\$ 170,000	
		0.233	Cutoff Slurry Wall					\$-	
			Excavation	1,8	830 CY	\$	4.60	\$ 10,000	
			Slurry Wall	16,5	500 SF	\$	72.44	\$ 1,200,000	
	0.3		Main Dam					\$-	
	0.31		Main Dam					\$-	
		0.311	Excavation					\$-	
			Overburden above el. 1470	2,026,0	000 CY	\$	11.53	\$ 23,360,000	
			Overburden below el. 1470	5,320,0		\$	11.06	\$ 58,840,000	
			Rock Usable above el. 1470		000 CY	\$	43.03		
			Rock Usable below el. 1470		000 CY	\$	43.72		
			Rock Waste above el. 1470	1,950,0		\$		\$ 83,910,000	
			Rock Waste below el. 1470		500 CY	\$		\$ 43,630,000	
		0.312		809,0	300 01	Ψ	50.10	\$ 43,030,000 \$ -	
		0.312		400 (¢	00.00		
			Rip Rap (upstream)	,	000 CY	\$	23.30	\$ 9,530,000	
			Gravel (upstream)	6,659,0		\$		\$ 136,910,000	
			Coarse Filter (upstream)		759 CY	\$	28.86	\$ 26,720,000	
			Fine Filter (upstream)	1,045,5		\$	37.91		
			Core (impervious)	6,300,0		\$	25.37		
			Fine Filter (downstream)	1,171,4		\$	37.91		
			Coarse Filter (downstream)	1,074,2		\$		\$ 31,000,000	
			Shell- Rock and Gravel	2,998,2		\$		\$ 57,510,000	
			Shell- Rock From Other Sources		000 CY	\$		\$ 14,580,000	
			Cobbles (downstream Face)	530,0	000 CY	\$	16.35	\$ 8,670,000	
			Road Base	12,0	000 CY	\$	34.42	\$ 410,000	
			Frost Protection					\$-	
			Process Protection	960,0	000 CY	\$	10.31	\$ 9,900,000	
			Place Protection	960.0	000 CY	\$	3.29	\$ 3,160,000	
			Remove 1' Protect and Waste	,	000 CY	\$	7.21	\$ 670,000	
			Scarify Core Surface	,	193 ACRE	\$	858.77	\$ 170,000	
			Filter Fabric			Ψ	0001	\$ -	
			Filter Fabric	592 (000 SF	\$	0.88	\$ 520,000	
		0.313	Surface Prep/ Grouting	552,0		Ψ	0.00	\$ 520,000 \$ -	
		0.313	Surface Preparation					ъ - \$-	
			•	4 0 4 0 6		¢	2 4 4	+	
			Under Core/Filters above el. 1500	1,340,0		\$	3.11	\$ 4,170,000	
			Under Core/Filters below el. 1500	,	000 SF	\$	3.11		
			Under Shell above el. 1500	4,149,0	000 SF	\$	2.15	\$ 8,920,000	

RC Line #	Sub Categories	Low Watana (Non-E) Description		Jnits	2008 U	nit Price	Line Price	Total
		Under Shell below el. 1500	2,067,000 \$		\$	2.15	\$ 4,440,000	
		Consolidation Grout					\$ -	
		Drill Holes	550,000 L	F	\$	11.91	\$ 6,550,000	
		Cement	550,000 C		\$	67.81		
		Grout Curtain					\$ -	
		Drill Holes	372,000 L	F	\$	26.76	\$ 9,950,000	
		Cement	149,000 C		\$		\$ 12,080,000	
		Dental Concrete	-,		•		\$ -	
		Dental Concrete	68,000 C	CY	\$	365.33	\$ 24,840,000	
	0.317	Drainage	00,000 0		÷	000100	\$ -	
	0.017	Holes	109,000 L	F	\$	51.32	\$ 5,590,000	
	0.32	Grout Galleries/Portals	100,000 E		Ψ	01.02	\$ 0,000,000 \$ -	
	0.321	Excavation					\$ -	
	0.321	Tunnels/ Shafts- Core Area					\$ - \$ -	
		Rock Horizontal	8,100 C	-v	¢	204.90		
					\$	394.80	\$ 3,200,000	
		Rock Inclined	9,000 C		\$	552.93		
		Rock Vertical	1,600 C	۲	\$	536.19		
		Tunnels/ Shafts- Access		214	•	004.00	\$ -	
		Rock Horizontal	10,400 C		\$	394.80	\$ 4,110,000	
		Rock Inclined	1,600 C	۲	\$	552.93	\$ 880,000	
		Portals			•		\$ -	
		Overburden Rock	2,900 0		\$	17.16		
		Rock	800 C	CY	\$	49.16	\$ 40,000	
	0.323	Surface Preparation					\$ -	
		Portals					\$ -	
		Horizontal	24 \$		\$	2.30	\$-	
		Inclined	160 S	SF	\$	3.33	\$ -	
							\$ -	
	0.324	Concrete and Shotcrete					\$-	
		Tunnels- Core Area					\$-	
		Concrete Plugs	800 C	CY	\$	428.32	\$ 340,000	
		Concrete Slab	1,800 0		\$	944.82		
		Concrete Overbreak 6"	920 0		\$		\$ 700,000	
		Reinforcing Steel	64 T		\$	2,887.51	. ,	
		2" Shotcrete	12,000 \$		\$	5.26		
		Tunnels-Access	12,000 0		÷	0.20	\$ -	
		Concrete Slab	1,280 C	CY.	\$	944.82	•	
		Concrete Overbreak 6"	640 C		\$	755.86		
		Reinforcing Steel	48 T		\$ \$	2,887.51		
		2" Shotcrete	48 1 4,300 S		э \$	2,007.51 5.26		
		Shafts	4,300 5	-IC	φ	5.20	\$ 20,000 \$ -	
			4 000 5	26	¢	E 00	•	
		2" Shotcrete	4,000 \$	51	\$	5.26	\$ 20,000	
		Portals		21/	¢	100.00	\$ -	
		Concrete	16 C		\$	406.36		
		Reinforcing Steel	2 1	FON	\$	2,887.51	\$-	
	0.325	Support and Anchors					\$ -	
		Tunnels- Core Area					\$ -	
		Rockbolts 3/4" @6'	1,400 E		\$	327.15	. ,	
		Steel Mesh	2,400 \$		\$			
		Steel Support	16 T	ΓON	\$	12,801.49		
		Tunnels- Access					\$ -	
		Rockbolts 3/4" @6'	960 E	ΞA	\$	327.15	\$ 310,000	
		Steel Mesh	880 5	SF	\$	5.37	\$ -	
		Steel Support	16 T		\$	12,801.49		
		Shafts			-	, ,	\$ -	
		Rockbolts 3/4" @6'	280 E	ΞA	\$	327.15	\$ 90,000	
		Steel Mesh	800 \$		\$	5.37	\$ -	
		Portals	000 0		Ψ	0.01	\$ -	

Low Watana (Non-Expandable) (4	Turbines)	
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				Low Watana (Non-Expandable						
FERC Line #	Sub	Categories	6	Description	Quantity Units		08 Unit Price	Line Price	Total	
				Rockbolts 1" @15'	24 EA	\$	735.81	\$ 20,000		
			0.329	Architectural Portal Doors				\$-		
				Portal Doors	1 LS	\$	33,900.00	\$ 30,000		
		0.33		Instrumentation				\$-		
			0.331	Instrumentation	1 LS	\$	17,315,220.00	\$ 17,320,000		
	0.	4		Relict Channel				\$-		
		0.41		Shore Protection				\$-		
			0.411	Excavation				\$-		
				Overburden Stripping 2' thick	2,200 CY	\$	11.56	\$ 30,000		
			0.412	Fill				\$ -		
				Dump and Spread				\$ -		
				Filter Material - 2' layer	2,200 CY	\$	31.93	\$ 70,000		
				Rock Spalls/ Rip Rap- 3' Ave	3,300 CY	\$		\$ 30,000		
				Shore Protection	0,000 01	Ŷ	0.00	\$ -		
				Rip Rap	24,000 CY	\$	24.26	\$ 580,000		
				Waste Rock	24,000 CY	\$	22.78	\$ 550,000		
		0.44		Channel Filter Blanket	24,000 01	Ψ	22.70	\$		
		0.44								
			0.442	Fill Coorres Filter	2,000,000,01/	¢	00.05	\$ - \$ 08.170.000		
				Coarse Filter	2,900,000 CY	\$	33.85	\$ 98,170,000 \$ 05,400,000		
				Fine Filter	2,180,000 CY	\$	43.65			
				Rip Rap	182,000 CY	\$	24.26	\$ 4,420,000		
			0.443	Surface preparation				\$ -		
				Foundation Prep				\$-		
				Clearing and Grubbing	460 ACRE	\$	3,963.11			
				Excavation	2,236,000 CY	\$	15.62	\$ 34,930,000		
	0.	5		Outlet Facilities					\$ 1,537,6	90,000
		0.51		Outlet Facilities- (Intake Civil Work Include in Power Intake)	1 LS	\$	73,000,000	\$ 73,000,000		
		0.52		Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1 LS	\$	182,000,000	\$ 182,000,000		
		0.53		Emergency Spillway	1 LS	\$	164,000,000	\$ 164,000,000		
	0.			Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1 LS	\$	97,000,000			
	0.			Surge Chamber	1 LS	\$	17,000,000			
	0.	0.81		Head Race (Based on Penstock costs	1 LS	\$	28,000,000	. , ,		
		0.82		Penstocks	1 LS	\$	17,000,000			
	0.			Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1 LS	\$	12,000,000			
	0.	5			1 23	Ψ	12,000,000	φ 12,000,000	\$ 590,0	00,000
									φ 330,0	00,000
	333		Waterw	heels, Turbines and Generators						
-	000	0.11		Turbines and Governors						
		0.11	0.111	Supply						
			0.112							
	0	<u> </u>	0.112							
	0.			Generators and Exciters						
		0.21		Generators and Exciters (Supply and Install)						
	_	_	0.211	Generators and Exciters						
	0.	3		Total Bid From Vendor (includes all equipment in this category)	4 EA	\$	74,200,000.00	\$ 297,000,000	\$ 297,0	00,000
				Average from acquired quotes						
-	334		Access	ory Electrical Equipment						
	0.			Connections, Supports and Structures						
		0.11		Structures						
			0.111	Structures (included Below)						
		0.12		Conductors and Insulators						
			0.121	Generator Isolated Phase Bus	1 LS	\$	3,792,000.00	\$ 3,790,000		
			0.122	HV Power Cables and Accessories	1 LS	\$	1,540,500.00	\$ 1,540,000		
			0.123	LV Power Cables and Accessories	1 LS	\$	711,000.00	\$ 710,000		
			0.124	Control Cables and Accessories	1 LS	\$	1,303,500.00			
			0.125	Grounding System	1 LS	\$	177,750.00			
		0.13		Conduits and Fittings	. 20	Ŷ	,. 66.66			
		0.10	0.131	Conduits and Fittings	1 LS	\$	474,000.00	\$ 470,000		
			0.101	_onaano ana i nango	. 20	Ψ		-		

L	.ow	Watana	(Non-Ex	pandable)	•	4 Turbines)
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				Low Watana (Non-Exp					
FERC Line #	Sub Cat	egories		Description	Quantity	Units	2008 Unit Price	Line Price	Total
	0.2			Switchgear and Control Equipment					
		0.21		Auxiliary Transformers					
			0.211	Auxiliary Transformers		4 EA	\$ 83,811	\$ 340,000	
		0.22		Circuit Breakers Generators				\$ -	
			0.221	Circuit Breakers Generators		4 EA	\$ 1,504,300	\$ 6,020,000	
		0.23		Surge Protectors and Generator Cubicles			\$ -	\$ -	
		0.20	0.231	Surge Protectors and Generator Cubicles		4 EA	\$ 50,000.00	\$ 200,000	
		0.24	0.201	Switch boards		1 2/1	\$ -	\$ -	
		0.24	0.241	Switch boards		1 LS	\$ 924,300.00		
		0.25	0.241	Auxiliary Power Equipment		1 L3	\$ 924,300.00 \$ -	\$ <u>920,000</u> \$ -	
		0.25	0.054			4 5 4			
	0.0		0.251	Auxiliary Power Equipment		4 EA	\$ 100,000	\$ 400,000	
	0.3			Cubicles and Appurtenances				\$ -	
		0.31		Control, relay and meter boards				\$-	
			0.311	Control, relay and meter boards		4 EA	\$ 200,000	\$ 800,000	
		0.32		Computer Control System			\$ -	\$-	
			0.321	Computer Control System			\$ -	\$-	
		0.33		Supervisor and Telemeter System			\$-	\$-	
			0.331	Supervisor and Telemeter System			\$-	\$-	
							\$-	\$-	
	0.4			Power Transformers			\$-	\$-	
		0.41		Power Transformers			\$-	\$-	
			0.411	Power Transformers		7 EA	\$ 2,571,429	\$ 18,000,000	
							\$ -	\$ -	
	0.5			Lighting System			Ŧ	÷ -	
	0.0	0.51		Powerhouse and Transformer Gallery				\$-	
		0.01	0.511	Powerhouse and Transformer Gallery		1 LS	\$ 1,824,900.00	\$ 1,820,000	
		0.52	0.511	Access Tunnels and Roads		1 25	φ 1,024,300.00	\$ 1,020,000	
		0.52	0.521	Access Tunnels and Roads		1 LS	\$ 402,900.00	\$ 400,000	
			0.521	Access Tunnels and Roads		1 13	\$ 402,900.00	\$	
	0.0			Miss Electrical Environment					
	0.6			Misc. Electrical Equipment				\$ -	
		0.61		Misc. Electrical Equipment				\$ -	
			0.611	Misc. Electrical Equipment		1 LS	\$ 625,680.00	\$ 630,000	
								\$ -	
	0.7			Surface Accessory Equipment				\$-	
		0.71		34.5 kV and LV Equipment				\$-	
			0.711	Switchboard		1 LS	\$ 213,300	\$ 210,000	
			0.712	Cables		1 LS	\$ 450,300	\$ 450,000	
			0.713	Aux Transformers		1 LS	\$ 284,400	\$ 280,000	
		0.73		Diesel Generator- Standby				\$ -	
			0.731	Diesel Generator- Standby		2 EA	\$ 347,550	\$ 700,000	
		0.74		Exterior Lighting			,	\$ -	
			0.741	Exterior Lighting		1 LS	\$ 355,500	\$ 360,000	
		0.75		Mimic Board- Control Building		-		\$ -	
		0.10	0.751	Mimic Board- Control Building		1 LS	\$ 1,185,000	\$ 1,190,000	
			0.701	Minio Board, Control Balloling		. 25	÷ 1,100,000	\$ 1,130,000	\$ 41,000,000
33	5		Mico Do	werplant Equipment				\$-	φ 41,000,000
33	0.1	-		Auxiliary Systems- Underground				ş - \$ -	
	0.1	0.11						у - \$-	
		0.11		Station Water Systems		4.1.0	¢ 0.400 500.00	+	
			0.111	Station Water Systems		1 LS	\$ 2,488,500.00	\$ 2,490,000	
		0.12		Fire Protection Systems			\$-	\$-	
			0.121	Fire Protection Systems		1 LS	\$ 1,422,000.00	\$ 1,420,000	
		0.13		Compressed Air Systems			\$ -	\$-	
			0.131	Compressed Air Systems		1 LS	\$ 1,777,500.00	\$ 1,780,000	
		0.14		Oil Handling Systems			\$-	\$-	
			0.141	Oil Handling Systems		1 LS	\$ 1,185,000.00	\$ 1,190,000	
		0.15		Drainage & Dewatering			\$ -	\$ -	
			0.151	Drainage & Dewatering		2 EA	\$ 1,738,000	\$ 3,480,000	
		0.16		Heating, Ventilation and Cooling System			\$ -	\$ -	
				5, · · · · · · · · · · · · · · · · · · ·					

FERC Line #	Sub Ca	ategories		Low Watana (Non-Expan) Description	Quantity	Units	200	8 Unit Price	Line	e Price	Total	
	045 04	atogonoc	0.161	Heating, Ventilation and Cooling System	Quantity	1 LS	\$	1,777,500.00	\$	1,780,000	. otai	
		0.17		Miscellaneous			\$	-	\$	-		
			0.171	Miscellaneous		1 LS	\$	1,185,000.00		1,190,000		
	0.2		0	Auxiliary Systems- Surface Facilities		. 20	\$	-	\$	-		
	0.2	0.21		Auxiliary Systems- Surface Facilities			\$	_	\$	-		
		0.21	0.211	Auxiliary Systems- Surface Facilities		1 LS	\$	711,000	\$	710,000		
	0.3		0.211	Auxiliary Equipment		1 25	\$	711,000	\$	710,000		
	0.5	0.31		Powerhouse Cranes			э \$	-	э \$	-		
		0.51	0.211	Powerhouse Cranes		2 EA	э \$	1 800 000				
		0.00	0.311			ZEA		1,800,000		3,600,000		
		0.32		Elevators			\$	-	\$	-		
			0.321	Elevators		2 EA	\$	181,700		360,000		
		0.33		Miscellaneous Cranes and Hoists			\$	-	\$	-		
			0.331	Miscellaneous Cranes and Hoists		1 LS	\$	505,500		510,000		
		0.34		Machine Shop Equipment			\$	-	\$	-		
			0.341	Machine Shop Equipment		1 LS	\$	2,022,000		2,020,000		
	0.4			General Station Equipment			\$	-	\$	-		
	0.5			Communications Equipment		1 LS	\$	106,650.00	\$	110,000		
									\$	-	\$	21,000,000
330	<u>)</u>		Roads,	Rails and Air Facilities					\$	-		
	0.1			Roads								
		0.11		Permanent Roads								
				Cost of road upgrades for 23 mi of Denali Highway		23 Mi	\$	1,000,000.00	\$	23,000,000.00		
				Cost of New road to 42 Mi of road to Watana		42 Mi	\$	3,000,000.00		126,000,000.00		
		0.131		Site Roads			•	-,,	•	,,.		
		0.101		Construction Roads								
				Site Roads		20 Mile	\$	750,000.00	\$	15,000,000		
				Maintenance		141 MI/YRS	\$	223,092.85		31,500,000		
				Waintenance		141 100/11(3	Ψ	223,032.03	Ψ	31,300,000		
		0.132		Permanent Roads								
		0.132				6 Mile	¢	1 207 007 42	¢	7 700 000		
				Permanent Roads		6 Mile	\$	1,287,997.42	Φ	7,700,000		
				D-1								
	0.2			Rail								
			0.1	Railhead at Cantwell		1 LS	\$	14,000,000.00	\$	14,000,000		
	0.3			Airstrip								
		0.31		Airstrip								
				Permanent Airstrip		1 LS	\$	13,000,000.00		13,000,000		
				Temporary Airstrip		1 LS	\$	2,000,000.00	\$	2,000,000		
											\$	232,000,000
<u>350-35</u>	<u>)</u>		Transmis	ssion Plant		33 MILE	\$	5,700,000.00	\$	188,100,000.00		
						2 EA	\$	18,000,000.00	\$	36,000,000.00		
											\$	224,000,000.00
			General	l Plant								
389)		Land ar	nd Land Rights								
	-			Land and Land Rights								
							(inc	l in 330)				
390)		Structu	res and Improvements			(
<u></u>	<u>-</u>		onuoru	Structures and Improvements								
							(inc	l in 331 2)				
20.			041ac 5	investigate and Equipment			(IIIC	l in 331.2)				
<u>39</u>	<u>L</u>		Unice F	Furniture and Equipment								
				Office Furniture and Equipment			<i></i>	1				
			_				(inc	l in 399)				
<u>392</u>	2		Transpo	ortation Equipment								
				Transportation Equipment								
							(inc	l in 399)				
<u>393</u>	3		Stores I	Equipment								

ERC Line #	Sub Categorie	s Description	ole) (4 Turbines) Quantity	Units	2008 Unit Price Line Price Total	
	eas ealogene	Stores Equipment	quantity	e inte		
					(incl in 399)	
	<u>394</u>	Tools Shop and Garage Equipment				
		Tools Shop and Garage Equipment			(in al in 200)	
	<u>395</u>	Laboratory Equipment			(incl in 399)	
	333	Laboratory Equipment				
					(incl in 399)	
	<u>396</u>	Power-Operated Equipment				
		Power-Operated Equipment				
					(incl in 399)	
	<u>397</u>	Communications Equipment				
		Communications Equipment			(incl in 399)	
	<u>398</u>	Miscellaneous Equipment				
		Miscellaneous Equipment				
					(incl in 399)	
	<u>399</u>	Other Tangible Property			· · · · · · · · · · · · · · · · · · ·	
		Other Tangible Property		1 LS 1 LS	\$ 16,000,000 \$ 16,000,000 (221,000) \$ (200,000)	
		Saved Maintenance		1 15	\$ (231,220) \$ (230,000) \$ - \$	16,000,0
		Indirect Costs			ψ ψ	10,000,0
	<u>61</u>	Temporary Construction Facilities				
		Temporary Construction Facilities			(incl in direct costs)	
	<u></u>	Construction Equipment				
	<u>62</u>	Construction Equipment Construction Equipment			(incl in direct costs)	
		Construction Equipment				
	<u>63</u>	Main Construction Camp				
	0.1	Main Construction Camp		1 LS	\$ 180,000,000 \$ 180,000,000	
	64	Labor Expense			\$	180,000,0
	<u>64</u>	Labor Expense				
	<u>65</u>	Superintendence				
		Superintendence				
	<u>66</u>	Insurance				
		Insurance				
	<u>68</u>	Mitigation Fishery, Terrestrial and Recreational)- Not Included				
	<u>69</u>	Fees				
	—	Fees				
ibtotal						
	Contingency	(20%)		1 LS	\$ 749,200,000.00 \$	749,000,0
btotal	71	Engineering (4%), Environmental (2%), Regulatory(1%)		1 LS	\$ 236,000,000.00 \$	236,000,0
	71a	Construction Management (4%)		1 LS 1 LS	\$ 236,000,000.00 \$ \$ 135,000,000.00 \$	135,000,0
	72	Legal Expenses		. 20	τ ····,•································	,,
	75	Taxes				
	<u>76</u>	Administrative & Gen. Expenses				
	7 <u>1</u> 7 <u>1a</u> 7 <u>2</u> 7 <u>5</u> 7 <u>6</u> 7 <u>7</u> 80	Interest				
	<u>80</u>	Earnings/Expenses During Construction				
tal Project C	Cost				\$	4,495,000,0

Max Plant Capacity 600

HDR/AEA Susitna Hydroelectric Project Cost Estimates based on 1982 quantities By: HDR By: Leanne Andruszkiewicz, E.I.T. Checked By: Kellen Roberts, E.I.T. Date: 10/15/2009

2008 Dollars

Low Watana (Expandable) (4 Turbines)

Line #		Sub Cate			Description	Quantity	Units	2008	Unit Price	Line	Price	Total	
	<u>330</u>	0.1			. <u>and Rights</u> and		1 LS	\$	120,870,000	\$	120,870,000		
		0.2			and Rights		1 20	Ψ	120,070,000	\$	120,070,000		
		0.2			lisc Charges in Credit Above					\$ \$			
		0.5		IV	list Gharges in Credit Above					ф \$	-	\$	121,000
										э \$	-	φ	121,000
	331			Powernlan	t Structure Improvements					ф \$			
	331	0.1		-	owerhouse					¢			
		0.1	0.11	'	Powerhouse and Draft Tube					ф \$			
			0.11	0.111	Excavation					ф \$			
				0.111	Powerhouse Vault Rock	122 5	00 CY	\$	90	\$ \$	11,040,000		
					Draft Tube Rock		00 CY	φ \$	90	\$ \$	2,270,000		
				0.113	Surface Preparation/ Grouting	20,2	00 01	Ψ	50	\$	2,270,000		
				0.113	Powerhouse	0.00	00 SF	\$	3		330,000		
Total	т	otal Eat	imatad	Const Cos	ts (Million \$) Draft Tube	,	00 SF	φ \$	3	\$	250,000		
TULAI	'	Utal ESI	maleu	Const. Cos	Grout Curtain- Drill holes		00 SF 00 LF	э \$	28		1,210,000		
					Grout Curtain- Cement		00 LF 00 CF	ф \$	81	ф \$	1,420,000		
				0.114	Concrete and Shot Crete	17,5	00 CF	φ	01	ф \$	1,420,000		
				0.114	Powerhouse Concrete	22.6	00 CY	\$	693	-	22,590,000		
					Powerhouse Concrete Overbreak	,	00 CY	ф \$	447		1,070,000		
					Powerhouse Reinforcing Steel	,	30 TON	э \$	2,858		4,660,000		
					Powerhouse 4" Shotcrete	,	00 SF	φ \$	2,000		420,000		
					Draft Tube Concrete		00 CY	φ \$	693		8,310,000		
					Draft Tube Concrete Overbreak		00 CY	э \$	447		1,120,000		
					Draft Tube Reinforcing Steel		90 TON	φ \$	2,858		2,830,000		
					Draft Tube 2" Shotcrete		00 SF	ф \$		ф \$	2,830,000		
				0.115	Support and Anchors	0,1	00 SF	φ	5	э \$	30,000		
				0.115	Powerhouse Rockbolts 1" @ 25' Hy	0	70 EA	\$	1,235	-	1,200,000		
					Powerhouse Rockbolts 1" @ 25 Hy		70 EA 70 EA	э \$	736		1,450,000		
					Powerhouse Steel Mesh	,	00 SF	ф \$		э \$	260,000		
					Powerhouse Steel Support	,	37 TON	э \$	12,672		1,740,000		
					Draft Tube Rockbolts 1" @ 25' Hy		50 EA	φ \$	1,235		190,000		
					Draft Tube Rockbolts 1" @ 12'		90 EA	ф \$	528		210,000		
								ъ \$	432				
					Draft Tube Rockbolts 1" @ 9' Draft Tube Steel Mesh		90 EA 00 SF	э \$		э \$	80,000 120,000		
				0.117	Holes (U/S of Powerhouse)		00 SF 00 LF	ф \$, 51		770,000		
				0.117	Holes (Powerhouse Crown)	,	00 LF 00 LF	φ \$	51	э \$	1,460,000		
				0.118	Structural- Misc Steelwork	28,5	UU LF	φ	51	գ Տ	1,400,000		
				0.110	Powerhouse and Draft Tube- Steel Crane Rails		1 LS	\$	10,276,309	-	- 10,280,000		
				0.119	Architectural- Powerhouse		1 LS	ф \$	2,927,898		2,930,000		
				0.119 0.11c	Mechanical		1 13	φ	2,927,090	գ Տ	2,930,000		
				0.110	Draft Tube Gates		4 SETS	\$	427,880	-	- 1,710,000		
					Draft Tube Gates		4 SETS 6 SETS	э \$	427,880		1,220,000		
					Draft Tube Gate Guides		6 SEIS 1 LS	Դ Տ	1,140,000		1,220,000		
			0.12		Access Tunnels and Portals		1 1.5	φ	1,140,000	ф \$	1,140,000		
			0.12	0.121	Excavation					ֆ \$	-		
				0.121	Main Tunnel	E0 0	50 CY	\$	97	ֆ \$	4,900,000		
						,	50 CY		97 97				
					Transformer Gallery Tunnel	,		\$ ¢			1,730,000		
					Grouting Gallery Tunnel		00 CY	\$	396		750,000		
					Surge Chamber Access Tunnel		50 CY	\$	145		1,050,000		
					Penstock Access Tunnel	61,5	00 CY	\$	145	Ф	8,930,000		

Line # S	Sub Categories	Description	Quantity U	nits 200	8 Unit Price	Line Price	Total
		Penstock Elbow Access Tunnel	15,000 C	Y \$	145	\$ 2,180,000)
		Access Shaft Tunnel	1,300 C	Y \$	145	\$ 190,000)
		Connector Tunnel	1,900 C	Y \$	379	\$ 720,000)
		Portals Overburden	6,000 C		17		
		Portals Rock	3,000 C		49	. ,	
	0.123	Surface Preparation	-,	•		\$ -	
	0.120	Main Tunnel Slab	53,100 S	= \$	2		1
		Penstock Access Slab	65,200 S		2		
						\$ 140,000 \$ -)
		Horizontal Portal	200 S				
		Inclined Portal	2,100 S	= \$	3	. ,)
	0.124	Concrete and Shot Crete				\$-	
		Main Portal				\$ -	
		Concrete Slab	30 C		406		
		Concrete Walls	570 C		406	. ,	
		Concrete Overbreak	50 C	Y \$	368	\$ 20,000)
		Reinforcing Steel	40 T(DN \$	2,888	\$ 120,000)
		Tunnels				\$ -	
		Concrete Slab Main Tunnel	1,950 C	Y \$	504)
		Concrete Plugs Penstock Elbow ACC	15,000 C		756		
		Concrete Overbreak Main Tunnel 6"	1,000 C		346		
		Reinforcing Steel	70 T		2,888	. ,	
		2 " Shotcrete Main Tunnel	20,100 S		2,000	. ,	
		2 "Shotcrete Transformer Gal	7,100 S		5	. ,	
		2 "Shotcrete Surge Chamber Acc	3,900 S		5		
		2 " Shotcrete Penstock Access	24,700 S		5		
		2 " Shotcrete Penstock Elbow Acc	7,100 S		5)
		2 " Shotcrete Access Shaft	300 S		5	•	
		2 " Shotcrete Grout Gallery	800 S		5	•	
		2 " Shotcrete Connector Tunnel	800 S	= \$	5	•	
	0.125	Support and Anchors				\$-	
		Main Tunnel				\$-	
		Rockbolts 1" @12'	1,200 E	۹ \$	528	\$ 630,000)
		Rockbolts 1" @ 9'	250 E.	۹ \$	432	\$ 110,000)
		Steel Mesh	63,000 S		6	\$ 400,000)
		Steel Support	66 T		12,801		
		Main Tunnel Portal			/	\$ -	
		Rockbolts 1" @15'	50 E.	۹ \$	736	\$ 40,000)
		Transformer Gallery Tunnel	00 2	, φ	100	\$ -	
		Rockbolts 1" @12'	410 E	۹ \$	528	\$ 220,000	1
		Rockbolts 1 @ 9'	410 E		432		
		Steel Mesh	22,500 S		6		
		Steel Support	24 T	SN \$	12,801	. ,)
		Grouting Gallery Tunnel				\$ -	
		Rockbolts 3/4" @ 6'	160 E		327	\$ 50,000)
		Steel Mesh	160 S		6		
		Steel Support	2 T	ON \$	12,801)
		Surge Chamber Access Tunnel				\$-	
		Rockbolts 1" @12'	230 E	۹ \$	528	\$ 120,000)
		Rockbolts 1" @ 9'	50 E.		432		
		Steel Mesh	12,050 S		6		
		Steel Support	14 T(12,801		
		Penstock Access Tunnel	14 14	• Ψ	12,001	\$ 100,000	
		Rockbolts 1" @12'	1,430 E	۹ \$	528		1
					528 432		
		Rockbolts 1" @ 9'	240 E				
		Steel Mesh	77,500 S		6		
		Steel Support	58 T	ON \$	12,801)
		Penstock Elbow Access Tunnel				\$-	
		Rockbolts 1" @12'	420 E	۹ \$	528	\$ 220,000	

FERC Line # St	ub Categories	Description Rockbolts 1" @ 9' Steel Mesh Steel Support Access Shaft Tunnel Rockbolts 1" @ 12' Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel	22,	Units 120 EA ,500 SF 30 TON 20 EA 20 EA	2008 L \$ \$ \$ \$	<u>Jnit Price</u> 432 6 12,801	Line Price \$ 50,00 \$ 140,00 \$ 380,00 \$ -)
		Steel Mesh Steel Support Access Shaft Tunnel Rockbolts 1" @12' Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel	22,	,500 SF 30 TON 20 EA	\$ \$	6	\$ 140,00 \$ 380,00)
		Steel Support Access Shaft Tunnel Rockbolts 1" @12' Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel		30 TON 20 EA	\$		\$ 380,00	
		Access Shaft Tunnel Rockbolts 1" @12' Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel		20 EA		12,801)
		Rockbolts 1" @12' Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel			\$		¢ _	
		Rockbolts 1" @ 9' Steel Mesh Steel Support Connector Tunnel			\$		ψ -	
		Steel Mesh Steel Support Connector Tunnel		20 EA		528	\$ 10,00)
		Steel Mesh Steel Support Connector Tunnel			\$	432	\$ 10,00)
		Steel Support Connector Tunnel		930 SF	\$	6		
		Connector Tunnel						
				8 TON	\$	12,801)
				100 51	•	0.07	\$ -	
		Rockbolts 3/4" @ 6'		160 EA	\$	327	\$ 50,00)
		Steel Mesh		160 SF	\$	6	\$ -	
	0.400	Steel Support		2 TON	\$		\$ 30,00	
	0.129	Architectural- Main Portal Doors		2 SETS	\$	158,372	\$ 320,00	J
	0.12c	Mechanical Ventilation System					\$-	
	0.13	Access Shaft	10		•		\$ -	
	0.131	Excavation Rock	,	,700 CY	\$	228	\$ 3,120,00	
	0.133	Surface Preparation Shaft	64,	,000 SF	\$	3	\$ 210,00	J
	0.134	Concrete and Shot Crete	-	050.0%	•	o	\$ -	
		Concrete Lining		,350 CY	\$		\$ 3,170,00	
		Concrete Overbreak 6"		,220 CY	\$		\$ 670,00	
	0.135	Support and Anchors - Rockbolts 3/4" @ 6'	1,	,050 EA	\$		\$ 340,00	
	0.138	Structural Misc Steelwork		50 TON	\$	7,395	\$ 370,00)
	0.139	Architectural- control Building					\$ -	
	0.13c	Mechanical Elevators		1 LS	\$	2,368,815	\$ 2,370,00)
	0.14	Fire Protection Head Tank					\$ -	
	0.141	Excavation		,150 CY	\$		\$ 680,00	
	0.143	Surface Preparation	2,	,800 SF	\$	2	\$ 10,00)
	0.144	Concrete & Shotcrete					\$-	
		Concrete		250 CY	\$	964	\$ 240,00	
		Concrete Overbreak 6"		45 CY	\$		\$ 20,00	
		Reinforcing Steel		10 TON	\$	2,858	\$ 30,00)
	0.145	Support and Anchors					\$-	
		Rockbolts 1" @12'		25 EA	\$	528	\$ 10,00)
		Rockbolts 1" @ 9'		10 EA	\$		\$-	
		Steel Mesh	1,	,200 SF	\$		\$ 10,00	
		Steel Support		2 TON	\$		\$ 30,00)
	0.148	Misc Steelwork		1 LS	\$	73,298	\$ 70,00)
	0.14c	Mechanical Piping/Valves					\$-	
	0.15	Bus Tunnels (totals for 3 Bus Tunnels)					\$ -	
	0.151	Excavation					\$ -	
		Rock Horizontal		,700 CY	\$	214	\$ 580,00	
		Rock Inclined		,300 CY	\$	601	\$ 780,00	
	0.153	Surface Preparation- Tunnels	7,	,100 SF	\$	3	\$ 20,00)
	0.154	Concrete and Shotcrete					\$ -	
		Concrete Slab		350 CY	\$		\$ 290,00	
		Concrete Overbreak 12"		250 CY	\$		\$ 120,00	
		Reinforcing Steel		18 TON	\$		\$ 50,00	
		2" Shotcrete	2,	,200 SF	\$	5	\$ 10,00)
	0.155	Supports and Anchors					\$ -	
		Rockbolts 1" @ 25'		60 EA	\$,	\$ 70,00	
		Rockbolts 1" @ 12'		140 EA	\$	528	\$ 70,00	
		Rockbolts 1" @ 9'		50 EA	\$		\$ 20,00)
		Steel Mesh	6,	,800 SF	\$		\$ 40,00)
		Steel Support		11 TON	\$	12,672	\$ 140,00)
	0.16	Transformer Gallery Tunnel					\$-	
	0.161	Excavation- Rock	26,	,800 CY	\$	87	\$ 2,340,00)
	0.163	Surface Preparation		,600 SF	\$	2		

Line #	Sub Cat	egories		Low Watana (Expandable) (4 Tu Description	Quantity Units	2008 Ui	nit Price	Line Price	Total
			0.164	Concrete and Shotcrete				\$-	
				Concrete Base Slab	2,400 CY	\$	1,228		
				Concrete Overbreak 12"H/6"V	770 CY	\$	378	\$ 290,000	
				Reinforcing Steel	120 TON	\$	2,858		
			0.165	Support and Anchors				\$-	
				Rockbolts 1" @ 25'	600 EA	\$	1,235	\$ 740,000	
				Rockbolts 1" @ 15'	270 EA	\$	736	\$ 200,000	
				Steel Mesh	20,700 SF	\$	6	\$ 120,000	
				Steel Support	29 TON	\$	12,672	\$ 370,000	
			0.167	Drainage Holes	8,300 LF	\$	48	\$ 400,000	
		0.17		Cable Shafts				\$ -	
			0.171	Excavation Rock	3,400 CY	\$	601	\$ 2,040,000	
			0.173	Surface Preparation Shafts	41,400 SF	\$	3	\$ 140,000	
			0.174	Concrete and Shotcrete	,	÷	U	\$ -	
			0.114	Concrete Lining	1,040 CY	\$	1,764	\$ 1,830,000	
				Concrete Overbreak 6"	800 CY	\$	882	. , ,	
			0.175	Supports and Anchors- Rockbolts 3/4" @ 6'	650 EA	э \$	327		
			0.175	Supports and Anchors- Rockbolts 3/4 @ 6 Structural Misc Steelwork	18 TON				
						\$	15,602		
			0.179	Architectural- Enclosures	1 LS	\$	199,317		
			0.17c	Mechanical Hoist	2 EA	\$	476,960		
		0.18		Dewatering (during Construction)		•		\$ -	
			0.181	Dewatering (Power Facilities)	1 LS	\$	1,336,799		
		0.19		Instrumentation				\$ -	
			0.191	Instrumentation	1 LS	\$	1,714,814		
	0.2			Misc Buildings (Control Buildings)	1 LS	\$	4,433,085	\$ 4,430,000	
	0.3			Permanent Town	(included in 63.5)				
								\$-	\$ 159,000
332				Reservoir, Dams and Waterways				\$-	
	0.1			Reservoir				\$-	
		0.11		Reservoir Clearing	23,000 ACRE	\$	3,006	\$ 69,130,000	
	0.2			Diversion Tunnels /Cofferdams				\$-	
		0.21		Diversion Tunnels /Portals				\$-	
			0.211	Excavation				\$ -	
				Upper Tunnel				\$ -	
				Rock	221,000 CY	\$	92	\$ 20,400,000	
				Lower Tunnel	,	•		\$ -	
				Rock	208,000 CY	\$	92		
				Excavate Concrete for Plug	700 CY	\$	97	\$ 70,000	
				Upstream Upper Portal	700 01	Ψ	31	\$ 70,000 \$ -	
				Rock Usable (Face Only)	11,200 CY	\$	49	\$ 550,000	
				Upstream Lower Portal (Including Most Excav. for Upper Portal)	11,200 01	Ψ	49	\$	
				Rock Usable	108 000 CV	¢	40		
					108,000 CY	\$	49	\$ 5,310,000 \$ 1,070,000	
				Rock Waste	21,750 CY	\$	49	\$ 1,070,000	
				Downstream Portals	47 000 01/	•		\$ -	
				Overburden	17,000 CY	\$	17	\$ 290,000	
				Rock Usable	120,000 CY	\$	49	\$ 5,900,000	
				Rock Waste	28,000 CY	\$	49	\$ 1,380,000	
				Emergency Release Chambers				\$ -	
				Excavate Concrete for Plugs	1,800 CY	\$	102		
				Gate Chamber	4,700 CY	\$	111	• • • • • • • • • • • • • • • • • • • •	
				Access Tunnel to Gate Chamber				\$-	
				Rock	19,100 CY	\$	97	\$ 1,860,000	
			0.212	Fill- Temp for Coffer Dam to Construct Upstream Portals	23,000 CY	\$	12	\$ 270,000	
			0.212					\$ -	
			0.212	Surface Preparation \ grouting				φ =	
								ş - \$ -	
				Upstream Upper Portal	3.200 SF	\$	2	\$ -	
					3,200 SF 8,600 SF	\$ \$	2	\$- \$10,000	

Sub Categories	Description	Quantity Units	2008 U		ine Price Tot
	Horizontal	1,300 SF	\$	2 \$	
	Inclined	14,900 SF	\$	3 \$	50,000
	Downstream Upper Portal			\$	-
	Horizontal	6,100 SF	\$	2 \$	10,000
	Inclined	20,500 SF	\$	3 \$	
	Downstream Lower Portal	-,	•	\$	
	Horizontal	600 SF	\$	2 \$	
	Inclined	5,600 SF	\$	3 \$	
		5,000 55	φ		
	Grout Upper Tunnel Plugs	4 400 1 5	•	\$	
	Drill Holes	4,100 LF	\$	27 \$	
	Cement	820 CF	\$	81 \$	
	Grout Lower Tunnel Permanent Plugs			\$	
	Drill Holes	2,050 LF	\$	27 \$	
	Cement	410 CF	\$	81 \$	30,000
0.214	Concrete and Shotcrete			\$	-
	Upper Tunnel			\$	-
	Concrete Lining	42,400 CY	\$	567 \$	
	Concrete Lining Overbreak 6"	10,200 CY	\$	315 \$, ,
	Reinforcing Steel	24 TON	\$	2,888 \$, ,
	2" Shotcrete		э \$		
		56,000 SF	Φ		
	Lower Tunnel		•	\$	
	Concrete Lining	37,600 CY	\$	567 \$	
	Concrete Lining for Plug	6,200 CY	\$	428 \$, ,
	Concrete Lining Overbreak 6"	10,000 CY	\$	315 \$	
	Reinforcing Steel	24 TON	\$	2,888 \$	70,000
	2" Shotcrete	57,900 SF	\$	5 \$	300,000
	Upstream Upper Portal			\$	-
	Concrete Headwall	3,200 CY	\$	652 \$	2,090,000
	Concrete Lining	1,300 CY	\$	652 \$	850,000
	Concrete Slab	750 CY	\$	652 \$,
	Concrete Piers	800 CY	\$	652 \$,
	Concrete Overbreak 12" H/6"V	300 CY	\$ \$	472 \$	
		400 TON	ъ \$	2,888 \$,
	Reinforcing Steel	400 TON	Ф		
	Upstream Lower Portal			\$	
	Concrete Headwall	4,500 CY	\$	652 \$, ,
	Concrete Lining	3,000 CY	\$	652 \$	
	Concrete Slab	300 CY	\$	652 \$	
	Concrete Piers	700 CY	\$	652 \$	460,000
	Concrete Overbreak 12" H/6"V	350 CY	\$	472 \$	170,000
	Reinforcing Steel	600 TON	\$	2,888 \$	
	Downstream Upper Portal			\$	
	Concrete Headwall	500 CY	\$	652 \$	
	Concrete Slab	100 CY	\$	652 \$,
	Concrete Overbreak 12" H/6"V	100 CY	\$	472 \$	
					,
	Reinforcing Steel	40 TON	\$, ,	,
	Downstream Lower Portal			\$	
	Concrete Headwall	2,500 CY	\$	652 \$, ,
	Concrete Slab	100 CY	\$	652 \$	- ,
	Concrete Overbreak 12" H/6"V	150 CY	\$	472 \$	70,000
	Reinforcing Steel	170 TON	\$	2,888 \$	490,000
	Downstream Flip Bucket			\$	
	Concrete Slab	800 CY	\$	652 \$	
	Concrete Walls	2,300 CY	\$	652 \$,
	Concrete Invert		э \$	652 \$, ,
		1,200 CY	ъ \$		
	Concrete Overbreak 12" H/6"V	410 CY		42 \$	
	Reinforcing Steel	280 TON	\$	2,888 \$	
	Downstream Retaining Wall			\$	
	Concrete Slab	200 CY	\$	652 \$	130,000

ERC Line #	Sub Categories	Description	Quantity Units	2008	Unit Price	Line Price	Total
		Concrete Walls	2,000 CY	\$	652	\$ 1,300,000	
		Concrete Overbreak 12" H/6"V	110 CY	\$	472	\$ 50,000	
		Reinforcing Steel	90 TON	\$	2,888	\$ 260,000	
		Emergency Release Chambers				\$-	
		Concrete Plug	15,300 CY	\$	756	\$ 11,560,000	
		4" Shotcrete	2,790 SF	\$	10	\$ 30,000	
		Access Tunnel to Gate Chamber				\$ -	
		2" Shotcrete	12,800 SF	\$	5	\$ 70,000	
	0.215	Supports and Anchors	,	•		\$ -	
		Lower Tunnel				\$ -	
		Rockbolts 1" @ 12'	3,650 EA	\$	528	\$ 1,930,000	
		Rockbolts 1" @ 9'	620 EA	\$			
		Steel Mesh	217,100 SF	\$		\$ 1,380,000	
		Steel Support	220 TON	\$			
		Upper Tunnel	220 101	Ψ	12,001	\$ 2,020,000	
		Rockbolts 1" @ 12'	3,530 EA	\$	528		
		Rockbolts 1" @ 9'	600 EA	э \$			
		Steel Mesh	210,200 SF	\$		\$ 1,340,000 \$ 2,720,000	
		Steel Support	213 TON	\$	12,801		
		Upstream Lower Portal	0/0 51	•		\$ -	
		Rockbolts 1" @ 15'	240 EA	\$		\$ 180,000	
		Anchors 1" @ 25'	290 EA	\$	1,235	\$ 360,000	
		Upstream Upper Portal				\$ -	
		Rockbolts 1" @ 15'				\$ -	
		Anchors 1" @ 25'	130 EA	\$	736	\$ 100,000	
		Downstream Lower Portal				\$-	
		Rockbolts 1" @ 15'	200 EA	\$	736	\$ 150,000	
		Downstream Upper Portal				\$-	
		Rockbolts 1" @ 15'	100 EA	\$	736	\$ 70,000	
		Retaining Wall Anchors 1" @25'	100 EA	\$	1,235	\$ 120,000	
		Emergency Release Chambers				\$ -	
		Rockbolts 1" @ 25'	100 EA	\$	1,235	\$ 120,000	
		Rockbolts 1" @ 15'	125 EA	\$	736		
		Steel Mesh	3,600 SF	\$		\$ 20,000	
		Steel Support	14 TON	\$	12,801		
		Metal to Roof Anchors 3/4" @ 6'	20 EA	\$	342		
		Access Tunnel to Gate Chamber		Ψ	0.12	\$ 10,000	
		Rockbolts 1" @ 12'	775 EA	\$	528	\$ 410,000	
		Rockbolts 1" @ 9'	240 EA	э \$		• • • • • • • • • • • • • • • • • • • •	
		Steel Mesh	39,900 SF	э \$		\$ 250,000	
		Steel Support		ծ \$			
	0.019		55 TON				
	0.218	Structural- Misc Steelwork	2,775 SF	\$	94		
	0.21c	Mechanical				\$ -	
		Upstream Lower Gates	- - - -	•	E 070 400	\$ -	
		Gate Equipment	2 EA	\$	5,073,120		
		Upstream Upper Gates				\$ -	
		Gate Equipment	2 EA	\$	2,840,080		
		Trashracks	1 LS	\$	1,777,500		
		Downstream Lower Outlet				\$-	
		Stoplog Guides	1 LS	\$	142,200	\$ 140,000	
		Stoplogs includes follower	1 LS	\$	1,967,100	\$ 1,970,000	
		Downstream Upper Outlet				\$ -	
		Stoplog Guides	1 LS	\$	82,950	\$ 80,000	
		Low Level Release			. ,	\$ -	
		Slide Gates Include Steel Liner	9 EA	\$	3,517,470	T	
			0 271	Ŧ	2,2 , 110	\$ -	
	0.22	Upstream Cofferdam				\$-	
	0.221	Excavation				\$-	

C Line #	Sub Cat	tegories		Description	Quantity Units	2008	Unit Price	Line Price	Total
				Overburden Removal	1,000 CY	\$	12	\$ 10,000	
			0.222	Fill				\$ -	
				Rock Fill	38,400 CY	\$		\$ 420,000	
				Fine Filter	16,600 CY	\$		\$ 610,000	
				Coarse Filter	15,900 CY	\$		\$ 480,000	
				Rock Shell	196,500 CY	\$	11	\$ 2,060,000	
				Closure Dike	58,500 CY	\$	11	\$ 640,000	
				Rip Rap	21,200 CY	\$	24	\$ 510,000	
			0.223	Cutoff Slurry Wall				\$ -	
				excavation	4,850 CY	\$	5	\$ 20,000	
				slurry wall	43,600 SF	\$	72	\$ 3,160,000	
			0.22d	Dewatering				\$ -	
				Initial Dewatering	1 LS	\$	5,807,685	\$ 5,810,000	
				Dewatering Maintenance	1 LS	\$		\$ 22,380,000	
		0.23		Down Stream Cofferdam		•	,- ,	\$ -	
			0.231	Excavation				\$ -	
			0.201	overburden	5,000 CY	\$	12	\$ 60,000	
				Rock	500 CY	\$		\$	
				Removal of Cofferdam	14,500 CY	\$		\$ 200,000	
			0.232	Fill	14,000 01	Ψ	10	\$ -	
			0.202	Rip Rap	1,800 CY	\$	24	\$ 40,000	
				Closure Dike	15,200 CY	э \$			
			0 222		15,200 C1	φ	11	\$ 170,000 \$ -	
			0.233	Cutoff Slurry Wall	4 830 67	¢	5	\$ 10.000	
				Excavation	1,830 CY	\$ \$		• • • • • • • • • • • • • • • • • • • •	
				Slurry Wall	16,500 SF	Ф	72	\$ 1,200,000	
	0.3			Main Dam				\$ -	
		0.31		Main Dam				\$ -	
			0.311	Excavation				\$ -	
				Overburden above el. 1470	2,026,000 CY	\$		\$ 23,360,000	
				Overburden below el. 1470	5,320,000 CY	\$		\$ 58,840,000	
				Rock Usable above el. 1470	1,289,000 CY	\$		\$ 55,470,000	
				Rock Usable below el. 1470	478,000 CY	\$		\$ 20,900,000	
				Rock Waste above el. 1470	1,950,000 CY	\$		\$ 83,910,000	
				Rock Waste below el. 1470	869,500 CY	\$	50	\$ 43,630,000	
			0.312	Fill- From 1985 FERC Application				\$-	
				Rip Rap (upstream)	733,802 CY	\$	23	\$ 17,100,000	
				Gravel (upstream)	11,950,489 CY	\$	21	\$ 245,700,000	
				Coarse Filter (upstream)	925,759 CY	\$	29	\$ 26,720,000	
				Fine Filter (upstream)	1,045,588 CY	\$		\$ 39,640,000	
				Core (impervious)	6,300,000 CY	\$		\$ 159,830,000	
				Fine Filter (downstream)	1,171,412 CY	\$		\$ 44,410,000	
				Coarse Filter (downstream)	1,074,241 CY	\$		\$ 31,000,000	
				Shell- Rock and Gravel	5,379,949 CY	\$		\$ 103,190,000	
				Shell- Rock From Other Sources	2,569,967 CY	\$		\$ 25,930,000	
				Cobbles (downstream Face)	950,100 CY	φ \$		\$ 25,530,000 \$ 15,530,000	
				Road Base	12,000 CY	φ \$		\$ 13,330,000	
				Frost Protection	12,000 C f	φ	- 34	\$ 410,000 \$ -	
						¢	10		
				Process Protection	960,000 CY	\$		\$ 9,900,000 \$ 2,160,000	
				Place Protection	960,000 CY	\$		\$ 3,160,000	
				Remove 1' Protect and Waste	93,000 CY	\$		\$ 670,000	
				Scarify Core Surface	193 ACRE	\$	859	\$ 170,000	
				Filter Fabric				\$ -	
				Filter Fabric	592,000 SF	\$	1	\$ 520,000	
			0.313	Surface Prep/ Grouting				\$ -	
				Surface Preparation				\$ -	
				Under Core/Filters above el. 1500	1,340,000 SF	\$	3	\$ 4,170,000	
				Under Core/Filters below el. 1500	490,000 SF	\$		\$ 1,520,000	
				Under Shell above el. 1500	4,149,000 SF	\$	2		

_ine #	Sub Categories	Low Watana (Expa Description	Quantity Units	2008 U	nit Price Lir	e Price Total
	e outogeneo	Under Shell below el. 1500	2,067,000 SF	\$	2 \$	4,440,000
		Consolidation Grout	,,	•	\$	-
		Drill Holes	550,000 LF	\$	12 \$	6,550,000
		Cement	550,000 CF	\$	68 \$	37,300,000
		Grout Curtain		Ŷ	\$	-
		Drill Holes	372,000 LF	\$	27 \$	9,950,000
		Cement	149,000 CF	Ψ \$	81 \$	12,080,000
		Dental Concrete	140,000 01	Ψ	\$	12,000,000
		Dental Concrete	68,000 CY	\$	э 365 \$	- 24,840,000
	0.317		08,000 C I	φ	305 \$	24,840,000
	0.317	Drainage	100 000 1 5	¢		-
	0.00	Holes	109,000 LF	\$	51 \$	5,590,000
	0.32	Grout Galleries/Portals			\$	-
	0.321	Excavation			\$	-
		Tunnels/ Shafts- Core Area			\$	
		Rock Horizontal	8,100 CY	\$	395 \$	3,200,000
		Rock Inclined	9,000 CY	\$	553 \$	4,980,000
		Rock Vertical	1,600 CY	\$	536 \$	860,000
		Tunnels/ Shafts- Access			\$	-
		Rock Horizontal	10,400 CY	\$	395 \$	4,110,000
		Rock Inclined	1,600 CY	\$	553 \$	880,000
		Portals			\$	-
		Overburden Rock	2,900 CY	\$	17 \$	50,000
		Rock	800 CY	\$	49 \$	40,000
	0.323	Surface Preparation			\$	-
		Portals			\$	-
		Horizontal	24 SF	\$	2 \$	-
		Inclined	160 SF	\$	3 \$	-
					\$	-
	0.324	Concrete and Shotcrete			\$	-
		Tunnels- Core Area			\$	-
		Concrete Plugs	800 CY	\$	428 \$	340,000
		Concrete Slab	1,800 CY	\$	945 \$	1,700,000
		Concrete Overbreak 6"	920 CY	\$	756 \$	700,000
		Reinforcing Steel	64 TON	\$	2,888 \$	180,000
		2" Shotcrete	12,000 SF	\$	2,000 \$	60,000
		Tunnels-Access	12,000 31	Ψ	5 \$ \$	-
		Concrete Slab	1 380 CV	¢		
			1,280 CY	\$	945 \$	1,210,000
		Concrete Overbreak 6"	640 CY	\$	756 \$	480,000
		Reinforcing Steel	48 TON	\$	2,888 \$	140,000
		2" Shotcrete	4,300 SF	\$	5 \$	20,000
		Shafts		•	\$	-
		2" Shotcrete	4,000 SF	\$	5\$	20,000
		Portals			\$	-
		Concrete	16 CY	\$	406 \$	10,000
		Reinforcing Steel	2 TON	\$	2,888 \$	-
	0.325	Support and Anchors			\$	-
		Tunnels- Core Area			\$	-
		Rockbolts 3/4" @6'	1,400 EA	\$	327 \$	460,000
		Steel Mesh	2,400 SF	\$	5\$	10,000
		Steel Support	16 TON	\$	12,801 \$	200,000
		Tunnels- Access			\$	-
		Rockbolts 3/4" @6'	960 EA	\$	327 \$	310,000
		Steel Mesh	880 SF	\$	5 \$	-
		Steel Support	16 TON	\$	12,801 \$	200,000
		Shafts		•	\$	-
		Rockbolts 3/4" @6'	280 EA	\$	327 \$	90,000
		Steel Mesh	800 SF	\$	5 \$	-

Low Watana	(Expandable)	(4	I Turbines)	
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FERC Line #	Sub	Categories		Description	Low Watana (Expandable) (4 Turbines) Description Quantity Units			Line Price	Total	
				Rockbolts 1" @15'	24 EA	\$	3 Unit Price 736	\$ 20,000		
			0.329	Architectural Portal Doors				\$ -		
				Portal Doors	1 LS	\$	33,900	\$ 30,000		
		0.33		Instrumentation				\$-		
			0.331	Instrumentation	1 LS	\$	17,315,220	\$ 17,320,000		
	0.			Relict Channel				\$ -		
		0.41		Shore Protection				\$-		
			0.411	Excavation				\$-		
				Overburden Stripping 2' thick	2,200 CY	\$	12	\$ 30,000		
			0.412					\$ -		
				Dump and Spread				\$-		
				Filter Material - 2' layer	2,200 CY	\$	32	\$ 70,000		
				Rock Spalls/ Rip Rap- 3' Ave	3,300 CY	\$	10	\$ 30,000		
				Shore Protection				\$ -		
				Rip Rap	24,000 CY	\$	24	\$ 580,000		
				Waste Rock	24,000 CY	\$	23	\$ 550,000		
		0.44		Channel Filter Blanket				\$-		
			0.442		0.000.000.00	¢	~ ·	\$ -		
				Coarse Filter	2,900,000 CY	\$	34	\$ 98,170,000		
				Fine Filter	2,180,000 CY	\$	44	\$ 95,160,000		
			0 4 4 0	Rip Rap	182,000 CY	\$	24	\$ 4,420,000 \$ -		
			0.443	Surface preparation Foundation Prep				ъ - \$-		
						¢	2.002			
				Clearing and Grubbing Excavation	460 ACRE 2,236,000 CY	\$ \$	3,963 16			
				Excavation	2,230,000 C1	φ	10	\$ 34,930,000	\$	1,718,000,000
	0.	5		Outlet Facilities					Þ	1,710,000,000
	0.	0.51		Outlet Facilities- (Intake Civil Work Include in Power Intake)	1 LS	\$	73,000,000	\$ 73,000,000		
		0.51		Main (Chute) Spillway (Includes Civil Works for Outlet Facilities)	1 LS	\$	182,000,000			
		0.52		Emergency Spillway	1 LS	\$	164,000,000			
	0.			Power Intake (Inc Inlet exec and Inlet Structure Civil Works for Outlet)	1 LS	\$	145,000,000			
	0.			Surge Chamber	1 LS	\$	24,000,000			
	0.	0.81		Head Race (Based on Penstock costs	1 LS	\$	42,000,000			
		0.82		Penstocks	1 LS	\$	25,000,000			
	0.			Tailrace Works (1 Portal with Combined Tailrace/Diversion Tunnel)	1 LS	\$	22,000,000			
	0.	•			. 20	Ŷ	22,000,000	• ==,000,000	\$	677,000,000
:	<u>333</u>		Waterw	heels, Turbines and Generators					•	,
		0.11		Turbines and Governors						
			0.111	Supply	4 EA					
			0.112							
	0.	2		Generators and Exciters						
		0.21		Generators and Exciters (Supply and Install)						
			0.211	Generators and Exciters	4 EA					
	0.	3		Total Bid From Vendor (includes all equipment in this category)	4 EA	\$	74,200,000	\$ 297,000,000	\$	297,000,000
				Average from acquired quotes						
	334		Access	ory Electrical Equipment						
	0.			Connections, Supports and Structures						
		0.11		Structures						
			0.111	Structures (included Below)						
		0.12		Conductors and Insulators						
			0.121	Generator Isolated Phase Bus	1 LS	\$	3,792,000			
			0.122		1 LS	\$	1,540,500			
			0.123		1 LS	\$	711,000			
			0.124		1 LS	\$	1,303,500			
			0.125		1 LS	\$	177,750			
		0.13		Conduits and Fittings		\$	-	\$ -		
			0.131	Conduits and Fittings	1 LS	\$	474,000	\$ 470,000		

Low Watana (Exp	andable) (4 Turbines)
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		4			indable) (4 Turbines)	1.1+34+	0000	D Linit Drine	Line Drive	Tatal
FERC Line #	Sub Ca 0.2	tegories		Description Switchgear and Control Equipment	Quantity	Units	2008 \$	3 Unit Price	Line Price \$ -	Total
	0.2	0.21		Auxiliary Transformers			ծ Տ	-	ъ - \$-	
		0.21	0.211	Auxiliary Transformers		4 EA	э \$	- 83,811	\$ 340,000	
		0.22	0.211	Circuit Breakers Generators		4 EA	φ	03,011	\$ 340,000 \$ -	
		0.22	0.221	Circuit Breakers Generators		4 EA	\$	1,504,300	\$ 6,020,000	
		0.23	0.221	Surge Protectors and Generator Cubicles		4 67	\$	1,504,500	\$ 0,020,000	
		0.25	0.231	Surge Protectors and Generator Cubicles		4 EA	\$	50,000	\$ 200,000	
		0.24	0.201	Switch boards		4 67	\$	-	\$ <u>200,000</u> \$ -	
		0.24	0.241	Switch boards		1 LS	\$	924,300		
		0.25	0.211	Auxiliary Power Equipment		1 20	\$	-	\$ -	
			0.251	Auxiliary Power Equipment		4 EA	\$	100,000	\$ 400,000	
	0.3		0.201	Cubicles and Appurtenances		,.	Ŷ	100,000	\$ -	
		0.31		Control, relay and meter boards			\$	-	\$ -	
			0.311	Control, relay and meter boards		4 EA	\$	200,000	\$ 800,000	
		0.32		Computer Control System			\$	-	\$ -	
			0.321	Computer Control System			\$	-	\$ -	
		0.33		Supervisor and Telemeter System			\$	-	\$ -	
			0.331	Supervisor and Telemeter System			\$	-	\$ -	
				. ,			\$	-	\$ -	
	0.4			Power Transformers			\$	-	\$ -	
		0.41		Power Transformers			\$	-	\$-	
			0.411	Power Transformers		7 EA	\$	2,571,429	\$ 18,000,000	
							\$	-	\$-	
	0.5			Lighting System			\$	-	\$-	
		0.51		Powerhouse and Transformer Gallery			\$	-	\$-	
			0.511	Powerhouse and Transformer Gallery		1 LS	\$	1,824,900	\$ 1,820,000	
		0.52		Access Tunnels and Roads					\$-	
			0.521	Access Tunnels and Roads		1 LS	\$	402,900	\$ 400,000	
									\$-	
	0.6			Misc. Electrical Equipment					\$-	
		0.61		Misc. Electrical Equipment					\$-	
			0.611	Misc. Electrical Equipment		1 LS	\$	782,100	\$ 780,000	
									\$ -	
	0.7			Surface Accessory Equipment					\$ -	
		0.71		34.5 kV and LV Equipment					\$ -	
			0.711	Switchboard		1 LS	\$	213,300	\$ 210,000	
			0.712	Cables		1 LS	\$	450,300	\$ 450,000	
		0 70	0.713	Aux Transformers		1 LS	\$	284,400	\$ 280,000	
		0.73	0 704	Diesel Generator- Standby		0.54	•	0.47.550	\$ -	
		0.74	0.731	Diesel Generator- Standby		2 EA	\$	347,550	\$ 700,000	
		0.74	0 744	Exterior Lighting		410	¢		\$ -	
		0.75	0.741	Exterior Lighting Mimic Board- Control Building		1 LS	\$	355,500	\$ 360,000 \$ -	
		0.75	0.751	Mimic Board- Control Building Mimic Board- Control Building		1 LS	\$	1,185,000	\$	
			0.751	Minic Board- Control Building		1 13	φ	1,165,000	\$ 1,190,000 \$ -	\$ 41,000,000
2.	35		Mise Po	werplant Equipment					\$- \$-	\$ 41,000,000
<u></u>	<u>55</u> 0.1		HISC FO	Auxiliary Systems- Underground					ъ - \$ -	
	0.1	0.11		Station Water Systems					\$- \$-	
		0.11	0.111	Station Water Systems		1 LS	\$	4,977,000	\$ 4,980,000	
		0.12	0.111	Fire Protection Systems			\$	-	\$	
		0.12	0.121	Fire Protection Systems		1 LS	\$	2,844,000		
		0.13	0.121	Compressed Air Systems		0	\$	2,044,000	\$ <u>2,040,000</u> \$ -	
		23	0.131	Compressed Air Systems		1 LS	\$	3,555,000	\$ 3,560,000	
		0.14		Oil Handling Systems			\$	-	\$ 0,000,000 \$ -	
			0.141	Oil Handling Systems		1 LS	\$	2,370,000		
		0.15		Drainage & Dewatering			\$	_,,	\$ -	
			0.151	Drainage & Dewatering		3 EA	\$	1,738,000	\$ 5,210,000	
		0.16		Heating, Ventilation and Cooling System			\$	-	\$ -	
		-		J. J-J			÷			

Low Watana (Expandable) (4 Turbines)	5)
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						Low Watana (Expan	dable) (4 Turbines)						
FERC Line #	Su	ib Cate	gories			Description	Quantity			08 Unit Price	Line Price	Total	
				0.161		Heating, Ventilation and Cooling System		1 LS	\$	3,555,000	\$ 3,560,000		
			0.17		M	iscellaneous					\$-		
				0.171		Miscellaneous		1 LS	\$	2,370,000	\$ 2,370,000		
		0.2				ry Systems- Surface Facilities					\$ -		
			0.21		A	uxiliary Systems- Surface Facilities					\$ -		
				0.211		Auxiliary Systems- Surface Facilities		1 LS	\$	711,000	\$ 710,000		
		0.3			Auxilia	ry Equipment					\$-		
			0.31		P	owerhouse Cranes			\$	-	\$-		
				0.311		Powerhouse Cranes		2 EA	\$	1,800,000	\$ 3,600,000		
			0.32		EI	evators			\$	-	\$-		
				0.321		Elevators		3 EA	\$	181,700	\$ 550,000		
			0.33		Μ	iscellaneous Cranes and Hoists			\$	-	\$ -		
				0.331		Miscellaneous Cranes and Hoists		1 LS	\$	505,500	\$ 510,000		
			0.34		М	achine Shop Equipment			\$	-	\$ -		
				0.341		Machine Shop Equipment		1 LS	\$	2,022,000	\$ 2,020,000		
		0.4			Genera	al Station Equipment			\$	-	\$-		
		0.5			Comm	unications Equipment		1 LS	\$	106,650	\$ 110,000		
									\$	-	\$ -	\$	32,000,000
	<u>336</u>		F	Roads, I	Rails an	d Air Facilities			-		\$ -		
		0.1	-		Roads								
			0.11		P	ermanent Roads							
						Cost of road upgrades for 23 mi of Denali Highway		23 Mi	\$	1,000,000.00	\$ 23,000,000.00		
						Cost of New road to 42 Mi of road to Watana		42 Mi	\$	3,000,000.00	\$ 126,000,000.00		
		C	.131		Site Ro	pads							
					C	onstruction Roads							
						Site Roads		20 Mile	\$	750,000.00	\$ 15,000,000		
						Maintenance		141 MI/YRS	\$	223,092.85	\$ 31,500,000		
		C	.132		P	ermanent Roads							
						Permanent Roads		6 Mile	\$	1,287,997.42	\$ 7,700,000		
		0.2			Rail								
				0.1		Railhead at Cantwell		1 LS	\$	14,000,000.00	\$ 14,000,000		
		0.3			Airstrip								
			0.31		Ai	rstrip							
						Permanent Airstrip		1 LS	\$	13,000,000.00	\$ 13,000,000		
						Temporary Airstrip		1 LS	\$	2,000,000.00	\$ 2,000,000		
												\$	232,000,000
350	<u>0-359</u>		1	Fransmis	sion Plan			33 MILE	\$	5,700,000.00	\$ 188,100,000.00		
								2 EA	\$	18,000,000.00	\$ 36,000,000.00		
												\$	224,000,000
			<u>(</u>	General	Plant								
	<u>389</u>		1	and an	d Land	Rights							
			-			nd Land Rights							
									(inc	l in 330)			
	<u>390</u>		9	Structur	es and I	mprovements			(c	/			
	<u></u>		-			res and Improvements							
									(inc	l in 331.2)			
	<u>391</u>		(Office F	urniture	and Equipment			(i c	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
			-			Furniture and Equipment							
									line	l in 200)			

<u>Transportation Equipment</u> Transportation Equipment

<u>392</u>

(incl in 399)

RC Line #	Sub Cotoreria	s Description	<u>Turbines)</u> Quantity	Units	2008 Linit Drice	Line Price	Total	
C Line #	Sub Categorie		Quantity	Units	2008 Unit Price (incl in 399)	Line Price	TOLAI	
:	393	Stores Equipment			(
		Stores Equipment						
					(incl in 399)			
	394	Tools Shop and Garage Equipment						
		Tools Shop and Garage Equipment						
					(incl in 399)			
-	<u>395</u>	Laboratory Equipment						
		Laboratory Equipment						
					(incl in 399)			
	<u>396</u>	Power-Operated Equipment						
		Power-Operated Equipment			(1.1.1			
	207	Communications Equipment			(incl in 399)			
:	<u>397</u>	Communications Equipment						
		Communications Equipment			(incl in 399)			
	398	Miscellaneous Equipment			(1101111-0393)			
:	<u>550</u>	Miscellaneous Equipment						
					(incl in 399)			
:	<u>399</u>	Other Tangible Property						
		Other Tangible Property		1 LS	\$ 16,000,000	\$ 16,000,0	00	
		Saved Maintenance		1 LS	\$ (231,220			
						\$ -	\$	16,000,
		Indirect Costs						
	<u>61</u>	Temporary Construction Facilities						
		Temporary Construction Facilities			(incl in direct costs)			
	<u>62</u>	Construction Equipment						
		Construction Equipment			(incl in direct costs)			
	~~	Main Construction Comp						
	<u>63</u> 0.1	Main Construction Camp		110	¢ 190.000.000	¢ 100.000.0	00	
	0.1	Main Construction Camp		1 LS	\$ 180,000,000	\$ 180,000,0	00	
							\$	180,000,
	64	Labor Expense					Ψ	100,000,
	<u>04</u>	Labor Expense						
	<u>65</u>	Superintendence						
	<u></u>	Superintendence						
	<u>66</u>	Insurance						
		Insurance						
	<u>68</u>	Mitigation Fishery, Terrestrial and Recrational)- Not Included						
				1 LS	\$ 200,000,000)	\$	
	<u>69</u>	Fees						
		Fees						
otal	•						•	
- 4-1	Contingency	(20%)		1 LS	\$ 821,000,000)	\$	821,000
otal	71	Engineering (4%) Envioremental (2%) Desculators (4%)		110	¢ 250.000.000	,	¢	250 000
	7 <u>1</u>	Engineering (4%), Environmental (2%), Regulatory(1%)		1 LS 1 LS	\$ 259,000,000		\$	259,000
	<u>/ 1d</u> 72	Construction Management (4%)		115	\$ 148,000,000	J	\$	148,000
	<u>14</u> 75	Legal Expenses						
	<u>76</u>	Taxes Administrative & Gen. Expenses						
	71a 72 75 76 77	Administrative & Gen. Expenses						
	80	Earnings/Expenses During Construction						

Max Plant Capacity 600

HDR/AEA Susitna Hydroelectric Project Cost Estimates for 1982 quantities- Alternatives By: Dta By: Leanne Andruskiewicz, EIT Date: 1/25/09 Reviewed By: David Elwood, EIT Date: 1/25/09 Monthe due Hatch Acres mb 061109, R&M 11/15/09

3 EIW000, EI I	Date: 1/25/09, Modified by Hatch Acres mb U	J61109,
	Alternatives- 2008 Dollars	

					Revie	wed By: David Elwood, EIT Date: 1/25/09, Modified by Hatch	Acres mb 061109	, R&M 11/10	6/09			
						Alternatives- 2008 Dollars						Md Badruzzaman revisions 6/11/09
						Full Watana RCC Estmate from 11/17/09 u Modified by Hatch Associates Consultants, Inc						Md Badruzzaman revisions 6/11/09 Color Denotes Cells copied from Low Watana Non Expandab
						Low Watana RCC (Non Expandable) Alterna						Control pendes cens copreu non cuw waaraa kon expandad Denotes QUX Adjustment by RST
FERC Line #	Sub C	ategories				Description	Quantity	Units	Unit Price	Line Price	Total	
330			nd Land Ri	ghts								
	0.1		Land				1	LS	\$ 120,870,000.00 \$	120,870,000		
	0.2		Land Righ				Included Above					
	0.3		Misc Char	ges in C	redit Abo	IVE	Included Above					
										1	\$ 120,900,000	
331	_	Damas				-1-						
331	0.1	Power	Powerhou			115						
	0.1	0.11				aft Tube						
		0.111			vation							
						house Rock	914,400		\$ 43.72 \$	39,978,000		Performed End Area Calcs for total area, Assume 60% Rock, 40% Overburden. Used Unit price from Item 332.311 - Main Dam Exc (\$43.
						nouse Overburder	609,600	CY (\$ 11.53 \$	7,029,000		Performed End Area Calcs for total area, Assume 40% Rock, 60% Overburden. Used Unit price from Item 332.311 - Main Dam Exc (\$11.)
Total	T	stimat 0.113				ube Rock	(CY	\$ 90.12 \$	-		Included in Powerhouse Exc
i otal	I otal E	stimat 0.113		Surfa	Power	aration/ Grouting	108,000	OF.	\$ 3.33 \$	360,000		Copied from Low Watana Non Expandabl Calculated Qty
					Draft T) SF	\$ 3.33 \$			Uncluded units
					Grout	Curtain- Drill holes	47,700	LF	\$ 27.63 \$	1,318,000		Multiplied by Surface area by ratio of original grout length to surface prep (29,200/66,00
						Curtain- Cemen	19,000		\$ 81.10 \$	1,541,000		Multiplied by Surface area by ratio of original cement dty to surface prep (11,667/66,00
		0.114		Con		Shot Crete						
						nouse Concrete	62,356	6 CY	\$ 544.85 \$	33,970,000	-	Total Concrete Qty to Resist Uplift 56,687 cyd. Multiplied by Factor of Safety of 1.1 (Includes Transformer Deck Are
L						nouse Concrete Overbreal	(CY	\$ 447.21 \$	-		Included in Item 332.111
						nouse Reinforcing Stee nouse 4" Shotcrete		3 TON) SF	\$ 2,858.29 \$ \$ 10.14 \$	8,910,000		Original Ratio of steel to concrete was 0.05 ton/cyd. Multiplied Concrete Volume by 0. Not needed for surface powerhous
						ube Concrete			\$ 10.14 \$ \$ 692.87 \$			Not needed for surface powerhouse Include w/ Powerhouse Concret
						ube Concrete Overbreal		CY	\$ 447.21 \$			Include w Powerhouse Concert
					Draft T	ube Reinforcing Stee	() TON	\$ 2,858.29 \$	-		Include w/ Powerhouse Concrete
					Draft T	ube 2" Shotcrete) SF	\$ 5.45 \$	-		Not needed for surface powerhous
		0.115		Supp		Anchors						
					Power	house Rockbolts 1" @ 25' Hy		B EA	\$ 1,234.86 \$	180,000		Multiplied Underground Qty by reduction in surface area on rock, 0.229
						nouse Rockbolts 1" @ 15'			\$ 735.81 \$	220,000		Multiplied Underground Qty by reduction in surface area on rock, 0.229
						nouse Steel Mesh	6,821		\$ 5.81 \$ \$ 12.671.94 \$	40,000		Multiplied Underground Qty by reduction in surface area on rock, 0.229 Utabilitied Underground Oty by reduction in surface area on rock, 0.020
				_	Draft T	nouse Steel Suppor ube Rockbolts 1" @ 25' Hy	2	EA	\$ 12,071.94 \$ \$ 1,234.86 \$	270,000		Multiplied Underground Qty by reduction in surface area on rock, 0.229 Assume no rockbolts for draft tube on surface powerhous
						ube Rockbolts 1" @ 12		EA	\$ 528.34 \$			Assume to rockolas for draft tube on surface powerhous
						ube Rockbolts 1" @ 9			\$ 432.12 \$			Assume no rockbolts for draft tube on surface powerhous
						ube Steel Mesh	() SF	\$ 6.55 \$	-		Assume no rockbolts for draft tube on surface powerhous
		0.117				f Powerhouse	() LF	\$ 51.32 \$			Not needed for surface powerhous
						Powerhouse Crown	() LF	\$ 51.32 \$	-		Not needed for surface powerhous
		0.118		Stru		isc Steelwork		IS	\$ 10,276,309.00 \$	-		Copied from Low Watana Non Expandabl
		0.119		Arch		nouse and Draft Tube- Steel Crane Rail			\$ 10,276,309.00 \$ \$ 5,500,000.00 \$	10,280,000		Copied from Low Watana Non Expandabl Increased ratio of Architectural Cost vs Total Powerplant Cost to approx 4.5% to reflect recent surface powerhouse experience. Formerly was at 2
v		0.110			nanical			1.5	\$ 3,300,000.00 \$	3,300,000		Incleased faile of Architectural Cost of Polar Fowerplant Cost to approx 4.576 to renect recent solitate powerhouse experience. Formerly was at 2
1		0.110				ube Gates	4	SETS	\$ 427.880.00 \$	1.712.000		Copied from Low Watana Non Expandabl
						ube Gate Guides	4	I SETS	\$ 202,680.00 \$	811,000		Copied from Low Watana Non Expandabl
					Draft T	ube Crane	1	LS	\$ 1,140,000.00 \$	1,140,000		Copied from Low Watana Non Expandabl
		0.12				Portals						
	_	0.121		Exca	vation				\$ 97.45 \$			No Transle for Outfore Downshows Online Assess Through Downshows Furnish
					Main T	ormer Gallery Tunne		CY CY	\$ 97.45 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						ng Gallery Tunne		CY	\$ 396.04 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Surge	Chamber Access Tunne			\$ 145.22 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Pensto	ck Access Tunnel		CY	\$ 145.22 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						ck Elbow Access Tunne	(CY	\$ 145.22 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Shaft Tunnel			\$ 145.22 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Conne	ctor Tunnel		CY CY	\$ 379.26 \$ \$ 17.14 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Portals	Rock			\$ 17.14 \$ \$ 49.31 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
		0.123		Surfa	ace Prep			1.	÷			
					Main T	unnel Slab			\$ 2.21 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						ck Access Slab) SF	\$ 2.21 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Horizo	ntal Portal) SF	\$ 2.30 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
		0.124			Incline		() SF	\$ 3.33 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
		0.124		Con	Main F	I Shot Crete						
						Concrete Slab	(CY	\$ 406.27 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Concrete Walls		CY	\$ 406.27 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Concrete Overbreak			\$ 368.48 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Reinforcing Stee	(TON	\$ 2,887.51 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
					Tunnel							
						Concrete Slab Main Tunne		CY	\$ 503.90 \$ \$ 755.86 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Concrete Plugs Penstock Elbow ACC Concrete Overbreak Main Tunnel 6	(CY CY	\$ 755.86 \$ \$ 346.43 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						Reinforcing Stee			\$ 2,887.51 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Main Tunne	() SF	\$ 5.26 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Transformer Ga	() SF	\$ 5.26 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Surge Chamber Act	() SF	\$ 5.26 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Penstock Access	() SF	\$ 5.26 \$	-	-	No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Penstock Elbow Acc			\$ 5.26 \$	-		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
						2 " Shotcrete Access Shaft 2 " Shotcrete Crowt College) SF	\$ 5.26 \$	-		No Trunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Trunnels for Surface Dewenhouse Option. Access Through Dewenhouse Excernatic
						2 " Shotcrete Grout Gallen 2 " Shotcrete Connector Tunne) SF) SF	\$ 5.26 \$ \$ 5.26 \$			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
		0.125		Supr		2 Shotcrete Connector Tunne Anchors	(, or	ψ 0.20 Ş	-		no rumeis to curace i overnouse opioni. Access milougii rovernouse Excevent
	\vdash	0.120		000	Main T			1				
						Rockbolts 1" @ 12'	(EA .	\$ 528.34 \$	-		No Tunnels for Surface Powerhouse Optior
						Rockbolts 1" @ 9'			\$ 432.12 \$	-		No Tunnels for Surface Powerhouse Option

# Sub Categories				Low Watana RCC (Non Expandable Description	Quantity	Unite	Unit Price	Line Price	Denotes Qty Adjustment by RST Total Notes / Remarks
# Sub Categories				Steel Mesh	Quantity	0 SE	\$ 6.37 \$	LINEFICE	Notari Notariano Powerhouse Option
	_			Steel Support		0 TON	\$ 12,801.49 \$		No Turnels for Surface Powerhouse Option
			M	ain Tunnel Portal		0.011	¢ 12,001.10 ¢		
				Rockbolts 1" @15'		0 EA	\$ 735.79 \$		No Tunnels for Surface Powerhouse Option
			Ti	ansformer Gallery Tunnel			S		No transformer gallery, included in surface powerhous
				Rockbolts 1" @12'		0 EA	\$ 528.34 \$		No transformer gallery, included in surface powerhous
				Rockbolts 1" @ 9'		0 EA	\$ 432.12 \$	-	No transformer gallery, included in surface powerhous
				Steel Mesh		0 SF	\$ 5.89 \$		No transformer gallery, included in surface powerhous
				Steel Support		0 TON	\$ 12,801.49 \$		No transformer gallery, included in surface powerhous
			G	routing Gallery Tunne			\$		
				Rockbolts 3/4" @ 6'		0 EA	\$ 327.15 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Steel Mesh		0 SF	\$ 6.37 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Steel Support		0 TON	\$ 12,801.49 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
			S	urge Chamber Access Tunne			\$		
				Rockbolts 1" @12'		0 EA	\$ 528.34 \$	-	No Surge Chambei
				Rockbolts 1" @ 9'		0 EA	\$ 432.12 \$	-	No Surge Chamber
				Steel Mesh		0 SF 0 TON	\$ 6.37 \$ \$ 12,801.49 \$		No Surge Chambei
				Steel Support enstock Access Tunnel		UTON	\$ 12,801.49 \$		No Surge Chambei
			P	Rockbolts 1" @12'		0 EA	\$ 528.34 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Rockbolts 1" @ 9'		-	\$ 528.34 \$ 432.12 \$		
	_			Steel Mesh		0 SF	\$ 432.12 \$ 6.37 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
			-	Steel Support		0 TON	\$ 12,801.49 \$		No Trunies for Surface Powerhouse Option. Access Timough Powerhouse Excavatic No Trunels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
			D	enstock Elbow Access Tunne		UTON	φ 12,001.49 φ		No runners for Sunace Fowerhouse Option. Access Through Fowerhouse Excavatio
	_		-	Rockbolts 1" @12'		0 EA	\$ 528.34 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Rockbolts 1" @ 9'		0 EA	\$ 432.12 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
				Steel Mesh		0 SF	\$ 6.37 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
				Steel Suppor		0 TON	\$ 12,801.49 \$	-	No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
			Δ	ccess Shaft Tunnel					
			r r	Rockbolts 1" @12'		0 EA	\$ 528.34 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
				Rockbolts 1 @ 12 Rockbolts 1" @ 9'			\$ 528.34 \$ 432.12 \$		
								-	No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
				Steel Mesh			\$ 6.37 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
				Steel Support		0 TON	\$ 12,801.49 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavation
			С	onnector Tunnel					
				Rockbolts 3/4" @ 6'		0 EA	\$ 327.15 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Steel Mesh			\$ 6.37 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
				Steel Support		0 TON			No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.129				tural- Main Portal Doors ical Ventilation System	Included in (63.)	0 SETS	\$ 158,371.90 \$	-	No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.12c	0	Access		ical ventilation system	included in (63.6	51 and 63.6	2		
0.13	1	ACCESS	Excavat	ion Rock		0 CY	\$ 227.67 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.133	3		Surface	Preparation Shaft		0 SF	\$ 3.33 \$		No Tunnels for Surface Powerhouse Option. Access Timough Powerhouse Excavatic No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.133			Concret	e and Shot Crete		0 01	φ 5.55 φ	-	No Fullites for Sufface Fowerhouse Option. Access Through Fowerhouse Excavation
0.101			C	oncrete Lining		0 CY	\$ 944.82 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
			č	oncrete Overbreak 6'		0 CY	\$ 551.14 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.135	5			and Anchors - Rockbolts 3/4" @ 6			\$ 327.15 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.138	8		Structur	al Misc Steelwork		0 TON	\$ 7,395.00 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.139				tural- control Building					
0.13c	0		Mechan	ical Elevators		0 LS	\$ 2,368,815.00 \$		No Tunnels for Surface Powerhouse Option. Access Through Powerhouse Excavatic
0.14				Head Tank					
0.141			Excavat			0 CY	\$ 43.72 \$		Excavation included in total powerhouse ex
0.143				Preparation		0 SF	\$ 2.30 \$		Surface Prep included in total powerhouse ex
0.144	4			e & Shotcrete		0.01/			
			0	oncrete		N8 CY	\$ 963.72 \$	200,000	Increased underground Oty by 25% to account for thicker outside wal
				oncrete Overbreak 6'		0 CY 8 TON	\$ 406.27 \$ \$ 2,858.29 \$	20,000	None for Surface Option Increased underground Qty by 25% to account for thicker outside wal
0.145	-		Rupport	einforcing Stee		BTON	\$ 2,858.29 \$	20,000	increased underground Qty by 25% to account for thicker outside wai
0.145			oupport	and Anchors ockbolts 1" @12		0 EA	\$ 528.34 \$		None for Surface Option
				ockoolts 1 @ 12		0 EA	\$ 528.34 \$ 432.12 \$		None for Surface Option None for Surface Option
				eel Mesh		0 SF	\$ 6.30 \$		None for Surface Option
				teel Support			\$ 12.671.95 \$		None for Surface Option
0.148	3		Misc Ste	selwork		1 LS	\$ 73.297.50 \$	70.000	Polie for Suraze Option Copied from Low Watana Non Expandabl
0.140				ical Piping/Valves				10,000	
0.15				tals for 3 Bus Tunnels]					
0.151	1		Excavat						
			R	ock Horizonta		0 CY	\$ 213.70 \$	-	No Bus Tunnel
			R	ock Inclined			\$ 601.04 \$		No Bus Tunnel
0.153			Surface	Preparation- Tunnels		0 SF	\$ 3.33 \$		No Bus Tunnel
0.154	4		Concret	e and Shotcrete					
			С	oncrete Slab		0 CY	\$ 818.84 \$	-	No Bus Tunnel
			С	oncrete Overbreak 12'		0 CY	\$ 472.41 \$		No Bus Tunnel
			R	einforcing Stee		0 TON	\$ 2,858.29 \$		No Bus Tunnel
				Shotcrete		0 SF	\$ 5.26 \$	-	No Bus Tunnel
0.155	5			s and Anchors					
				ockbolts 1" @ 25'			\$ 1,234.86 \$		No Bus Tunnel
				ockbolts 1" @ 12'		0 211	\$ 528.34 \$		No Bus Tunnel
				ockbolts 1" @ 9'		0 211	\$ 432.12 \$	-	No Bus Tunnel
				eel Mesh			\$ 6.30 \$	-	No Bus Tunnel
International In			S	eel Support		0 TON	\$ 12,671.94 \$	-	No Bus Tunnel
			ormer G	allery Tunne		-			
0.16		Transfo		ion- Rock		0 CY	\$ 87.44 \$		No transformer gallery, included in surface powerhous
0.161				Preparation		0 SF	\$ 2.30 \$		No transformer gallery, included in surface powerhous
0.161 0.163	3		Surface						
0.161	3		Surface Concret	e and Shotcrete		0 CY	\$ 544.85 \$		Included in Powerhouse Cost, as all one building for surface optic
0.161 0.163	3		Surface Concret C	e and Shotcrete oncrete Base Slab			+		Included in Deventeeren Const. en all ens building fan aufgang antis
0.161 0.163	3		Surface Concret C	e and Shotcrete oncrete Base Slat oncrete Overbreak 12*H/6*V		0 CY	\$ 377.93 \$		Included in Powerhouse Cost, as all one building for surface optic
0.161 0.163 0.164	4		Surface Concret C	e and Shotcrete oncrete Base Slab		0 CY	\$ 377.93 \$ \$ 2,858.29 \$		Included in Powerhouse Cost, as all one building for surface optic Included in Powerhouse Cost, as all one building for surface optic
0.161 0.163	4		Surface Concret C C C R Support	e and Shotcrete oncrete Base Slat oncrete Overbreak 12"H/6"v einforcing Stee and Anchors		0 CY 0 TON	\$ 377.93 \$ \$ 2,858.29 \$	-	Included in Powerhouse Cost, as all one building for surface optic
0.161 0.163 0.164	4		Surface Concret C C C R Support	e and Shotcrete oncrete Base Slab oncrete Overbreak 12"H/6"\v einforcing Stee		0 CY 0 TON 0 EA	\$ 377.93 \$ \$ 2,858.29 \$ \$ 1,234.86 \$	· ·	
0.161 0.163 0.164	4		Surface Concret C C C R Support R R R	e and Shotcret oncrete Base Slat oncrete Overbreak 12°H6°V sinforcing Stee and Anchors oxbobits 1° @ 25 oxbobits 1° @ 15		0 CY 0 TON 0 EA 0 EA	\$ 377.93 \$ \$ 2,858.29 \$ \$ 1,234.86 \$ \$ 735.81 \$		Included in Powerhouse Cost, as all one building for surface optic None for Surface Optior None for Surface Optior None for Surface Optior
0.161 0.163 0.164	4		Surface Concret C C R Support R R Support S S S S S	e and Shotcret oncrete Destreak 12°H/6°V einforcing Stee and Anchors ockbolts 1° @ 15' ockbolts 1° @ 15' ockbolts		0 CY 0 TON 0 EA 0 EA 0 SF	\$ 377.93 \$ \$ 2,858.29 \$ \$ 1,234.86 \$ \$ 735.81 \$ \$ 5.81 \$	• • •	Included in Powerhouse Cost, as all one building for surface optic None for Surface Optior None for Surface Optior None for Surface Optior
0.161 0.163 0.164	5		Surface Concret C C R Support R R Support S S S S S	e and Shotcret oncrete Base Slat oncrete Overbreak 12°H6°V ainforcing Stee and Anchors and Anchors ochootis 1° @ 15° ochootis 1° @ 16° eel Mesh eel Support		0 CY 0 TON 0 EA 0 EA 0 SF 0 TON	\$ 377.93 \$ \$ 2,858.29 \$ \$ 1,234.86 \$ \$ 735.81 \$	• • •	Included in Powerhouse Cost, as all one building for surface optic None for Surface Optior None for Surface Optior

							Low Watana RCC (Non Expandable) Altern	ative (4 Turbines)				Denotes Qty Adjustment by RST
FERC Line #							Description	Quantity	Units	Unit Price	Line Price	Total Notes / Remarks
	0.1	7	1	Cab	le Shaf		I Rock		CY	\$ 601.04	e	Included in Surface Powerhouse
		0.17					eparation Shafts) SF	\$ 601.04		Incuded in Surface Powerhouse Copied from Low Watana Non Expandabl
		0.17			Con	crete	Ind Shotcrete			• ••••	•	
						Cor	crete Lining		CY	\$ 1,763.66		Copied from Low Watana Non Expandabl
		0.17	_		0	Cor	crete Overbreak 6' nd Anchors- Rockbolts 3/4" @ 6	(O CY D EA	\$ 881.83 \$ 327.15	<u>\$</u> -	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.17		_	Stru	pons	Steel Support Tower:		2 TON	\$ 15,602.00		Copied from Low watana won's spandadi Was formenty Structural Mics Steelwork, changed to Towers for running from transformer deck to switchyard. Kept qty and unit cost the sa
		0.17					al- Enclosures		LS	\$ 199,317.00	\$ -	None for Surface Option
		0.17	с		Mec	chanic	I Hoist	() EA	\$ 476,960.00	\$ -	None for Surface Option
	0.1		_	Dev			g Construction		IS	\$ 1,336,798.50	\$ 1,340,000	
	0.1	0.18	1	Inet	Dew	aterir	(Power Facilities	1	LS	\$ 1,336,798.50	\$ 1,340,000	Copied from Low Watana Non Expandabl
	0.1	0.19	1	Inst	Inst		ation	1	LS	\$ 1,714,813.50	\$ 1,710,000	Copied from Low Watana Non Expandabl
	0.2		Mis	c Buildi	ngs (Co	ontrol	luildings		LS	\$ 4,433,085.00	\$ 4,430,000	Copied from Low Watana Non Expandabl
	0.3		Per	manent	Town			(included in 63.5)	1			A 444 949 949
332			Res	ervoir	Dams	and	laterways					\$ 121,219,000
332	0.1			servoir								
	0.1	1		Res	ervoir C			23,000	ACRE	\$ 3,005.85	\$ 69,135,000	Copied from Low Watana Non Expandabl
	0.2		Dive				erdams					
	0.2	0.21		Dive		unnel avatio	/Portals	-			<u>s</u> -	
		0.21			EXC		bined Tunnels				s - s -	Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.43-
						00.	Rock	186,500	CY	\$ 92.33	\$ 17,220,000	Multiplied Low Watana Gity by (4100/7320)*31/40) = 0.43
						Cor	bined Upstream Portal:				\$ -	Calculated Quantity
						0	Rock	35,000	CY	\$ 49.16	\$ 1,720,000	Calculated Quantity
						Cor	bined Downstream Portal Rock Usable	75,000	CY	\$ 49.16	\$ - \$ 3,690,000	Calculated Quantity Calculated Quantity
						Em	rgency Release Chamber:				\$ -	Multiplied Low Watana Qty by (31/49) = 0.633
							Excavate Concrete for Plugs	1,139	CY	\$ 101.98	\$ 120,000	Multiplied Low Watana Qty by (31/49) = 0.634
							Gate Chamber	2,975	5 CY	\$ 110.73	\$ 330,000	Multiplied Low Watana Qty by (31/49) = 0.63
						Acc	iss Tunnel to Gate Chambe			\$ 97.15	ş -	No Access Tunnel No Access Tunnel
		0.21	2		Fills	Temr	Rock for Coffer Dam to Construct Upstream Portal	23,000		\$ 97.15 \$ 11.66		NO ACCESS TUNNEI Copied from Low Watana Non Expandabl
		0.21					eparation \ grouting	23,000		\$ 11.00	\$ 270,000	Copied from Low Watana Non Expandabl
			-		-		ream Upper Portal				\$ -	Copied from Low Watana Non Expandabl
							Horizontal	3,200		\$ 2.30		Copied from Low Watana Non Expandabl
							Inclined	8,600) SF	\$ 3.33	\$ 30,000	Copied from Low Watana Non Expandabl
		_	_	_	_	Ups	ream Lower Portal		05	• • • • •	<u>s</u> -	Copied from Low Watana Non Expandabl
		-	_	_			Horizontal Inclined	1,300		\$ 2.30 \$ 3.33		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
			_			Dov	nstream Upper Porta	14,500) SF	¢ 3.33	\$ 50,000	Copied from Low Watana Non Expandabl
							Horizontal	6,100) SF	\$ 2.30	\$ 10,000	Copied from Low Watana Non Expandabl
							Inclined	20,500) SF	\$ 3.33	\$ 70,000	Copied from Low Watana Non Expandabl
						Dov	nstream Lower Porta				ş -	Copied from Low Watana Non Expandabl
				_		-	Horizontal Inclined	600		\$ 2.30		Copied from Low Watana Non Expandabl
		-	_	_		Gro	Inclined It Upper Tunnel Plugs	5,600	SF	\$ 3.33	\$ 20,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
						010	Drill Holes	4.100	LF	\$ 26.76	\$ 110.000	Copied from Low Watana Non Expandabl
							Cement	820		\$ 81.10		Copied from Low Watana Non Expandabl
						Gro	it Lower Tunnel Permanent Plug:				\$ -	Copied from Low Watana Non Expandabl
		_	_	_	_	_	Drill Holes	2,050		\$ 26.76		Copied from Low Watana Non Expandabl
		0.21	4	_	Con	crete	Cement and Shotcrete	410	CF	\$ 81.10	\$ 30,000	Copied from Low Watana Non Expandabl
		0.21	4		CON		bined Tunnels				s -	
							Concrete Lining	34,000	CY	\$ 566.89	\$ 19,270,000	Multiplied Low Watana Qty by 0.426
							Concrete Lining Overbreak 6	15,000	CY	\$ 314.94	\$ 4,720,000	Multiplied Low Watana Qty by 0.426
							Reinforcing Steel		TON	\$ 2,887.51		
							Concrete Lining for Plug 2" Shotcrete	6,200		\$ 428.32 \$ 5.26	\$ 2,660,000 \$ 260,000	Copied from Low Watana Non Expandabl Multivitied Low Watana Non Expandabl
						Une	2" Shotcrete ream Upper Porta	48,500	55	φ 5.26	\$ 260,000	Multiplied Low Watana Oty by 0.42t Coolied from Low Watana Non Expandabl
						- Ops	Concrete Headwall	3,200	CY	\$ 651.93	\$ 2,090,000	Copied from Low Watana Non Expandabl
							Concrete Lining	1,300	CY	\$ 651.93	\$ 850,000	Copied from Low Watana Non Expandabl
							Concrete Slab		CY	\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Piers Concrete Overbreak 12" H/6"v	800	OCY CY	\$ 651.93 \$ 472.41	\$ 520,000 \$ 140,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
			1			1	Reinforcing Steel		TON	\$ 4/2.41 \$ 2,887.51		Copied rom Low Watana Non Expandabi Copied from Low Watana Non Expandabi
			1			Ups	ream Lower Portal	400		2,007.51	\$ -	Copied from Low Watana Non Expandabl
						10	Concrete Headwall	4,500	CY	\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Lining	3,000	CY	\$ 651.93	\$ 1,960,000	Copied from Low Watana Non Expandabl
							Concrete Slab	300	CY	\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Piers Concrete Overbreak 12" H/6"\	700	CY CY	\$ 651.93 \$ 472.41	\$ 460,000 \$ 170,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
			1			1	Reinforcing Steel		TON	\$ 4/2.41 \$ 2.887.51	\$ 170,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
			1			Dov	nstream Upper Porta	000		2,007.51	\$ -	Copied from Low Watana Non Expandabl
							Concrete Headwall	500	CY	\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Slab	100	CY (\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Overbreak 12" H/6"V		CY	\$ 472.41		Copied from Low Watana Non Expandabl
						Der	Reinforcing Steel nstream Lower Porta	40	TON	\$ 2,887.51	\$ 120,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
						001	Concrete Headwall	2,500	CY	\$ 651.93	\$ - \$ 1,630,000	Copied rom Low Watana Non Expandabi Copied from Low Watana Non Expandabi
							Concrete Slab	2,300	CY	\$ 651.93		Copied from Low Watana Non Expandabl
							Concrete Overbreak 12" H/6"V	150	CY	\$ 472.41	\$ 70,000	Copied from Low Watana Non Expandabl
							Reinforcing Steel	170	TON	\$ 2,887.51	\$ 490,000	
						Dov	nstream Flip Bucke	_		¢	s -	No Filip Bucket
							Concrete Slab Concrete Walls		CY	\$ 651.93 \$ 651.93		No Flip Bucket No Flip Bucket
							Concrete Invert		CY CY	\$ 651.93 \$ 651.93		No Filp Bucket
							Concrete Overbreak 12" H/6"V		CY	\$ 42.41		No Filp Bucket
						T	Reinforcing Steel		TON	\$ 2,887.51	\$ -	No Flip Bucket
						Dov	nstream Retaining Wal				\$-	Copied from Low Watana Non Expandabl
1	1						Concrete Slab	200	CY	\$ 651.93	\$ 130,000	Copied from Low Watana Non Expandabl

Protect Norm							Low Watana RCC (Non Expandable) Alternat					Denotes Qty Adjustment by RST
No. No. No. No. No. No. No. No. No	FERC Line # Sub	o Catego	ries				Description	Quantity Units	Unit Price	Line Price	Total	
Image: black in the sector of the sector							Concrete Walls					
Image: Problem Image:									\$ 472.41 \$			
Image: problem Image: proble						_	Reinforcing Steel	90 TON	\$ 2,887.51 \$	260,000		
Image: black in the second						E		E 500 CV	\$ 755.00	-		
Image: Province of the section of					-							Multiplied Low Watana Qiy by (15.37222.372) = 0.37 Multiplied Low Watana Qiy by (15.37222.372) = 0.37
N N					_	A		1,000 01	¢ 10.10 \$	-		
N N						- 1	2" Shotcrete	0 SF	\$ 5.26 \$			No Access Tunnel
Image: Solution of the second seco			0.215		S	upport	ts and Anchors		\$			Copied from Low Watana Non Expandabl
Image: Section of the sectio						C	ombined Tunnels		\$	-		Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.434
Note::::::::::::::::::::::::::::::::::::							Rockbolts 1" @ 12'	3,100 EA				Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.43
N N <td></td> <td>Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.43</td>												Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.43
Image: Provide and the sector of th							Steel Mesh		\$ 6.37 \$	1,180,000		Multiplied Low Watana Qty by (4100/7320)*(31/40) = 0.43
I I I I Note: I					_	_		190 TON	\$ 12,801.49 \$	2,430,000		
Image: Section of the section of t					-	- 0		240 EA	¢ 735.81 ¢	180.000		
I I								290 EA				
						U			S	-		
Image: Section of the section of t							Rockbolts 1" @ 15'		\$			Copied from Low Watana Non Expandabl
Image: Section of the sectio								130 EA	\$ 735.81 \$	100,000		
Image: Section of the section of t						D			\$	-		
Image: Probability of the second se								200 EA	\$ 735.81 \$	150,000		
Image: Section of the sectio						D	ownstream Upper Porta	100 51	\$	-		Copied from Low Watana Non Expandabl
												Logied from Low Watana Non Expandabl Conjed from Low Watana Non Expandabl
						E		100 EA	φ 1,234.00 \$ ¢	120,000		
Image: sector Imag						-	Rockbolts 1" @ 25'	63 FA	\$ 1,234.86 \$	80.000		
Image: Provide set of the s									\$ 735.77 \$			
I I I I Image: Section of the section of t								2,279 SF	\$ 6.37 \$	10,000		
							Steel Support			110,000		
								13 EA	\$ 342.42 \$	-		
Note 1 Note 1 <td></td> <td></td> <td></td> <td></td> <td></td> <td>A</td> <td></td> <td></td> <td>\$</td> <td>-</td> <td></td> <td></td>						A			\$	-		
Image: state in the state i										-		
Image: Section of the section of t							Rockbolts 1" @ 9"		\$ 432.12 \$	-		NO ACCESS LUNNEI
Image: ProblemImage: ProblemImage						_	Steel Mesh		\$ 6.37 \$	-		
Image: Sector			0.219			truotur	Steel Support	2 775 SE		260.000		NO ACCESS LUMEI Conject from Lew Matters Nes Exceeded
								2,115 5F	a 55.01 a	200,000		
			0.210						Š			Copied from Low Watana Non Expandabl
Image: Section of the section of t						Ē	Gate Equipment	2 EA	\$ 5,073,120.00 \$	10,150,000		
I I I I I Impaired matrix lay Cubic Impa						U	pstream Upper Gates		\$	-		Copied from Low Watana Non Expandabl
I I <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Gate Equipment</td> <td></td> <td></td> <td></td> <td></td> <td>Copied from Low Watana Non Expandabl</td>							Gate Equipment					Copied from Low Watana Non Expandabl
Image: Section Lange Sectin Lange Section Lange Section Lange Section Lange Section							Trashracks	1 LS	\$ 1,777,500.00 \$	1,780,000		
Image: Section of the section of t						D			\$	-		
								. 20				
Image: Section Legicial intermediation in the section intermediation in the section intermediation in the section intermediation in the section intermediation intermediation in the section intermediation intermediatintermediation intermediation intermediation intermediation						-		1 LS	\$ 1,967,100.00 \$	1,970,000		Copied from Low Watana Non Expandabl
					-	0	Stoplog Cuides	110	\$ 92.050.00 \$	-		
Image: section of the section of t					-	- 17	Stopiog Guides	1 123	a 02,900.00 a	80,000		Conject inter Low Watana Non Expandabi Conject from Low Watana Non Expandabi
								9 EA	\$ 3.517.470.00 \$	31,660,000		Copied from Low Watan Non Expanded
									,. ,			
		0.22	2	U								
			0.221		C	offerda	am					
1 0 </td <td></td> <td></td> <td>0.000</td> <td></td> <td>_</td> <td></td> <td></td> <td>978,000 CY</td> <td>\$ 100.00</td> <td></td> <td></td> <td>(incorporated in the main dam</td>			0.000		_			978,000 CY	\$ 100.00			(incorporated in the main dam
1 0 0.2 0			0.222		Р			00.400.01/	¢ 40.00 €	255.000		
1 1		_	0.222					23,400 C f	\$ 10.90 \$	255,000		23333 C T, Calculated
1 1 2 2 3 2 4 9			0.223					5 100 CV	2 88 1 2	25.000		4 850 CV from embankment dan
Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: market dam Image: mar												
Image: Sector of the sector		1	0.22d		D	ewate	ring			5,502,000		(same as embankment dam
Image: Section of the section of t					Ē	In	itial Dewatering		\$ 5,807,685.00 \$			
Image: black						D	ewatering Maintenance	1 LS	\$ 22,377,990.00 \$	22,378,000		
Image: black of the state of the s		0.23		D								
Image: constraint of the second of the se			0.231		С	offerda	am					
Image: market for the state and s		_	0.000		_			261,300 CY	\$ 100.00			Uncorporated in the main dam
Image: section of the sectin the sectin the sectin of the section of the sectin		_	0.232	_	P			23.400 CV	\$ 10.00 €	255.000		
Image: Non-Section Source			0.233		_			20,400 01	φ 10.30 \$	200,000		
Image: start with the start of for pint area of RCC dam / Embankment dam = 0.321. Multipled Full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCC Oty by ratio of Base Length and Crest Width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54 Image: start width full RCS width above width for the start width (915/1100) (2380/3640) = 0.54			0.200	_				5,100 CY	\$ 4.60 S	23.000		
Image: Normal base in the second s							Slurry Wal	46,000 SF	\$ 72.44 \$	3,332,000		
Image: Normal base in the second s												
Image: black	0.3											
Image: Normal Sector Overburden above el. 147(367.381 CY \$ 11.53 S 4.286.000 Image: Normal Sector Norburden above el. 147(233.738 CY \$ 4.303 S \$ 10.058.000 Image: Normal Sector Rock Usable above el. 147(233.738 CY \$ 4.303 S \$ 10.058.000 Image: Normal Sector Rock Usable balove el. 147(365.000 CY \$ 4.303 S \$ 10.058.000 Image: Normal Sector Rock Wasta balove el. 147(365.000 CY \$ 3.790.000 Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embankment dam = 0.321. Multiplied Full RCC Qty by ratio of Base Length and Width (15/1100)*(2380/3640) = 0.544 Image: Normal Sector Rock Wasta above el. 147C 15/669 CY \$ 10.00 S Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embankment dam = 0.321. Multiplied Full RCC Qty by ratio of Base Length and Width (15/1100)*(2380/3640) = 0.544 Image: Normal Sector Rock Wasta above el. 147C 15/669 CY \$ 10.00 S Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embankment dam = 0.321. Multiplied Full RCC Qty by ratio of Base Length and Cest Width (15/1100)*(2380/3640) = 0.544 Image: Normal Sector Ro		0.31		N								
Image: Normal System Image: Normal System Overtured helow el. 147(964.693 [CY \$ 10.6 [S 10.70.000 Image: Normal System Image: Normal System Norma		_	0.311		E			007 004 004	¢	4 000 000		
Image: Normal System Rock Usable balow ed. 147(233,739 (CY \$ 4.303 [s] 10.058,000 Image: System Image: System Rock Usable balow ed. 147(86,677 (CY \$ 4.327 [s] \$.739,000 Image: System Rock Usable balow ed. 147(353,600 (CY \$ 4.303 [s] \$ 15,215,000 Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embandment dam = 0.321. Multiplied Full RCC Qby by ratio of Base Length and Width (915/1100) (2380/3640) = 0.544 Image: System System Image: System System Rock Waste balow ed. 147C 95,600 (CY \$ 97,000 Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embandment dam = 0.321. Multiplied Full RCC Qby by ratio of Base Length and Up (915/1100) (2380/3640) = 0.544 Image: System System Rock Waste balow ed. 147C 97,600,000 F Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embandment dam = 0.321. Multiplied Full RCC Qby by ratio of Base Length and Up (915/1100) (2380/3640) = 0.544 Image: System System System Rock Waste balow ed. 147C 76,000,00 F Portal Volume in value abow Image: System								367,381 CY		4,236,000		4
Image: Normal Sector Secto		_							\$ 11.06 \$ \$ 43.03 \$			1
Image: Normal State Processing Sta		_										1
Image: Note of the set of the se		-										Previous Study Calcs indicate the ratio of foot print area of RCC dam / Embankment dam = 0.321. Multiplied Full RCC Oty by ratio of Base Length and Cres
Image: Normal SystemImage: Normal System <th< td=""><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Width (915/1100)*(2380/3640) = 0.544</td></th<>		1										Width (915/1100)*(2380/3640) = 0.544
Image: Constraint of the state and			0.312		D	am						
Image: Constraint of the second sec										760,000,000		
Image: Constraint of the state of								0 CY	\$ 100.00 \$		-	Put all Volume in value abovi
Image: Constraint of the set of			0.313		S					-	-	
Image: Construction of the service of the s						s						
Image: Constraint of the set of		_				_	Under Core/Filters above el. 150	911,200 SF	\$ 3.11 \$	2,834,000		Imutipied Full KCC uty by ratio or Base Length and Crest Width (915/1100)*(2380/3640) = 0.54
Image: Constraint of the second sec			<u> </u>	_				013,000 SF	⇒ 3.11 \$ € 2.15 €			Lett ure same as cinualinitienti and cruit Ku Multiplied cill PCC ON the ratio of Base Longth and Craet Width (015/1100)*/2380/3640) = 0.54
Image: Consolidation Grout Image: Consolidation Grout <th< td=""><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td>1,405,696 SF</td><td>\$ 2.15 \$ \$ 2.15 \$</td><td></td><td></td><td>Interpret of note any by ratio of base Length and Crest What (915/100/(230/3640) = 0.54 Multiplied Full RCC Otty by ratio of Base Length and Crest What (915/100/(230/3640) = 0.54</td></th<>		-						1,405,696 SF	\$ 2.15 \$ \$ 2.15 \$			Interpret of note any by ratio of base Length and Crest What (915/100/(230/3640) = 0.54 Multiplied Full RCC Otty by ratio of Base Length and Crest What (915/100/(230/3640) = 0.54
Image: Second		-				c		1,100,000 01	2.10 9	0,022,000		
Cement 190,400 CF \$ 67.81 \$ 12,911,000 687,000 CF from embankment dam. Multiply Full RCC Qty by ratio of footprint area = 0.54						ľ		190,400 LF	\$ 11.91 \$			687,000 LF from embankment dam. Multiply Full RCC Qty by ratio of footprint area = 0.54
Grout Čurtain												
								190,400 CF	\$ 67.81 \$	12,911,000		687,000 CF from embankment dam. Multiply Full RCC Qty by ratio of footprint area = 0.54

		Low Watana RCC (Non Expandable) Alte	rnative (4 Turbines)			Denotes Qty Adjustment by RST
FERC Line #	Sub Categories	Description	Quantity Units	Unit Price	Line Price	Total Notes / Remarks
		Drill Holes	252,960 LF	\$ 26.76 \$	6,769,000	465,000 LF from embankment dam. Multiply Full RCC Qty by ratio of footprint area = 0.54
		Cement Dental Concrete	101,184 CF	\$ 81.10 \$	8,206,000	186,000 CF from embankment dam. Multiply Full RCC Qty by ratio of footprint area = 0.54 Isame as embankment dam
		Dental Concrete	85.000 CY	\$ 365.33 \$	31,053,000	(same as emparisment dam
	0.317	Drainage		,		
		Holes	73,984 LF	\$ 51.32 \$	3,797,000	Multiply Full RCC Qty by ratio fo crest lengths (2380/3640) = 0.65-
	0.318	Bridge				
		Precast Bridge Beams	25,500 CY	\$ 544.85 \$	13,894,000	Unit price from item 0.614
		Concrete Road Deck Piers	5,400 CY 500 CY	\$ 544.85 \$ \$ 544.85 \$	2,942,000 272,000	Unit price from item 0.614 Unit price from item 0.614
	0.32	Grout Galleries/Portals	500 CT	a 344.03 a	272,000	(3 portals , multiply by 3
	0.321	Excavation		S	-	(a because i combañ eñ el
		Tunnels/ Shafts- Core Area		\$	-	
		Rock Horizonta	0 CY	\$ 394.80 \$	-	No Excavation in Core Area of RCC Option. Tunnels will be formed integral to the da
		Rock Inclined Rock Vertical	0 CY 0 CY	\$ 552.93 \$ \$ 536.19 \$	-	No Excavation in Core Area of RCC Option. Tunnels will be formed integral to the da No Excavation in Core Area of RCC Option. Tunnels will be formed integral to the da
		Tunnels/ Shafts- Access	0.01	\$ 030.19 \$ ¢		No excavation in Core Area of RCC Option. Tunnels will be formed integral to the da
		Rock Horizonta	1,300 CY	\$ 394.80 \$	510,000	Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately
		Rock Inclined	200 CY	\$ 552.93 \$	110,000	Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately
		Portais		\$	-	
		Overburden Rock	2,900 CY	\$ 17.16 \$	50,000	Keep the same as embankment. Conservative since portals are at dam face and excavation would be included w/ main dam (
	0.323	Rock	800 CY	\$ 49.16 \$	40,000	Keep the same as embankment. Conservative since portals are at dam face and excavation would be included w/ main dam (
	0.323	Surface Preparation Portals		3	-	
		Horizontal	24 SF	\$ 2.30 \$	-	Keep the same as embankment. Conservative since portals are at dam face and excavation would be included w/ main dam (
		Inclined	160 SF	\$ 3.33 \$	-	Keep the same as embankment. Conservative since portals are at dam face and excavation would be included w/ main dam i
				\$	-	
	0.324	Concrete and Shotcrete		\$	-	
		Tunnels- Core Area	267 CY	\$ 428.32 \$	- 110,000	With RCC Dam, tunnel lining may reduce from avg of 12 in for embankment to estimated 4 in. (Probably conservati
		Concrete Plugs Concrete Slab	267 CY 600 CY	\$ 428.32 \$ \$ 944.82 \$	570,000	With RCC Dam, tunnel ining may reduce from avg of 12 in for embankment to estimated 4 in. (Probably conservati With RCC Dam, tunnel lining may reduce from avg of 12 in for embankment to estimated 4 in. (Probably conservati
		Concrete Overbreak 6'	0 CY	\$ 755.86 \$	-	Tunnels formed intergral to dam, so no overbrea
		Reinforcing Stee	21 TON	\$ 2,887.51 \$	60,000	With RCC Dam, unnel lining may reduce from avg of 12 in for embankment to estimated 4 in. (Probably conservati
		2" Shotcrete	0 SF	\$ 5.26 \$		Tunnels formed intergral to dam, so no overbrea
		Tunnels-Access	160 CY	\$ 944.82 \$	- 150.000	
		Concrete Slab Concrete Overbreak 6'	160 CY 80 CY	\$ 944.82 \$ \$ 755.86 \$	150,000	Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately events and a constraint of the
		Reinforcing Stee	6 TON	\$ 755.80 \$ \$ 2.887.51 \$	20.000	Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately 1
		2" Shotcrete	538 SF	\$ 5.26 \$	-	Galleries are accessed via surface roads in rCC option. Length of access funnels reduced by approximately 1 Galleries are accessed via surface roads in RCC option. Length of access funnels reduced by approximately 1
		Shafts		\$	-	
		2" Shotcrete	4,000 SF	\$ 5.26 \$	20,000	
		Portals		\$	-	
		Concrete	16 CY	\$ 406.36 \$	10,000	
	0.325	Reinforcing Stee Support and Anchors	2 TON	\$ 2,887.51 \$		
	0.323	Tunnels- Core Area		3		
		Rockbolts 3/4" @6'	0 EA	\$ 327.15 \$		Not required in core area for the RCC optio
		Steel Mesh Steel Support	0 SF	\$ 5.37 \$	-	Not required in core area for the RCC optio
			0 TON	\$ 12,801.49 \$	-	Not required in core area for the RCC optio
		Tunnels- Access	120 EA	\$ 327.15 \$	- 40,000	
		Rockbolts 3/4" @6'	120 EA 110 SF	\$ 327.15 \$ \$ 5.37 \$	40,000	Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately Galleries are accessed via surface roads in RCC option. Length of access tunnels reduced by approximately
		Steel Support	2 TON	\$ 12,801,49 \$	30.000	Galaries are accessed via surface roads in RCC option. Length of access funnels reduced by approximately 1 Galaries are accessed via surface roads in RCC option. Length of access funnels reduced by approximately 1
		Shafts		S	-	
		Rockbolts 3/4" @6'	280 EA	\$ 327.15 \$	90,000	
		Steel Mesh	800 SF	\$ 5.37 \$	-	
		Portais		\$	-	
	0.329	Architectural Portal Doors	24 EA	\$ 735.81 \$	20,000	
	0.329	Portal Doors	1 LS	\$ 33,900.00 \$	30,000	
	0.33	Instrumentation		S		
	0.331	Instrumentation	1 LS	\$ 8,657,610.00 \$	8,660,000	Used previous assumption of 50% embankment dam. Multiplied Low Watana by 0
	0.4 R	telict Channel		\$		Copied from Low Watana Non Expandabl
	0.41	Shore Protection		\$	-	Copied from Low Watana Non Expandabl
	0.411	Excavation	2,200 CY	\$ 11.56 \$	- 30,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
	0.412	Overburden Stripping 2' thick	2,200 01	φ 11.30 \$ \$	30,000	Copied from Low Watana Non Expandabl
	0.412	Dump and Spreac		S		Copied from Low Watana Non Expandabl
		Filter Material - 2' laye	2,200 CY	\$ 31.93 \$	70,000	Copied from Low Watana Non Expandabl
		Rock Spalls/ Rip Rap- 3' Ave	3,300 CY	\$ 9.86 \$	30,000	Copied from Low Watana Non Expandabl
		Shore Protection		\$	-	Copied from Low Watana Non Expandabl
		Rip Rap Wasta Book	24,000 CY	\$ 24.26 \$	580,000	Copied from Low Watana Non Expandabl
	0.44	Waste Rock Channel Filter Blankel	24,000 CY	\$ 22.78 \$	550,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
	0.44	Fill		5		Copied rom Low Watana Non Expandabi
	0.112	Coarse Filter	2,900,000 CY	\$ 33.85 \$	98,170,000	Copied from Low Watana Non Expandabl
		Fine Filter	2,180,000 CY	\$ 43.65 \$	95,160,000	Copied from Low Watana Non Expandabl
-		Rip Rap	182,000 CY	\$ 24.26 \$	4,420,000	Copied from Low Watana Non Expandabl
	0.443	Surface preparation		\$	-	Copied from Low Watana Non Expandabl
		Foundation Prep Clearing and Grubbing	460 ACRE	\$ 3,963.11 \$	- 1,820,000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
235,760,000		Excavation	2,236,000 CY	\$ 3,963.11 \$	34,930,000	Copied from Low Watana Non Expandabl
200,1 00,000		Dutlet Facilities	2,200,000 01	÷ 10.02 \$	01,000,000	egreterit zur dahn den Expandaar
	0.51	Outlet Facilities- (Intake Civil Work Include in Power Intake				(same as embankment dam
	0.511	Excavation				
		Inlet	(Included in 332.611)			
		Outlet	(Included in 332.521)			
		Tunnels Rock Horizonta	0 CY	\$ 103.00 \$		No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
		Rock Inclined	0 CY	\$ 183.49 \$		No funites for Outlet. Excavation Volumes inclin Powerhouse Calc No Tunnels for Outlet. Excavation Volumes inclin Powerhouse Calc
	0.513	Surface Preparation/ Grouting				
		Inlet	(Included in 332.613)			
		Outlet	(Included in 332.523)			

FERC Line #	Sub Categories				Low Watana RCC (Non Expandable) Altern Description	Quantity Units	2	Unit Price	Line Price	Denotes Qty Adjustment by RST Total Notes / Remarks
TERO Ente #	oub outogones			Tu	nnels	0 SF	\$	2.30	\$ -	No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
				Co	ntact Grouting	0 LS	\$	569,428.05	\$-	No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
	0.514		С	oncret	and Shotcrete	(In all india d in 2020 C14)				
					etitlet	(Included in 332.614) (Included in 332.524)				
					nnels	(110/00/00/11/00/2.024)				
					Concrete Lining	0 CY	\$	944.82	ş -	No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
				_	Concrete Overbreak 6' 2" Shotcrete	0 CY 0 SF	\$	440.92 5.26		No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
		-		_	2 Shotcrete	0 SF	۵ ۵	7.69		No Tunnels to Outlet. Exclavation Volumes incl in Powerhouse Calc
	0.515		S	upport	and Anchors		Ť	1.00	•	
					et	(Included in 332.615)				
					nnels	(Included in 332.525)				
				- 11	Rock Bolts 1" @6'	0 EA	s	327.15	s .	No Tunnels for Outlet, Excavation Volumes incl in Powerhouse Calc
					Steel Mesh	0 SF	ŝ	6.37		No Tunnels for Outlet. Excavation Volumes incl in Powerhouse Calc
	0.516		М	echan	cal - Low Level Outle					Revised name from "Mechanical" to "Mechanical - Low Level Outlet" as a LLO system for the RCC option will be similar to Embankment Outlet Facili
				In	et Trash Racks/Guides	1 LS		1.540.500.00	\$ 1.541.000	Keep same as emebankment, as these will be used for LLO Structu
					Gate Equipment	2 EA	\$			Keep same as emebankment, as these will be used for LLO Structu Keep same as emebankment, as these will be used for LLO Structu
					Stoplog Guides		S \$			Keep same as emebankment, as these will be used for LLO Structu
				0	itlet					
					Fixed Cone Valves 6 +1 Spare	1 LS	\$	4,500,630.00		Keep same as emebankment, as these will be used for LLO Structu
					Ring Follower Gates Steel Manifold Line	6 EA 1,100 TON	\$	1,936,494.80	\$ 11,619,000 \$ 9,848,000	Keep same as emebankment, as these will be used for LLO Structu Determined new required steel liner quantity to be 1000 tons, added 10% to get 1100 tc
					Misc Mechanical Equipmen	1 LS	\$	948,000.00		Determined new required setermine quantity to be root on a get root de Keep same as emebankment, as these will be used for LLO Structu
					Misc Electrical Systems	1 LS	\$	237,000.00	\$ 237,000	Keep same as emebankment, as these will be used for LLO Structu
	0.52	N	Aain (Ch	ute)S	pillway (Includes Civil Works for Outlet Facilities					
	0.522		SI	epped	Spillway nventional Concrete - Step:	55.300 CY	\$	544.85	\$ 30,130,000	55,300 CY, calculated, unit price from item 0.61
				Re	inforcing Steel - Steps	1,340 TON	\$	2,887.51		1,340 TON, calculated, unit price from time 0.61
				C	nventional Concrete - Training Walls	3,600 CY	\$	544.85	\$ 1,961,000	55,300 CY, calculated, unit price from item 0.61
					inforcing Steel - Training Walk	90 TON	\$	2,887.51	\$ 260,000	1,340 TON, calculated, unit price from item 0.61-
	0.523		SI	illing E	asin nventional concrete	8,400 CY	e	544.85	\$ 4,577,000	8,400 CY, calculated, unit price from item 0.614 * Previous Estimate may have had error by inserting 85,000 cyd, not 8,400 c
					inforcing Stee	185 TON	ş S	2,887.51	\$ 534,000	183 TON, calculated, unit price from term 0.61
					cavation Rock	13,000 CY	\$	50.18	\$ 652,000	(03.31.311 Rock Waste)
	0.524		С		ation Grouting					
					ill Holes ment	7,000 LF 7,000 CF	\$	11.91	\$ 83,000 \$ 475,000	Caln for only stilling basin area
					out Curtain	7,000 CF	φ	07.01	\$ 475,000	
	0.525		S	upport	and Anchors					
				Di	ainage Tunne					(Assume drainage tunnel / gallery for spillway stillir
					Steel Support Steel Mesh	7 TON 1,000 SF	\$	12,801.49 5.87		basin, same as for embankment dam sheme
				R	ckbolts Drainage Gallen	1,000 3F	φ	5.87	\$ 0,000	
					3/4" @ 6'	576 EA	\$	330.19	\$ 190,000	
				R	ckbolts Approach					
					1" @ 15' ckbolts Chute and Structure	275 EA	\$	741.28	\$ 204,000	
				R	1" @ 15'	112 EA	\$	741.28	\$ 83,000	
				R	ckbolts Valve Block/Bucker	112 211	Ŷ			
					1" @ 15'	46 EA	\$	741.28	\$ 34,000	
				SI	ab/Wall Anchors	9.300 FA	s	474.06	\$ 4,409,000	
	0.527		D	rainag		9,300 EA	Э	474.06	\$ 4,409,000	
				Di	ill Holes					
					Box Drains (To Drain Tunnel	54,000 LF	\$	47.95		
	0.52c				3" Relief	640 LF	\$	49.50	\$ 32,000	
	0.520		M	echan	te Equipment	0 EA	s	4,249,280.00	s .	Eliminated as the RCC alternative is an uncontrolled weir crest at the spillway, where embankment option had (3) 44 ft wide radial g:
				St	oplog Guides	0 SETS	S \$	92,196.88	\$ -	Eliminated as the RCC alternative is an uncontrolled weir crest at the spillway, where embankment option had (3) 44 ft wide radial g
				St	oplogs Includes Followe sc Electrical	0 SET	\$	945,840.00	ş -	Eliminated as the RCC alternative is an uncontrolled weir crest at the spillway, where embankment option had (3) 44 ft wide radial g:
	0.6	Bourse	otok- (M	sc Electrical	0 LS	\$	237,000.00	\$-	Eliminated as the RCC alternative is an uncontrolled weir crest at the spillway, where embankment option had (3) 44 ft wide radial git forma an ophenkment dent
	0.6				exec and Inlet Structure Civil Works for Outle and Approact					(same as embankment dam
	0.611	1		cavat						
					erburden	68,000 CY	\$	14.87		272,000 Cyd calculated Excavation Volume. Assume 25% is overburde
	0.613		-		ick Usable Preparation	204,000 CY	\$	40.27	\$ 8,215,000	272,000 Cyd calculated Excavation Volume. Assume 75% is rock ex
	0.613		S		Preparation rrizontal	112,500 SF	¢	2.30	\$ 259,000	Calculated 112,500 sq fi
				In	lined	60,300 SF	\$	3.33	\$ 201,000	Calculated 60,300 sq ft
	0.614		С	oncret	and Shotcrete					
				St	ructure	401 000 011				
				-+	Concrete Structure Concrete - Apron Slat	121,000 CY 3,500 CY	\$	544.85 545.85		Same as embankment, as power intake and outlet structure intake will be sim Same as embankment, as power intake and outlet structure intake will be sim
					Concrete Overbreak 12" H/6" V	0 CY	\$	336.99	\$ 1,910,000	No Overbreak if formed integral to dar
					Reinforcing Stee	7,870 TON		2,887.51	\$ 22,725,000	Same as embankment, as power intake and outlet structure intake will be sim
	0.615				and Anchors- 1" @ 15	400 EA	\$	735.81	\$ 294,000	
	0.61c		М	echan	cal ashracks and Guides	ACETO	S \$	1.080.960.00	\$ 4,324,000	Revised Otv from 6 to 4
					ite Equipment	4 SE13	5 \$	1,902,720.00		Revised QV from 6 to 4
				Bu	Ikhead Gates Guides	4 SETS		225,200.00	\$ 901,000	Revised Qty from 6 to 4
				Bu	Ikhead Gates inc Followe	1 SET	\$	698,120.00	\$ 698,000	
					utter with Guides aboom with Hois	4 SETS	S \$ S \$	720,640.00	\$ 2,883,000 \$ 4,954,000	Revised Qty from 6 to 4 Revised Qty from 6 to 4
				lo	boom Guides	4 SETS		563,000.00	\$ 4,954,000 \$ 2,252,000	Revised Uty from 6 to 4
				In	ake Service Crane	1 EA	\$	693,700.00	\$ 694,000	
				В	bbler System sc Electrical	1 LS	\$	948,000.00	\$ 948,000	
					ec Electrical	1 LS	\$	237,000.00	\$ 237,000	
	0.614		le.				¢	237 000 00	¢ 237.000	
	0.61d	Surge C		take B	uilding	1 LS	\$	237,000.00	\$ 237,000	No Surge Chamber for Surface Powerhouse Alternativ

FEDC 1	Cub Catagori		Low Watana RCC (Non Expandable) Alternat		Unit Price	Line Price		Denotes Qty Adjustment by RS1 Notes / Remarks
FERC Line #			Description	Quantity Units	Unit Price	Line Price	Total	
	0.711	Excavation	nber Rock	0.02	\$ 90.12	e		No Surge Chamber for Surface Powerhouse Alternativ No Surge Chamber for Surface Powerhouse Alternativ
		Vent	Shaft Rock	0 CY	\$ 601.04	s -		No Surge Chamber for Surface Powerhouse Alternativ
	0.713	Surface Pr			\$ 2.30	s .		No Surge Chamber for Surface Powerhouse Atternativ
	0.714		nd Shotcrete			•		No Surge Chamber for Surface Powerhouse Alternativ
		Cond		0 CY	\$ 513.35	ş -		No Surge Chamber for Surface Powerhouse Alternativ
		Con	crete Overbreak	0 CY	\$ 440.92	\$-		No Surge Chamber for Surface Powerhouse Alternativ
		Rein	forcing Stee	0 TON	\$ 2,858.29			No Surge Chamber for Surface Powerhouse Alternativ
		4" Sł	otcrete	0 SF	\$ 10.13	\$-		No Surge Chamber for Surface Powerhouse Alternativ
		Vent Shaft						No Surge Chamber for Surface Powerhouse Alternativ
		2" Sł		0 SF	\$ 5.26	ş -		No Surge Chamber for Surface Powerhouse Alternativ
	0.715	Supports a	nd Anchors	0 EA	\$ 1,234.86	¢		No Surge Chamber for Surface Powerhouse Alternativ
		ROCK	bolts 1" @25' HY bolts 1" @ 15'	0 EA	\$ 735.81	3 - c		No Surge Chamber for Surface Powerhouse Alternativ No Surge Chamber for Surface Powerhouse Alternativ
		Stee	Mesh	0 SF	\$ 5.81	s -		No Surge Chamber for Surface Powerhouse Atternativ
		Stee	Support	0 TON	\$ 12,671.94	s -		No Surge Chamber for Surface Powerhouse Alternativ
		Vent Shaft						No Surge Chamber for Surface Powerhouse Alternativ
		Rock	bolts 3/4" @ 6	0 EA	\$ 327.15			No Surge Chamber for Surface Powerhouse Alternativ
			Mesh		\$ 6.30			No Surge Chamber for Surface Powerhouse Alternativ
	0.717	Drainage H	oles (In Chamber	0 LF	\$ 47.95	\$-		No Surge Chamber for Surface Powerhouse Alternativ
	0.71c	Mechanica				_		No Surge Chamber for Surface Powerhouse Alternativ
		Stop	og Guides	0 SETS	\$ 709,380.00	ş -		No Surge Chamber for Surface Powerhouse Alternativ
	0.9		og Includes Followe	0 SET	\$ 3,558,160.00	ə -		No Surge Chamber for Surface Powerhouse Alternativ
	0.8 Penste 0.81	Doks						(same as embankment dam (same as embankment dam
	0.81	Penstocks Excavation						Isame as embankment dam
	0.011	Tunn						Isame as embankment dam
			Rock Horizontal	53,400 CY	\$ 144.77	\$ 7,731,000		same as embankment dam
			Rock Inclined		\$ 286.15	\$ 15,452,000		(same as embankment dam
	0.813	Surface Pr	eparation/Groutinç					(same as embankment dam
			ce Preparation					(same as embankment dam
			Tunnels	378,000 SF	\$ 3.33	\$ 1,259,000		(same as embankment dam
		Cont	act Grouting					(same as embankment dam
			Contact Grouting	1 LS	\$ 574,582.80	\$ 575,000		(same as embankment dam
			olidation Grouting	410	¢ 707.000.00	C 707.000		(same as embankment dam
	0.814		Consolidation Grouting nd Shotcrete	1 LS	\$ 797,268.00	\$ 797,000		(same as embankment dam (same as embankment dam
	0.814		rete Liner	37.200 CY	\$ 970.01	\$ 36.084.000		Isame as embankment dam
			rete Overbreak 6'		\$ 692.87	\$ 7.344.000		same as embankment dam
			forcing Steel		\$ 2.858.29	\$ 77.000		Isame as embankment dam
		3" Sł	otcrete	34,000 SF	\$ 7.69	\$ 261,000		(same as embankment dam
		2" Sł	otcrete	20,800 SF	\$ 5.26	\$ 109,000		(same as embankment dam
	0.815	Support an						(same as embankment dam
			bolts 1" @ 25'		\$ 1,234.86	\$ 185,000		(same as embankment dam
		Rock	bolts 1" @ 6'		\$ 327.15	\$ 1,374,000		(same as embankment dam
		Stee			\$ 6.37	\$ 1,229,000		(same as embankment dam
	0.818	Structural	Aisc Steelwork	2,400 TON	\$ 9,673.24	\$ 23,216,000		(same as embankment dam
	0.9 Tailrad	Tailrace Tunnels/F	with Combined Tailrace/Diversion Tunn					
	0.911	Excavation						
	0.011	Tunn						*
			Rock	0 CY	\$ 103.00	ş -		
		Porta						
			Overburden	0 CY	\$ 17.14	\$-		
			Rock Usable	0 CY	\$ 49.16	ş -		
			Rock Waste	0 CY	\$ 49.16	ş -		
	0.913	Surface Pr	eparation					
		Tunn	els Tunnels	0 SF	\$ 3.33	¢		
		Porta		0.5P	φ 3.33	· ·		•
			Horizontal	0 SF	\$ 2.30	s -		
			Inclined		\$ 3.33			1
	0.914		nd Shotcrete					
		Tunn	els					
			Concrete Lining	0 CY	\$ 440.92	\$-		Ţ
			Concrete Overbreak 6'	0 CY	\$ 314.94	s -		
			2" Shotcrete	0 SF	\$ 5.26	s -		Included Qty in Item 331 - Powerplant Improvements
			Reinforcing Stee	0 TON	\$ 2,887.51	ş -		
		Porta		0 CY	\$ 651.93	e		
			Concrete Base Slab Concrete Walls	0 CY 0 CY	\$ 651.93 \$ 651.93			ł
			Concrete Walls Concrete Overbreak 12" H/6" V		\$ 651.93 \$ 471.65			
			Reinforcing Stee		\$ 2,887.51			•
	0.915	Support an	d Anchors	0101	2,007.01	•		
		Tunn						
			Rockbolts 1" @ 12'	0 EA	\$ 528.34			
			Rockbolts 1" @ 9'	0 EA	\$ 432.12		-	
			Steel Support	0 TONS	\$ 12,801.49			
			Steel Mesh	0 SF	\$ 6.37	\$-		
		Porta		0.54	¢ 705.01	0		
	0.91c		Rockbolts 1" @ 15'	0 EA	\$ 735.81	ə -		\mathbf{H}
	0.910	Mechanica		0 SET	\$ 112.600.00	¢		+
			og Guides ogs Includes Followe		\$ 112,600.00 \$ 751,200.00	s -		•
	0.92	Tailrace Outlet Ch		0001	¢ 751,200.00	•		
			ace Outlet Channel Concrete - Slal	4,190 CY	\$ 544.85	\$ 2,280,000		Calculated Qty. Unit price from item 0.614. New item for surface powerhouse alternati
		Tailra	ace Outlet Channel Concrete - Training Wall		\$ 544.85	\$ 650,000		Calculated A). Unit price from item 0.614. New item for surface powerhouse alternati
		Tailra	ace Reinforcing Stee	440 TON	\$ 2,858.29	\$ 1,260,000		Calculated Qty based on original Ratio of reinforcing steel to concrete volume for draft tubes (660/8000). New item for surface powerhouse alternational steel to concrete volume for draft tubes (660/8000).
							\$ 1,701,500,000	for embankment dam \$ 3,202,800,000
333	Waterwheels,	Turbines and Ger	erators					
	0.11 0.111	Turbines and Gov	ernors					Copied from Low Watana Non Expandabl
	0.111	Supply Install						Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl

				Low Watana RCC (Non Expandable) Alternativ	o (4 Turbinos)					Denotes Qty Adjustment by RST
FERC Line #	Sub C	ategories		Description	Quantity	Units	Unit Price	Line Price	Total	Notes / Remarks
	0.2		Generators and Exciters							Copied from Low Watana Non Expandabl
		0.21	Generators and Exciters (Si	upply and Instal						Copied from Low Watana Non Expandabl
	0.3	0.211	Generators and Exci	iter:		FA	\$ 74,200,000.00	\$ 297,000,000	\$ 207.000.000	Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
	0.3		Total Bid From Vendor (includes al Average from acquired quote	il equipment in this categor	4	EA	\$ 74,200,000.00	\$ 297,000,000	\$ 297,000,000	Copied from Low Watana Non Expandabl
										Copied from Low Watana Non Expandabl
334			ory Electrical Equipment							
	0.1	0.11	Connections, Supports and Structu Structures	ures						
		0.11	Structures (included	Below						
		0.12	Conductors and Insulators							
		0.121	Generator Isolated P			LS	\$ 5,056,000.00	\$ 5,060,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.122	HV Power Cables an LV Power Cables an			LS LS	\$ 2,054,000.00 \$ 948.000.00			Multiply Full Watana Unit Cost by 4/6 due to turbine reductio Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.123	Control Cables and				\$ 1,738,000.00			Multiply Fini Watana Onit Cost by Ho due to turbine reductio
		0.125	Grounding System		1	LS	\$ 237,000.00	\$ 240,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.13 0.131	Conduits and Fittings			LS	\$ 632,000.00	\$ 630,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
	0.2	0.131	Conduits and Fitting Switchgear and Control Equipmen	5	1	1.5	\$ 632,000.00	\$ 630,000		Multiply Pull Watana Onit Cost by 4/6 due to turbine reductio
		0.21	Auxiliary Transformers							
		0.211	Auxiliary Transforme		4	EA	\$ 83,811	\$ 340,000		
		0.22 0.221	Circuit Breakers Generators Circuit Breakers Gen			EA	\$ 1,504,300	\$ - \$ 6,020,000		
		0.221	Surge Protectors and Gene		4	EA	\$ 1,304,300	\$ 0,020,000		
		0.231	Surge Protectors and		1	LS	\$ 726,800.00	\$ 730,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.24	Switch boards				\$ 1,232,400.00	\$ 1.230.000		
		0.241	Switch boards Auxiliary Power Equipmen		1	LS	\$ 1,232,400.00	\$ 1,230,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.25	Auxiliary Power Equipment	ipmen	1	LS	\$ 347,600.00	\$ 350,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
	0.3		Cubicles and Appurtenances							
		0.31 0.311	Control, relay and meter boo Control, relay and m	ard board		LS	\$ 1,422,000.00	\$ 1,420,000		Multiply Full Watana Unit Cost by 4/6 due to turbine reductio
		0.32	Computer Control System	eter board	1	1.5	\$ 1,422,000.00	\$ 1,420,000		Multiply Pull Watana Onit Cost by 4/6 due to turbine reductio
		0.321	Computer Control S	System (Ir	ncluded in Trans	s-Ems)				
		0.33	Supervisor and Telemeter S	Systen						
		0.331	Supervisor and Tele	meter Systen In	cluded in Trans	EMS)				
	0.4		Power Transformers							
		0.41	Power Transformers							
		0.411	Power Transformers	3	7	EA	\$ 2,000,000	\$ 14,000,000		Copied from Low Watana Non Expandabl
	0.5		Lighting System							Copied from Low Watana Non Expandabl
		0.51	Powerhouse and Transform	ner Galler						Copied from Low Watana Non Expandadi
		0.511	Powerhouse and Tra	ansformer Galler	1	LS	\$ 1,824,900.00	\$ 1,820,000		Copied from Low Watana Non Expandabl
		0.52	Access Tunnels and Roads							
		0.521	Access Tunnels and	Roads	0	LS	\$ 402,900.00	\$ -		Included in Site Roads
	0.6		Misc. Electrical Equipmen							Copied from Low Watana Non Expandabl
		0.61	Misc. Electrical Equipmen							Copied from Low Watana Non Expandabl
		0.611	Misc. Electrical Equi	pmen	1	LS	\$ 625,680.00	\$ 630,000		Copied from Low Watana Non Expandabl
	0.7		Surface Accessory Equipmen							Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
	0.7	0.71	34.5 kV and LV Equipmen							Copied from Low Watana Non Expandabl
		0.711	Switchboard			LS	\$ 213,300	\$ 210,000		Copied from Low Watana Non Expandabl
		0.712	Cables Aux Transformers		1	LS LS	\$ 450,300 \$ 284,400	\$ 450,000 \$ 280,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.713	Diesel Generator- Standby		1	LS	\$ 284,400	\$ 280,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.731	Diesel Generator- St	tandby	2	EA	\$ 347,550	\$ 700,000		Copied from Low Watana Non Expandabl
		0.74	Exterior Lighting							Copied from Low Watana Non Expandabl
		0.741	Exterior Lighting Mimic Board- Control Buildi	P/	1	LS	\$ 355,500	\$ 360,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.75	Mimic Board- Control Buildin		1	LS	\$ 1,185,000	\$ 1,190,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
							,,	,,	\$ 40,000,000	
335		Misc Po	werplant Equipment							Considered from Low Materia New Exceeded
	0.1	0.11	Auxiliary Systems- Underground Station Water Systems							Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.111	Station Water System	ms	1	LS	\$ 2,488,500.00	\$ 2,490,000		Copied from Low Watana Non Expandabl
		0.12	Fire Protection Systems							Copied from Low Watana Non Expandabl
		0.121	Fire Protection Syste Compressed Air Systems	ems	1	LS	\$ 1,422,000.00	\$ 1,420,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.13	Compressed Air Systems Compressed Air Sys	stems	1	LS	\$ 1,777,500.00	\$ 1,780,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.14	Oil Handling Systems							Copied from Low Watana Non Expandabl
		0.141	Oil Handling System	IS	1	LS	\$ 1,185,000.00	\$ 1,190,000		Copied from Low Watana Non Expandabl
		0.15	Drainage & Dewatering Drainage & Dewater	ing		EA	\$ 1,738,000	\$ 3,480,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.151	Heating, Ventilation and Co		2	CA	φ 1,738,000	3,480,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.161	Heating, Ventilation		1	LS	\$ 1,777,500.00	\$ 1,780,000		Copied from Low Watana Non Expandabl
		0.17	Miscellaneous							Copied from Low Watana Non Expandabl
	0.2	0.171	Miscellaneous Auxiliary Systems- Surface Facilitie	D1	1	LS	\$ 1,185,000.00	\$ 1,190,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
	0.2	0.21	Auxiliary Systems- Surface Facilitie Auxiliary Systems- Surface	Facilitie:						Copied from Low Watana Non Expandabl
		0.211	Auxiliary Systems- S		1	LS	\$ 711,000	\$ 710,000		Copied from Low Watana Non Expandabl
	0.3		Auxiliary Equipmen							Copied from Low Watana Non Expandabl
		0.31 0.311	Powerhouse Cranes			EA	\$ 1,800,000	\$ 3,600,000		Copied from Low Watana Non Expandabl
		0.311	Powerhouse Cranes Elevators		2	CA	\$ 1,800,000	3,600,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.321	Elevators		2	EA	\$ 181,700	\$ 360,000		Copied from Low Watana Non Expandabl
		0.33	Miscellaneous Cranes and I			1.0				Copied from Low Watana Non Expandabl
		0.331	Miscellaneous Crane Machine Shop Equipmen	es and Hoist	1	LS	\$ 505,500	\$ 510,000		Copied from Low Watana Non Expandabl Copied from Low Watana Non Expandabl
		0.34	Machine Shop Equipmen Machine Shop Equip	omen	1	LS	\$ 2,022,000	\$ 2,020,000		Copied from Low Watana Non Expandadi
	0.4		General Station Equipment	(II	ncluded in Mech	anical And	Electrical Systems			Copied from Low Watana Non Expandabl
	0.5		Communications Equipmen		1	LS	\$ 106,650.00	\$ 110,000		Copied from Low Watana Non Expandabl

RC Line # Su	Sub Cat	eaories	-			Low Watana RCC (Non Expandable) Alter Description	Quantity	Units	Unit Price	Line Price	Total	Denotes Qty Adjustment by RST Notes / Remarks
Co Line # OC		egonea	-	1		Description	quantity	Unita	Unit Tree	Line Trice	\$ 21,000,000	Notes / Kentarks
336 R	Roads.	Rails and	Air Fa	cilities	5						21,000,000	
	0.1		Ro	ads	-							
		0.11		Pic	oneer Roads and B	Iridges						
		0.1	11		Gold Creek- V	Vatana						
					Road (5							
						Clearing		ACRE	\$ 11,416.62			Rail Only Access to Site
						Waste Excavation		CY	\$ 9.51			Rail Only Access to Site
					0	Common Excavatior		CY	\$ 8.32	\$-		Rail Only Access to Site
						18" Culverts		LF	\$ 62.55	ş -		Rail Only Access to Site
						36" Culverts		LS	\$ 32,760.98			Rail Only Access to Site
						D-1 Base Materia	0	TON	\$ 45.47			Rail Only Access to Site
						Fabric	0	SY	\$ 6.73	\$-		Rail Only Access to Site
					Mainten	ance	0	MI/YR	\$ 9,008.99	\$-		Rail Only Access to Site
		0.1	12		Gold Creek- P	Parks						
					Road (4	1.25 Miles)						
					0	Clearing	0	ACRE	\$ 11,416.62	\$-		Rail Only Access to Site
						Waste Excavation	0	CY	\$ 9.51	\$-		Rail Only Access to Site
						Common Excavatior	0	CY	\$ 8.32	ş -		Rail Only Access to Site
						18" Culverts	0	LF	\$ 62.55	\$-		Rail Only Access to Site
						36" Culverts		LS	\$ 35,451.31			Rail Only Access to Site
						D-1 Base Materia		TON	\$ 45.47			Rail Only Access to Site
						Fabric		SY	\$ 6.73			Rail Only Access to Site
		-			Mainten		0	MI/YR	\$ 9,008.32	\$ -		Rail Only Access to Site
		0.1	13			Low Level Crossing	-					
					Crossin	g (7.88 Miles)		ACRE				
						Clearing			\$ 11,416.62			Rail Only Access to Site
						Waste Excavation		CY	\$ 9.51			Rail Only Access to Site
						Common Excavation		CY	\$ 8.32 \$ 28.45			Rail Only Access to Site
						Rock Excavation 18° Culverts	0	CY	\$ 28.45 \$ 62.55			Rail Only Access to Site
												Rail Only Access to Site
						Bridge			\$ 120,000,000.00			Rail Only Access to Site
						D-1 Base Materia		TON	\$ 45.47			Rail Only Access to Site
					Mainten	ance		MI/YR	\$ 11,258.74			Rail Only Access to Site
		0.1			Cold Correl	Vatana (41.25 miles		LS	\$ 28,132,000			Rail Only Access to Site Rail Only Access to Site
		0.1	14		Gold Creek- V	vatana (41.25 miles	(LS	\$ 28,132,000			Kali Uniy Access to Site
		0.12		D	ermanent Roads an	d Drideer						
		0.12	104	Pe	ermanent Roads an	d Bridge:		MI	\$ 3,000,000.00	¢		Rail Only Access to Site
		0.		Pa	arks Highway to Wa	itana (62 mi			\$ 3,000,000.00	s -		Rail Only Access to Site
		0.	125	50	usitna Bridge		(SF	\$ 450.00	s -		Rail Only Access to Site
	0.2		0.	il Facili	141							
		0.04	Ra			Garahadia a salih arada						
		0.24		Pe	Gold Creek to	(including railheads						
		0.2	+*+		R-1. (33 Mi)	Watalia Rai						
						91a ania a	671	40	¢ 44.440.00	C 7 000 400		Left de serve es Full DOO Alternatio
			_			Clearing Waste Excavation	1687883		\$ 11,416.62 \$ 9.51	\$ 7,662,183 \$ 16,051,766		Left the same as Full RCC Alternative Left the same as Full RCC Alternative Left the same as Full RCC Alternative
			_			Common Excavation	3307678	CY	\$ 9.51	\$ 27,519,880		Left the same as Full RCC Alternative
						Rock Excavation	9114		\$ 28.51			Left the same as Full RCC Alternative
						Borrow	449500	CY	\$ 11.88	\$ 5,340,060		Left the same as Full RCC Alternative
						Subballast	711055	CY	\$ 18.15	\$ 12,902,807		Left the same as Full RCC Alternative
						Grade "A" Base Materia	6650	CY	\$ 35.45	\$ 235,729		Left the same as Full RCC Alternativ
						D-1 Base materia	2400	TON	\$ 43.20	\$ 103,680		Left the same as Full RCC Alternativ
						A.C. Surfacing	2400	TON	\$ 198.00	\$ 435,600		Left the same as Full RCC Alternativ
			-			Dock Lumber	2200	MBF	\$ 1,258.60	\$ 20,138		Left the same as Full RCC Alternativ
						18" Culvert	20093		\$ 68.26			Left the same as Full RCC Alternativ
						36" + Culverts	20030	IS	\$ 92,160.00	\$		Left the same as Full RCC Alternativ
						Fabric	12930		\$ 92,100.00			Left the same as Full RCC Alternative
						Fabric Thaw Pipes	41843		\$ 95.04			Let the same as Full RCC Alternativ
						Traw Pipes Topsoil & Seed	41843		\$ 95.04 \$ 10.800.00			Left the same as Full RCC Alternativ
						Rail Yard Control Device:		IS	\$ 1,800.00			Left the same as Full RCC Alternativ
						Bridges		SE	\$ 900.00			Left the same as Full RCC Alternativ
						Trackage	325940		\$ 900.00			Left the same as Full RCC Alternativ
					-+-+-+	naonago	320940		÷ 300.00	÷ 117,079,000		
					Maintenance		1	+ +				
		-				Bail	40F	Mile-year:	\$ 10,000.00	\$ 4,060,000		Left the same as Full RCC Alternative
						Railhead	700	years	\$ 75,000.00			Left the same as Full RCC Alternativ
		- 1 -					1 '			. 010,000		
		0.13		Sit	te Roads		1					
		0.13	31		Construction F	Roads	1	+ +				
		0.1			Site Roa	ads	20	Mile	\$ 750,000.00	\$ 15,000,000		Left the same as Full RCC Alternative. Revised Unit Price to \$750,000 (Same as Low Watana Non Expandable, Full RCC \$12,554,637.62 seems hig
					Mainten	ance	100	MI/YRS	\$ 223,092.85	\$ 22,755,000		Lencine same as run RCC anternative. Revised thin rife to \$750,000 (Same as Low Wataha Non Expandable, run RCC \$12,004,037.02 seems ing_ Reduced Full RCC QV by ratio of Construction Time 4 yr (5.5)
		0.1	32		Permanent Ro	pads	102		220,002.00	·, 00,000		
		0.1			Perman	ent Roads	F	MILE	\$ 1,287,997.42	\$ 7,728,000		Left the same as Full RCC Alternativ
		- 1 -				· · · · · · · · · · · · · · · · · · ·	1		,,	,, 20,000		
	0.3	1	Ain	strip			1					
		0.31	-		rstrip		1					
		- 1			Permanent Ai	rstrip	1	LS	\$ 12,798,000.00	\$ 12,798,000		Left the same as Full RCC Alternative
						enance savings	1	LS	,,			
		1			Temporary Air		1	LD	\$ 2,133,000.00	\$ 2,133,000		Left the same as Full RCC Alternative
	0.4	1	Sa	ved M:	aintenance				\$ (5,067,889.52)			Left the same as Full RCC Alternativ
	- 1	- 1 -	-	1			1		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
		- 1 -	+				1					
							1	+ +			\$ 254,700,000	
								+ +			234,700,000	
		Tran	smissi	on Pla	ant		1	+				
		iidi	5/11/001									
		lan	and L	and P	lights			+ +				
		Land		anu R	Land Rights		-					
350			Lai		ansmission			MILE	\$ 86,720.00	\$ 2,862,000		Copied from Low Watana Non Expandabl
350							33	COLC.	÷ 00,720.00	¥ 2,002,000		Copies non-con-tratana Non-Expanded
350			_					IS	\$ 2,607,000,001	S . I		I eft the same as Full Watana RCC
350					ubstations (4 Sites)		0	LS	\$ 2,607,000.00	ş -	\$ 2,862,000	Left the same as Full Watana RCC

				Ow Watana BCC (Non Expanded -) Alternet	ive (/ Turbines)				Denotes Qty Adjustment by RST
FERC Line #	Sub Cat	egories	5	Low Watana RCC (Non Expandable) Alternat Description	Quantity Units	Unit Price	Line Price	Total	
-	0.1		Sv	witchyard					
	\vdash	0.11		Switchyard	2 LS	\$ 14,000,000.00 \$	28,000,000	28,000,000	Left the same as Full Watana RCC
353		Su		n/Switching Station Equipment			4	10,000,000	
	\vdash			ster ////////////////////////////////////	0 LS 0 LS	\$ 57,922,800.00 \$ \$ 3,613,020,00 \$	-		
				nik Arm	0 LS	\$ 3,613,020.00 \$ \$ 29,838,300.00 \$			
			Ur	niversity	0 LS	\$ 88,685,400.00 \$ \$ 35,585,550.00 \$			
			De	evil Canyon	0 LS	\$ 35,585,550.00 \$			
			w	/illow Energy Management System (EMS					
				Equipment and System Cost:	0 LS	\$ 27,326,100.00 \$	-		
				Microwave Communication Equipmen EMS Control Center Building	0 LS 0 LS	\$ 11,660,400.00 \$ \$ 9,148,200.00 \$			
				Watana and Devil Canyon In-plant Monitor and Control Equipmer	0 LS	\$ 8,619,690.00 \$			
354			and Town	ers and Fixtures			\$		
334		50		owers (Including Foundation and Hardware	33 miles	\$ 4,500,000.00 \$	148,500,000		Used same length as Transmission Land Right
		_					\$	148,500,000	
356		Co	onducto	onductors	0 MILE	\$ 218 281 33 \$			
			Su	ubmarine Cables	0 EACH	\$ 218,281.33 \$ \$ 15,808,340.56 \$			
							\$		
359	\vdash	R	oads and	d Trails					
			Ro	oads and Trails	200 MILE		15,149,000		Left the same as Full Watana RCC
	-		CI	learing and Roads	340 MILE	\$ 37,872.00 \$	12,876,000	28,000,000	Left the same as Full Watana RCC \$ 207,362,000
-							\$	20,000,000	
-									
		Ge	eneral Pl	lant					
389		La	and and	Land Rights					
			La	and and Land Rights		\$			
390		St	ructures	s and Improvements					
		-	St	tructures and Improvement:		\$	-		
391		0		niture and Equipment					
391		01	Of	ffice Furniture and Equipmen		s			
392		Tr		ation Equipment ransportation Equipmen		\$			
						Ť			
<u>393</u>		St	ores Eq	uipment					
			St	tores Equipment		\$			
394		То	ools Sho	op and Garage Equipment					
			To	pols Shop and Garage Equipmer		\$			
395		La		y Equipment					
			La	aboratory Equipmen		\$	-		
396		Po	wer-Op	erated Equipment					
			Po	ower-Operated Equipmen		\$	-		
397		C (ommuni	cations Equipment					
331		-	Co	ommunications Equipmen		\$			
398	\vdash	Mi	Iscellane Mi	eous Equipment liscellaneous Equipmen		2			
						Ŷ			
399		Ot	ther Tan	ther Tangible Property	1 LS	\$ 16,000,000 \$	16,000,000		Copied from Low Watana Non Expandabl
			Sa	aved Maintence		\$ (231,220) \$	(231,000)		Copied from Low Watana Non Expandabl
		_					\$	15,800,000	
	\vdash	Inc	direct Co	osts					
<u>61</u>		Te	mporary	y Construction Facilities					
	\vdash \top		Te	emporary Construction Facilities					
<u>62</u>		Co		ion Equipment					
			Co	onstruction Equipment					
63	+	M	ain Cons	struction Camp					
<u> </u>	0.1		M	ain Construction Camp		\$ 316,340,280			Reduce Unit price by ratio of Low Watana Volume to High Watana Volume = (7.6/15.
	-		Sa	aved Maintence	1 LS	\$ (6,172,493.27)			
	\vdash		Si	ite Preparation	3270533				Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.
			Bu	uildings	15019120				Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.)
	\vdash	_	uti	ilities	12172667 30462320 5	\$ 152,311,600.00			Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.1 Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.1
					30402320 3	\$ 102,011,000.00 ⁻			
			M	AIN CONSTRUCTION VILLAGE	0.5.10/				
	\vdash			te prep uildings	3540080 10008187				Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.1 Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.1
			uti	ilities	4914160				Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.1
					18462426.67 5	\$ 92,312,133.33	152,311,600 \$		
64		La	abor Exp	pense		\$	152,311,600 \$	123,800,000	Camp cost to reflect lower volume (0.8125) *Previous Estimate doesn't total Con. Camp Costs Correctly
			La	abor Expense	(Included In Direct Costs)				
<u>65</u>		Su	uperinter	ndence uperintendence	Included In Direct Costs				
L	1 1		รเ	aponitionadiate	Incidueu III Difect Costs				

	Low Watana RCC (Non Expandable) Alternative (4 Turbines) RC Line # Sub Categories Description Quantity Units Unit Price Line Price													Denotes Qty Adjustment by RST
FERC Line #	Sub Catego	ories					Description	Quantity	Units	Unit Price	Line Price		Total	Notes / Remarks
66		Insuran	ce											
			Insurar					(Included In Dir	ect Costs					
68		Mitigatio	on Fish	ery, Te	rrestri	ial and	Recrational							
			Mitigati	on				(Not included in	1982 study	(\$-			
<u>69</u>		Fees												
			Fees											
Subtotal										Dire	ct Construction Cost	\$	2,903,300,000	
	Contingenc	:Y						21.3	13 %			\$	618,800,000	Used Same Contingency as Full RCC
Subtotal														
<u>71A</u>		Enginee	ring (4	%), En	viornm	nental	(2%), Regulatory(1%) and Construction Management		7 %			\$	203,200,000	
<u>71B</u>		Constru	ction N	lanage	ment ((4%)			4 %			\$	116,100,000	
72		Legal Ex	pense	s					0 %					
75		Taxes							0 %					
76		Adminis	trative	& Gen	. Expe	nses			0 %					
77		Interest							0 %					
80		Earning	s/Expe	nses D	uring	Const	ruction		0 %					
Total Project C	ost											\$	3,841,400,000	
r of Years for Ba	se Case						20.5	years						

of Years for Full Watana

16.5 years

HDR/AEA Susitna Hydroelectric Project Cost Estimates for 1982 quantities- Alternatives By: DTA By: DTA By: Dta By: Leanne Andruszkiewicz, EIT Date: 1/25/09 Reviewed By: David Elwood, EIT Date: 1/25/09, Modified by Hatch Acres mb 061109, R&M 11/16/09 Alternatives- 2008 Dollars Low Watana RCC (Non-Expandable) Estimate 10/28/10 used as basis Modified by Hatch Associates Consultants. Inc. RST 10/28/10

						Low Watana RCC (Non-Expandable) Estimate 10. Modified by Hatch Associates Consultants, Inc						Copied Full Watana Data
						Low Watana RCC (Expandable) Alternative (4 Turbi						Denotes Qty Adjustment by RST
FERC Line # 330	Sub (Categor		d Land Rigi	hto	Description	Quantity	Units	Unit Price	Line Price	Total	Notes / Remarks
330	0.1		Lanu ar	Land			1	LS	\$ 120,870,000.00	\$ 120,870,000		
	0.2			Land Rights			Included Above					
	0.3	3		Misc Charge	es in Credit	Above	Included Above					
											\$ 120,900,000	
331			Powern	lant Structu	re Improve	ements						
	0.1	1	<u>. ene.p</u>	Powerhouse	e							
		0.11		Powe		d Draft Tube						
			0.111		Excavati							
						owerhouse Rock owerhouse Overburden	1,336,761 891,174		\$ 43.72 \$ 11.53			Multiply by ratio of increased structure length (485/365) = 1.329, Plus additional 10% Multiply by ratio of increased structure length (485/365) = 1.329, Plus additional 10%
						raft Tube Rock		CY	\$ 90.12			multiply by faile of increased structure length (465/365) = 1.323, Fills additional 10%
Total	Total	Estimate	0.113			Preparation/ Grouting						
						owerhouse	143,532		\$ 3.33			Multiply by ratio of increased structure length (485/365) = 1.329
						raft Tube		SF	\$ 3.33			
						rout Curtain- Drill holes rout Curtain- Cement	63,393 25,251		\$ 27.63 \$ 81.10			Multiply by ratio of increased structure length (485/365) = 1.329 Multiply by ratio of increased structure length (485/365) = 1.329
			0.114			e and Shot Crete	23,231	CI	φ 01.10	φ 2,040,000		(Multiply by faile of increased structure rength (465/365) = 1.323
					Po	owerhouse Concrete	82,871		\$ 544.85			Multiply by ratio of increased structure length (485/365) = 1.329
						owerhouse Concrete Overbreak		CY	\$ 447.21			
						owerhouse Reinforcing Steel	4,144		\$ 2,858.29 \$ 10.14			Multiply by ratio of increased structure length (485/365) = 1.329
		+				owerhouse 4* Shotcrete raft Tube Concrete		SF CY	\$ 10.14 \$ 692.87			
		1				raft Tube Concrete Overbreak		CY	\$ 447.21			
					Di	raft Tube Reinforcing Steel	0	TON	\$ 2,858.29	\$ -		
						raft Tube 2" Shotcrete	0	SF	\$ 5.45	\$-		
			0.115			and Anchors owerhouse Rockbolts 1" @ 25' Hy	197	E 4	\$ 1,234.86	\$ 240,000		Multiply by ratio of increased structure length (485/365) = 1.329
						owerhouse Rockbolts 1" @ 25 Hy owerhouse Rockbolts 1" @ 15'	400		\$ 1,234.86 \$ 735.81			Multiply by ratio of increased structure length (485/365) = 1.329 Multiply by ratio of increased structure length (485/365) = 1.329
					Po	owerhouse Steel Mesh	9,065		\$ 5.81	\$ 50,000		Multiply by ratio of increased structure length (485/365) = 1.329
					Po	owerhouse Steel Support	28	TON	\$ 12,671.94	\$ 350,000		Multiply by ratio of increased structure length (485/365) = 1.329
						raft Tube Rockbolts 1" @ 25' Hy		EA	\$ 1,234.86			
						raft Tube Rockbolts 1" @ 12' raft Tube Rockbolts 1" @ 9'		EA EA	\$ 528.34 \$ 432.12			
						raft Tube Nockbolts 1 @ 9		SF	\$ 6.55	\$ -		
			0.117			J/S of Powerhouse)	0	LF	\$ 51.32			
						oles (Powerhouse Crown)	0	LF	\$ 51.32	\$ -		
-			0.118			al- Misc Steelwork owerhouse and Draft Tube- Steel Crane Rails		LS	\$ 10,276,309.00	\$ - \$ 10,280,000		*Same as Full Watana
			0.119			tural- Powerhouse		LS	\$ 10,276,309.00	\$ 10,280,000		Multiply by ratio of increased structure length (485/365) = 1.329
у			0.11c		Mechani			20	• 1,000,000.00	• 1,010,000		
						raft Tube Gates		SETS	\$ 427,880.00	\$ 2,567,000		Updated Qty for 6 total bays
						raft Tube Gate Guides		SETS	\$ 202,680.00			Updated Qty for 6 total bays
	_	0.12		Acce		raft Tube Crane	1	LS	\$ 1,140,000.00	\$ 1,140,000		
		0.12	0.121	Acco	Excavati							
					M	ain Tunnel		CY	\$ 97.45			
						ransformer Gallery Tunnel		CY	\$ 97.45			
	_	1				routing Gallery Tunnel	0	CY CY	\$ 396.04 \$ 145.22			
L	_	1				urge Chamber Access Tunnel enstock Access Tunnel	0	CY	\$ 145.22 \$ 145.22			
		1				enstock Elbow Access Tunnel	0	CY	\$ 145.22			
						ccess Shaft Tunnel		CY	\$ 145.22			
		-				onnector Tunnel		CY	\$ 379.26			
		-				ortals Overburden ortals Rock		CY CY	\$ 17.14 \$ 49.31			
		1	0.123			Preparation	0	51	÷ 49.01	• -		
	L	L			M	ain Tunnel Slab		SF	\$ 2.21			
						enstock Access Slab		SF	\$ 2.21			
						orizontal Portal		SF	\$ 2.30 \$ 3.33			
		+	0.124			clined Portal e and Shot Crete	0	SF	\$ 3.33	\$ -		
		1	0.124			lain Portal						
						Concrete Slab		CY	\$ 406.27			
						Concrete Walls		CY	\$ 406.27			
		+			+	Concrete Overbreak Reinforcing Steel		CY TON	\$ 368.48 \$ 2,887.51			
		+			т	Reinforcing Steel	0	NUN	φ 2,887.51	ф -		
		1				Concrete Slab Main Tunnel	0	CY	\$ 503.90	\$ -		
						Concrete Plugs Penstock Elbow ACC	0	CY	\$ 755.86	\$ -		
					+	Concrete Overbreak Main Tunnel 6"		CY	\$ 346.43			
						Reinforcing Steel	0	TON	\$ 2,887.51	ъ -	I	

				Low Watana RCC (Expandable) Alternative (4	Turbines + 2 Additional Bays)				Denotes Qty Adjustment by RST
RC Line #	Sub Categories			Description	Quantity Units	Unit Price	Line Price	Total	Notes / Remarks
				2 " Shotcrete Main Tunnel	0 SF	\$ 5.26 \$	-		
				2 " Shotcrete Transformer Gal		\$ 5.26 \$	-		
				2 " Shotcrete Surge Chamber Acc		\$ 5.26 \$	-		
				2 " Shotcrete Penstock Access		\$ 5.26 \$	-		
				2 " Shotcrete Penstock Elbow Acc		\$ 5.26 \$	-		
				2 "Shotcrete Access Shaft		\$ 5.26 \$	-		
				2 " Shotcrete Grout Gallery		\$ 5.26 \$	-		
				2 " Shotcrete Connector Tunnel	0 SF	\$ 5.26 \$	-		
	0.1	125	Support and A	Inchors					
			Main Tu						
				Rockbolts 1" @12'		\$ 528.34 \$	-		
				Rockbolts 1" @ 9'	0 EA	\$ 432.12 \$	-		
				Steel Mesh	0 SF	\$ 6.37 \$	-		
				Steel Support		\$ 12,801.49 \$	-		
			Main Tu	innel Portal		S	-		
				Rockbolts 1" @15'	0 EA	\$ 735.79 \$	-		
				rmer Gallery Tunnel	0 EA	\$ 155.15 \$			
			Talisio	Rockbolts 1" @12'	0 EA	\$ 528.34 \$	-		
				Rockbolts 1" @ 9'		\$ 432.12 \$	-		
				Steel Mesh		\$ 5.89 \$	-		
				Steel Support	0 TON	\$ 12,801.49 \$	-		
			Grouting	g Gallery Tunnel		\$	-		
				Rockbolts 3/4" @ 6'		\$ 327.15 \$	-		
		-		Steel Mesh		\$ 6.37 \$	-	-	
				Steel Support		\$ 12,801.49 \$	-		
				Chamber Access Tunnel		s	-		
		-	l l l l l	Rockbolts 1" @12'	0 EA	\$ 528.34 \$	-		
				Rockbolts 1" @ 9'		\$ 432.12 \$	-		
				Steel Mesh					
						\$ 6.37 \$	-		
				Steel Support	0 TON	\$ 12,801.49 \$	-		
				k Access Tunnel					
				Rockbolts 1" @12'		\$ 528.34 \$	-		
				Rockbolts 1" @ 9'	0 EA	\$ 432.12 \$	-		
				Steel Mesh	0 SF	\$ 6.37 \$	-		
				Steel Support	0 TON	\$ 12,801.49 \$	-		
				k Elbow Access Tunnel					
				Rockbolts 1" @12'	0 EA	\$ 528.34 \$	-		
				Rockbolts 1" @ 9'		\$ 432.12 \$	-		
				Steel Mesh		\$ 6.37 \$	-		
				Steel Support	0 TON	\$ 12,801.49 \$	-		
			Access	Shaft Tunnel					
				Rockbolts 1" @12'	0 EA	\$ 528.34 \$	-		
				Rockbolts 1" @ 9'		\$ 432.12 \$			
				Steel Mesh	0 SF	\$ 6.37 \$	-		
				Steel Support	0 TON	\$ 12,801.49 \$	-		
				tor Tunnel					
				Rockbolts 3/4" @ 6'	0 EA	\$ 327.15 \$	-		
				Steel Mesh		\$ 6.37 \$	-		
				Steel Support		\$ 12,801.49 \$	-		
	0.	129					-		
			Mechaniz-11/	Main Portal Doors	0 SETS	\$ 158,371.90 \$			
		12c		entilation System	Included in (63.81 and 63.82)				
	0.13		Access Shaft						
		131	Excavation Ro			\$ 227.67 \$	-		
		133	Surface Prepa	aration Shaft	0 SF	\$ 3.33 \$	-		
	0.1	134	Concrete and						
			Concret	e Lining	0 CY	\$ 944.82 \$	-		
			Concret	e Overbreak 6"		\$ 551.14 \$	-		
	0.1	135		Inchors - Rockbolts 3/4" @ 6'		\$ 327.15 \$	-		
	0.	138	Structural Mise		0 TON	\$ 7,395.00 \$	-		
		139		control Building	0101	φ 1,000.00 φ			
		139 13c	Mechanical El	evetors	0 LS	\$ 2,368,815.00 \$			
		136			ULS	φ 2,300,013.00 \$	-		
	0.14		Fire Protection Head			e 10 70 ±			
		141	Excavation			\$ 43.72 \$	-		
	0.1	143	Surface Prepa		0 SF	\$ 2.30 \$	-		
	0.1	144	Concrete & Sh						
			Concret	e		\$ 963.72 \$	200,000		
		-	Concret	e Overbreak 6"		\$ 406.27 \$	-	-	
				cing Steel		\$ 2,858.29 \$	20,000		
	0.1	145	Support and A	Inchors		,	.,		
				lts 1" @12'	0 EA	\$ 528.34 \$.		
				lts 1" @ 9'		\$ 526.34 \$ \$ 432.12 \$	-		
			Steel M			\$ 6.30 \$	-		
			Steel St	upport		\$ 12,671.95 \$	-		
				k	1 LS	\$ 73,297.50 \$	70,000		*Same as Full Watana
		148	Misc Steelwor						
	0.1	148 14c	Mechanical Pi	ping/Valves		1	1		
				ping/Valves					
	0.15	14c	Mechanical Pi	ping/Valves					
	0.15		Mechanical Pi Bus Tunnels (totals fo Excavation	ping/Valves or 3 Bus Tunnels)	0 CY	\$ 213.70 \$			
	0.15	14c	Mechanical Pi Bus Tunnels (totals fo Excavation	ping/Valves r 3 Bus Tunnels) prizontal		\$ 213.70 \$ \$ 601.04 \$			

FERC Line # Sub C	0.16	s 0.154 0.155 0.161 0.163 0.164		iransforr S	C C C C C C C C C C C C C C C C C C C	Description tea ad Shotcrete Concrete Slab Concrete Slab Concrete Overbreak 12" Reinforcing Steel 2" Shotcrete ts and Anchors Rockbolts 1" @ 25' Rockbolts 1" @ 25' Rockbolts 1" @ 9 Steel Mesh Steel Support Salery Tunnel ation- Rock e Preparation		0 CY 0 CY 0 TON 0 SF 0 EA	Unit Price \$ 818.84 \$ 472.41 \$ 2,858.29 \$ 5.26 \$ 1,234.86 \$ 528.34 \$ 432.12 \$ 6.30	\$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -	Total Notes / Remarks
	0.16	0.155		iransforr S	C C C C C C C C C C C C C C C C C C C	Concrete Slab Concrete Overbreak 12" Reinforcing Steel 2' Shotcrete Ts and Anchors Rockbolts 1" @ 25" Rockbolts 1" @ 12" Rockbolts 1" @ 9' Steel Mesh Steel Support Steel Support Jallery Tunnel		0 CY 0 TON 0 SF 0 EA 0 EA 0 EA 0 EA 0 SF	\$ 472.41 \$ 2,858.29 \$ 5.26 \$ 1,234.86 \$ 528.34 \$ 432.12	\$ - \$ - \$ - \$ - \$ - \$ - \$ -	Image: Constraint of the second sec
	0.16	0.161 0.163 0.164		ransforr E S	Guppor F Suppor F F F F S Suppor F F S Suppor S Suppor S S S S S S S S S S S S S S S S S S S	Concrete Overbreak 12" Reinforcing Steel 2" Shotorete 1ts and Anchors Rockbolts 1" @ 25" Rockbolts 1" @ 26" Steel Mesh Steel Support Steel Support		0 CY 0 TON 0 SF 0 EA 0 EA 0 EA 0 EA 0 SF	\$ 472.41 \$ 2,858.29 \$ 5.26 \$ 1,234.86 \$ 528.34 \$ 432.12	\$ - \$ - \$ - \$ - \$ - \$ - \$ -	Image: Constraint of the second sec
	0.16	0.161 0.163 0.164		ransforr E S	F Suppor F F F S S Surface Concre	Reinforcing Steel 2* Shotcrete rts and Anchors Rockbolts 1* @ 25' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Steel Mesh Steel Support Steel Support Steel Support Steor Junnel Lifon-Rock		0 TON 0 SF 0 EA 0 EA 0 EA 0 EA 0 SF	\$ 2,858.29 \$ 5.26 \$ 1,234.86 \$ 528.34 \$ 432.12	\$ - \$ - \$ - \$ -	
	0.16	0.161 0.163 0.164		ransforr E S	2 Suppor F F F S Sufface Concre	2° Shotorete rts and Anchors Rockbolts 1° @ 25° Rockbolts 1° @ 12° Rockbolts 1° @ 9' Steel Mesh Steel Support Steel Support Sallery Tunnel tion- Rock		0 SF 0 EA 0 EA 0 EA 0 SF	\$ 5.26 \$ 1,234.86 \$ 528.34 \$ 432.12	\$- \$- \$- \$-	Image:
	0.16	0.161 0.163 0.164		ransforr E S	Suppor F F F S S Surface Concre	rts and Anchors Rockbolts 1* @ 25' Rockbolts 1* @ 12' Rockbolts 1* @ 9' Steel Mesh Steel Support Steel Support Jallery Tunnel ation- Rock		0 EA 0 EA 0 EA 0 SF	\$ 1,234.86 \$ 528.34 \$ 432.12	\$ \$ \$ \$	- - - - - - - - - - - - - -
	0.16	0.161 0.163 0.164		ransforr E S	F F F S mer G Excava Surface Concre	Rockobits 1° @ 25' Rockbolts 1° @ 12' Rockobits 1° @ 9' Steel Mesh Steel Support Jallery Tunnel tion- Rock		0 EA 0 EA 0 SF	\$ 528.34 \$ 432.12	\$ - \$ -	
	0.17	0.163 0.164		E	mer G Excava Surface	Rockobits 1° @ 12' Rockobits 1° @ 9' Steel Mesh Steel Support Jallery Tunnel ation- Rock		0 EA 0 EA 0 SF	\$ 528.34 \$ 432.12	\$ - \$ -	
	0.17	0.163 0.164		E	mer G xcava Surface	Rockobts 1* @ 9* Steel Mesh Steel Support Jallery Tunnel Liton- Rock	(0 EA 0 SF	\$ 432.12	\$ -	
	0.17	0.163 0.164		E	mer G xcava Surface Concre	Steel Mesh Steel Support Jallery Tunnel ation- Rock	(0 SF			
	0.17	0.163 0.164		E	mer G xcava Surface Concre	Steel Support Sallery Tunnel ation- Rock	(\$ 6.30		
	0.17	0.163 0.164		E	mer G xcava Surface Concre	Ballery Tunnel ation- Rock		2 ITON	+	\$ -	
	0.17	0.163 0.164		E	xcava Surface Concre	ation- Rock			\$ 12,671.94	\$-	
	0.17	0.163 0.164		S	Surface Concre						
	0.17	0.164			Concre	e Preparation		0 CY	\$ 87.44		
	0.17		=				(0 SF	\$ 2.30	\$-	
	0.17	0.165	=			ete and Shotcrete					
	0.17	0.165	_			Concrete Base Slab		0 CY	\$ 544.85	\$ -	
	0.17	0.165	\rightarrow			Concrete Overbreak 12"H/6"V			\$ 377.93		
	0.17	0.165	1			Reinforcing Steel	(0 TON	\$ 2,858.29	\$ -	
	0.17			5	uppor	rt and Anchors					
	0.17				F	Rockbolts 1" @ 25'	(0 EA	\$ 1,234.86		
	0.17		+	-+		Rockbolts 1" @ 15'			\$ 735.81		
	0.17	1		-+		Steel Mesh			\$ 5.81		
	0.17	0.407	+	<u> </u>		Steel Support			\$ 12,671.94		
		0.167	<u> </u>			ge Holes	(0 LF	\$ 47.95	ə -	
		0 4 7 4	f	able Sh		- the Deale	+ .		¢	¢	
		0.171	+			ation Rock		0 CY	\$ 601.04		
		0.173	+			e Preparation Shafts	(0 SF	\$ 3.33	\$-	
		0.174		C		ete and Shotcrete		0.01	¢ 1700	¢	
1 1				<u> </u>		Concrete Lining	(0 CY	\$ 1,763.66	\$ -	
⊢		0.475	+	<u> </u>		Concrete Overbreak 6"		0 CY	\$ 881.83		
		0.175		s	uppor	rts and Anchors- Rockbolts 3/4" @ 6'		0 EA	\$ 327.15	\$ -	
		0.178				ural Steel Support Towers		2 TON	\$ 15,602.00		
		0.179				ectural- Enclosures			\$ 199,317.00		
		0.17c	;			nical Hoist	(0 EA	\$ 476,960.00	\$-	
	0.18			ewateri	ng (di	uring Construction)					
		0.181	;	D	ewate	ering (Power Facilities)		1 LS	\$ 1,336,798.50	\$ 1,340,000	*Same as Full Watana
	0.19			nstrume							
		0.191				nentation			\$ 1,714,813.50	\$ 1,710,000	*Same as Full Watana
0.2			VIISC BU	dings (Contro	ol Buildings)		1 LS	\$ 4,433,085.00	\$ 4,430,000	*Same as Full Watana
0.3			Perman	nt Iow	n		(included in 63.5)				\$ 161,389,000
332			Posony	ir Dar	ne an	d Waterways					a 161,363,000
0.1			Reservo					+			
0.1	0.11			leservoi			37 500	0 ACRE	\$ 3.005.85	\$ 112,719,000	Copied Full Watana Data
0.2						Cofferdams	.,			• • • • • • • • • • • • • • • • • • • •	
	0.21					nels /Portals		-		s -	
		0.211				ation		-		\$ -	
						Combined Tunnels		-		\$ -	
			1	7		Rock	203,285	5 CY	\$ 92.33	\$ 18,770,000	Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
					(Combined Upstream Portals		-		s -	
					-	Rock	35,000) CY	\$ 49.16	\$ 1,720,000	
					(Combined Downstream Portals	,	1		\$ -	
					-	Rock Usable	75,000	JCY	\$ 49.16		
					F	Emergency Release Chambers	,	1		\$ -	
						Excavate Concrete for Plugs	1,139	9 CY	\$ 101.98	\$ 120,000	
					\rightarrow	Gate Chamber	2,975		\$ 110.73		
						Access Tunnel to Gate Chamber	2,010	1		\$ -	
						Rock	(\$ 97.15		
		0.212		F	ill- Te	mp for Coffer Dam to Construct Upstream Portals	23,000	JCY	\$ 11.66		
		0.213		5	Jurfac	e Preparation \ grouting	20,000	+		\$ -	
				Ť		Upstream Upper Portal		1		\$ -	
			\rightarrow	-+	-	Horizontal	3,200	J SF	\$ 2.30		
1 1			-+	-+	+	Inclined	8,600		\$ 3.33		
			-+	-+	-	Upstream Lower Portal	0,000	1	φ 0.00	\$ -	
					-	Horizontal	1,300) SF	\$ 2.30	Ŧ	
			-+	-+	+	Inclined	14,900	J SF	\$ 3.33	\$ 50,000	
					r	Downstream Upper Portal	,000	1		\$ -	
						Horizontal	6,100) SF	\$ 2.30	\$ 10,000	
			-+	-+	+	Inclined	20,500		\$ 3.33		
					-	Downstream Lower Portal	20,000	1	. 0.00	\$ -	
			-+	1			600	0 SF	\$ 2.30	\$ -	
			_	+	-+	Horizontal					
			=	=	4	Horizontal		UISE			
				\mp		Inclined	5,600	USF	\$ 3.33		
				=		Inclined Grout Upper Tunnel Plugs	5,600			\$ -	
				\equiv		Inclined Grout Upper Tunnel Plugs Drill Holes	4,100	0 LF	\$ 26.76	\$ - \$ 110,000	
					0	Inclined Grout Upper Tunnel Plugs Drill Holes Cement	4,100		\$ 26.76 \$ 81.10	\$ - \$ 110,000 \$ 70,000	
					0	Inclined Grout Upper Tunnel Plugs Drill Holes Cement Torul Lower Tunnel Permanent Plugs	4,100 820	0 LF 0 CF	\$ 26.76 \$ 81.10	\$ - \$ 110,000 \$ 70,000 \$ -	
					0	Inclined Grout Upper Tunnel Plugs Drill Holes Cement Grout Lower Tunnel Permanent Plugs Drill Holes	5,600 4,100 820 2,050	0 LF 0 CF 0 LF	\$ 26.76 \$ 81.10 \$ 26.76	\$ - \$ 110,000 \$ 70,000 \$ - \$ 50,000	
		0.214			0	Inclined Grout Upper Tunnel Plugs Drill Holes Cement Grout Lower Tunnel Permanent Plugs Drill Holes Cement	5,600 4,100 820 2,050	0 LF 0 CF	\$ 26.76 \$ 81.10	\$ 50,000	
		0.214			Concre	Inclined Grout Upper Tunnel Plugs Drill Holes Cement Grout Lower Tunnel Permanent Plugs Drill Holes	5,600 4,100 820 2,050	0 LF 0 CF 0 LF	\$ 26.76 \$ 81.10 \$ 26.76 \$ 81.10	\$ - \$ 110,000 \$ 70,000 \$ - \$ 50,000	

FERC Line #					Low Watana RCC (Expandable) Alternative					Denotes Qty Adjustment by RST
	Sub C	ategorie	es		Description	Quantity		Unit Price	Line Price	Total Notes / Remarks
					Concrete Lining Overbreak 6"	16,350	CY	\$ 314.94	\$ 5,150,000	Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
-					Reinforcing Steel	23	TON	\$ 2,887.51		Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
-					Concrete Lining for Plug	6,200		\$ 428.32		
					2" Shotcrete	52,865		\$ 5.26		Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
					ostream Upper Portal	02,000	0.		\$ -	manpilos non Expandado egy by talo onongan nordado (1, non 1, 100) – 100
				0	Concrete Headwall	3,200	CV	\$ 651.93		
	_			 _						
				 _	Concrete Lining	1,300	CY	\$ 651.93		
-					Concrete Slab	750	CY	\$ 651.93		
					Concrete Piers	800		\$ 651.93		
					Concrete Overbreak 12" H/6"V	300		\$ 472.41		
					Reinforcing Steel	400	TON	\$ 2,887.51	\$ 1,160,000	
				U	ostream Lower Portal				\$ -	
					Concrete Headwall	4,500	CY	\$ 651.93	\$ 2,930,000	
					Concrete Lining	3,000		\$ 651.93		
					Concrete Slab	300		\$ 651.93		
					Concrete Piers	700	CY	\$ 651.93		
					Concrete Overbreak 12" H/6"V	350	CV	\$ 472.41		
	_			 _		330	TON		\$ 170,000	
	_				Reinforcing Steel	600	TON	\$ 2,887.51	\$ 1,730,000	
				D	ownstream Upper Portal				ş -	
					Concrete Headwall	500		\$ 651.93		
					Concrete Slab	100		\$ 651.93	\$ 70,000	
		Τ	٦		Concrete Overbreak 12" H/6"V	100		\$ 472.41		
-					Reinforcing Steel	40	TON	\$ 2,887.51	\$ 120,000	
				D	ownstream Lower Portal				\$ -	
					Concrete Headwall	2,500	CY	\$ 651.93	\$ 1,630,000	
					Concrete Slab	100	CY	\$ 651.93	\$ 70,000	
	+ +			 + +	Concrete Overbreak 12" H/6"V	150		\$ 472.41		1
	+ +			 + +		150	TON			
	+			 <u> </u>	Reinforcing Steel	170	TON	\$ 2,887.51	φ 490,000 ¢	
	+ +				ownstream Flip Bucket		01/	6 0F1 C	ə -	
					Concrete Slab			\$ 651.93		
					Concrete Walls			\$ 651.93		
					Concrete Invert	0	CY	\$ 651.93		
					Concrete Overbreak 12" H/6"V	0	CY	\$ 42.41		
					Reinforcing Steel	0	TON	\$ 2,887.51	\$ -	
				D	ownstream Retaining Wall				s -	
					Concrete Slab	200	CY	\$ 651.93	\$ 130,000	
					Concrete Walls	2,000		\$ 651.93		
					Concrete Overbreak 12" H/6"V	2,000		\$ 472.41		
				 	Beinforeing Steel			\$ 2,887.51		
	_			 -	Reinforcing Steel	90	TON	φ 2,007.01	\$ 260,000	
				 E	nergency Release Chambers	5 500	<u></u>		\$ -	
					Concrete Plug	5,500		\$ 755.86		
					4" Shotcrete	1,000	SF	\$ 10.13	\$ 10,000	
				A	ccess Tunnel to Gate Chamber				\$ -	
					2" Shotcrete	0	SF	\$ 5.26	\$-	
			0.215	Support	and Anchors					
				C	ombined Tunnels				\$ -	
				-	Rockbolts 1" @ 12'	3,379	FA	\$ 528.34	\$ 1,790,000	Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
					Rockbolts 1" @ 9'	578		\$ 432.12		Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
								\$ 6.37		
					Steel Mesh	202 740			\$ 1,200,000	Multiplied Non Expandable Oty by ratio of length increase (4 470/4 100) = 1.00
	+				Steel Mesh Steel Support	202,740		¢ 10.001.40		Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
					Steel Support	202,740 207	TON	\$ 12,801.49	\$ 2,650,000	Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09 Multiplied Non Expandable Qty by ratio of length increase (4,470/4,100) = 1.09
				U	Steel Support ostream Lower Portal	207			\$ 2,650,000 \$ -	
				U	Steel Support ostream Lower Portal Rockbolts 1" @ 15'	207	EA	\$ 735.81	\$ 2,650,000 \$ - \$ 180,000	
					Steel Support Sstream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25'	207	EA		\$ 2,650,000 \$ - \$ 180,000	
					Steel Support Stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' bstream Upper Portal	207	EA	\$ 735.81 \$ 1,234.86	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ -	
					Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' ostream Upper Portal Rockbolts 1* @ 15'	207 240 290	EA EA	\$ 735.81 \$ 1,234.86	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ -	
					Steel Support Stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' bstream Upper Portal	207	EA EA	\$ 735.81 \$ 1,234.86	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ -	
				U	Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' ostream Upper Portal Rockbolts 1* @ 15'	207 240 290	EA EA	\$ 735.81 \$ 1,234.86	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ -	
				U	Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' worktowns 1* @ 25' worktown 1* @ 25' worktown 1* @ 25'	207 240 290 130	EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ 100,000 \$ -	
					Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' ostream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' ownstream Lower Portal Rockbolts 1* @ 15'	207 240 290	EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ 100,000 \$ -	
					Steel Support Stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' winstream Upper Portal Rockbolts 1* @ 15' winstream Upper Portal	207 240 290 130 200	EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ 100,000 \$ - \$ 150,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -	
					Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Lower Portal Rockbolts 1* @ 15' wmstream Lower Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15'	207 240 290 130 200 100	EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ 100,000 \$ - \$ 100,000 \$ - \$ 150,000 \$ - \$ 70,000	
					Steel Support spream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Lower Portal Rockbolts 1* @ 15' wnstream Lower Portal Rockbolts 1* @ 15' wmstream Loper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25'	207 240 290 130 200	EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ 100,000 \$ - \$ 150,000 \$ - \$ 70,000	
					Steel Support Distream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Loper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Loper Portal Rockbolts 1* @ 15' Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' References Chambers	207 240 290 130 200 100 100	EA EA EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86	\$ 2,650,000 \$ 180,000 \$ 380,000 \$ 360,000 \$ - \$ 100,000 \$ - \$ 150,000 \$ - \$ 70,000 \$ 120,000 \$ -	
					Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' ostream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wnstream Lower Portal Rockbolts 1* @ 15' Monchors 1* @ 25' wnstream Upper Portal Rockbolts 1* @ 15' Rockbolts 1* @ 15' Redstower Portal Rockbolts 1* @ 15' Rockbolts 1* @ 15' Rockbolts 1* @ 25'	207 240 290 	EA EA EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86	\$ 2,650,000 \$	
					Steel Support sotream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' winstream Upper Portal Rockbolts 1* @ 15' winstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Rockbolts 1* @ 15'	207 240 290 130 200 100 100 63 79 7	EA EA EA EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 7,35.77	\$ 2,650,000 \$ 180,000 \$ 360,000 \$ 360,000 \$ - \$ 5 \$ 100,000 \$ - \$ 150,000 \$ - \$ 150,000 \$ - \$ 70,000 \$ 2,000 \$ 380,000 \$ 380,000 \$ 80,000 \$ 80,000 \$ 80,000 \$ 380,000 \$ 120,000 \$ 380,000 \$ 380,0000 \$ 380,0000 \$ 380,0000 \$ 380,0000 \$ 380,00000 \$ 380,0000 \$ 380,00000 \$ 380,0000 \$	
					Steel Support Distream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 15' Rockbolts 1* @ 15' Reckbolts 1* @ 15' Reckbolts 1* @ 15' Reckbolts 1* @ 15' Rockbolts 1* @ 15'	207 240 290 130 200 100 100 100 83 79 2,279	EA EA EA EA EA EA EA EA EA SF	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 3,735.77 \$ 6,37	\$ 2,650,000 \$	
					Steel Support stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 15' Rockbolts 1* @ 25' Rockbolts 1* @ 15' Steel Support Steel Support	207 240 290 130 200 100 100 100 100 100 201 201 9 9 9 9 9 9	EA EA EA EA EA EA EA EA EA SF TON	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 735.77 \$ 6.37 \$ 1,2801.49	\$ 2,650,000 \$ 380,000 \$ 380,000 \$	
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					Steel Support stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 15' Rockbolts 1* @ 25' Rockbolts 1* @ 15' Steel Support Steel Support	207 240 290 130 200 200 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1.234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 3.577 \$ 6.37 \$ 12,801.49 \$ 342.42	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ -	
					Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wrstream Lower Portal Rockbolts 1* @ 15' wrstream Lower Portal Rockbolts 1* @ 15' wrstream Lower Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Steel Support Metal to Roof Anchors 3/4* @ 6' cess Tunnel to Gate Chamber Rockbolts 1* @ 12'	207 240 290 130 200 100 100 63 709 2,279 9 9 9 13	EA EA EA EA EA EA EA EA EA EA EA EA EA	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 735.77 \$ 1,2,801.49 \$ 342.42 \$ 528.34	\$ 2,650,000 \$ 180,000 \$ 360,000 \$ 360,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 70,000 \$ - \$ 70,000 \$ - \$ 80,000 \$ 10,000 \$ - \$ - \$ -	
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					Steel Support sotream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wnstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Steel Mesh Steel Support Metal to Roof Anchors 3/4* @ 6' coses Turnel to Gate Chamber Rockbolts 1* @ 12' Rockbolts 1* @ 9' Steel Mesh	207 240 290 130 200 100 100 100 100 100 100 100 100 10	EA EA EA EA EA EA EA EA EA EA EA SF EA SF	\$ 735.81 \$ 1.234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 3.735.77 \$ 1.2,801.49 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ -	
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			0.218		Steel Support streen Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' stream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 25' Rockbolts 1* @ 15' Steel Support Metal to Roof Anchors 3/4* @ 6' Cess Tunnel to Gate Chamber Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 9' Steel Mesh Steel Support Metal to Roof Anchors 3/4* @ 6' Metal to Roof Anchors 3/4* @ 12' Rockbolts 1* @ 9' Steel Mesh Steel Support Metal Steel Support Janset Steel Support Janset Steel Support	207 240 290 130 200 100 100 100 100 100 100 100 100 10	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1.234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 3.735.77 \$ 1.2,801.49 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37	\$ 2,650,000 \$ -	
			0.218	L U U U U U U U U U U U U U U U U U U U	Steel Support ostream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Mockbolts 1* @ 15' Stream Upper Portal Rockbolts 1* @ 15' mostream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Steel Mesh Steel Mesh Steel Mosh Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 19' Steel Mesh Steel Support Antal to Roof Anchors 3/4* @ 6' Cess Tunnel to Gate Chamber Rockbolts 1* @ 12' Rockbolts 1* @ 19' Steel Mesh Steel Support al-Misc Steelwork cal	207 240 290 130 200 100 100 63 779 2,279 9 2,279 9 133 13 0 0 0 0 0 0 0 0 0 0 0 0 0	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 735.77 \$ 6.37 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 93.61	\$ 2,650,000 \$ 180,000 \$ 386,000 \$ 386,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 0.000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -	
				L U U U U U U U U U U U U U U U U U U U	Steel Support streen Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Lower Portal Rockbolts 1* @ 15' Rockbolts 1* @ 15' Wastream Lower Portal Rockbolts 1* @ 15' wmstream Lopper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 25 Rockbolts 1* @ 25' Rockbolts 1* @ 15' Steel Mesh Steel Support Metal Steel Support al-Misc Steelwork cal Stream Lower Gates	207 240 240 300 300 300 300 300 300 300 300 300 3	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 36.37 \$ 12,801.49 \$ 39.61 \$ 12,801.49 \$ 93.61 \$ 12,801.49 \$ 93.61 } 12,801.49 } 12,8	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 100,000 \$ - \$ 70,000 \$ 120,000 \$ 10,000 \$ - \$ 660,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - > -	
				L U U U U U U U U U U U U U U U U U U U	Steel Support sotream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wnstream Upper Portal Rockbolts 1* @ 15' wnstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Steel Mesh Steel Mosh Steel Support Metal to Roof Anchors 34* @ 6' cockbolts 1* @ 12' Rockbolts 1* @ 12 Rockbolts 1* @ 12 Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 15' Steel Mesh Steel Support Jahres Steelwork cal Mass Steelwork cal Gate Equipment	207 240 240 300 300 300 300 300 300 300 300 300 3	EA EA EA EA EA EA EA EA EA EA EA EA SF TON SF	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 735.77 \$ 6.37 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 93.61	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 100,000 \$ - \$ 70,000 \$ 120,000 \$ 10,000 \$ - \$ 660,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - > -	
				L U U U U U U U U U U U U U U U U U U U	Steel Support streen Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' wmstream Lower Portal Rockbolts 1* @ 15' Rockbolts 1* @ 15' Wastream Lower Portal Rockbolts 1* @ 15' wmstream Lopper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 25 Rockbolts 1* @ 25' Rockbolts 1* @ 15' Steel Mesh Steel Support Metal Steel Support al-Misc Steelwork cal Stream Lower Gates	207 240 240 300 300 300 300 300 300 300 300 300 3	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 36.37 \$ 12,801.49 \$ 39.61 \$ 93.61	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 100,000 \$ - \$ 70,000 \$ 120,000 \$ 10,000 \$ - \$ 660,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - > -	
				L U U U U U U U U U U U U U U U U U U U	Steel Support sotream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wnstream Upper Portal Rockbolts 1* @ 15' wnstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @25' nergency Release Chambers Rockbolts 1* @ 15' Steel Mesh Steel Mosh Steel Support Metal to Roof Anchors 34* @ 6' cockbolts 1* @ 12' Rockbolts 1* @ 12 Rockbolts 1* @ 12 Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 12' Rockbolts 1* @ 15' Steel Mesh Steel Support Jahres Steelwork cal Mass Steelwork cal Gate Equipment	207 240 290 130 200 100 100 100 100 100 100 100 100 10	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1,234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 1,234.86 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 36.37 \$ 12,801.49 \$ 39.61 \$ 93.61	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$	
				L U U U U U U U U U U U U U U U U U U U	Steel Support stream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' swnstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' wmstream Upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Rockbolts 1* @ 15' Steel Support Metal to Roof Anchors 3/4* @ 6' cess Turnel to Gate Chamber Rockbolts 1* @ 12' Rockbolts 1* @ 9' Steel Support Ident Support Ident Support Rockbolts 1* @ 9' Steel Support Ident Support Ident Support Ident Support Ident Support Ident Support Steel Support Ident Support	207 240 290 130 200 100 100 100 100 100 100 100 100 0 100 0 0 0 0 0 0 0 0 0 2,775 2,775 2 2 2 2 2	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1.234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 5,073,120.00 \$ 2,840,080.00	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$	
				L U D D D D D D D D D D D D D	Steel Support Distream Lower Portal Rockbolts 1* @ 15' Anchors 1* @ 25' Stream Upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' with the stream upper Portal Rockbolts 1* @ 15' Anchors 1* @ 25' with the stream upper Portal Rockbolts 1* @ 15' Retaining Wall Anchors 1* @ 25' Retraining Wall Anchors 1* @ 25' Redex Chambers Rockbolts 1* @ 15' Steel Support Metal to Roof Anchors 3/4* @ 6' Tunnel to Gate Chamber Rockbolts 1* @ 15 Steel Support Heats Steel Support Steel Support Jackbolts 1* @ 19' Steel Support Jackbolts 1* @ 26' Steel Support Steel Support Jackbolts 1* @ 26' Steel Support Stef	207 240 290 130 200 100 100 100 100 100 100 100 100 0 100 0 0 0 0 0 0 0 0 0 2,775 2,775 2 2 2 2 2	EA EA EA EA EA EA EA EA EA EA EA EA EA E	\$ 735.81 \$ 1.234.86 \$ 735.81 \$ 735.81 \$ 735.81 \$ 735.81 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 1.234.86 \$ 342.42 \$ 342.42 \$ 528.34 \$ 432.12 \$ 6.37 \$ 12,801.49 \$ 342.42 \$ 5,073,120.00 \$ 2,840,080.00	\$ 2,650,000 \$ - \$ 180,000 \$ 360,000 \$ - \$	

				Low Watana BCC (Expandable) Alternative (A	Turbines + 2 Additional Bays)			Denotes Qty Adjustment by RST
	FERC Line #	Sub Categories			Quantity Units	Unit Price	Line Price	
N N <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
				Downstream Upper Outlet		9	-	
Image: Problem in the state of the state				Stoplog Guides	1 LS	\$ 82,950.00	80,000	
All of the second se				Low Level Release		9	-	
Image: Section of the section of t			_	Slide Gates Include Steel Liner	9 EA	\$ 3,517,470.00	31,660,000	
Image: Section of the section of t		0.00						
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Image: Section of the sectio		0.22		RCC	978 000 CY	\$ 100.00		
Image: Section of the section of t	-	0.222	>	Pre-cofferdam	370,000 01	φ 100.00		
Image: Section of the sectio					23,400 CY	\$ 10.90 \$	255,000	
Image: second		0.223	3	Cutoff Slurry Wall				
Image: Constraint of the second of					5,100 CY		25,000	
					46,000 SF	\$ 72.44 \$	3,332,000	
Image: state		0.220	1	Dewatering	410	¢ 5 007 005 00 0	5 000 000	
Image: Constraint of the second sec					115	\$ 22 377 990 00	22 378 000	
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Image: Section of the section of t								
Image: constraint of the second of the s				RCC	261,300 CY	\$ 100.00		
Image: Second		0.232	2					
Image: state in the state i	L			Rock Fill	23,400 CY	\$ 10.90 \$	255,000	
Image: Constraint of the		0.233	3	Cutoff Slurry Wall				
Image: state in the state i		+ $+$ $+$ $-$						
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Image: Section between 1400 94.648 CV 8 10.84 S 9.0.7000 Image: Section between 1400 23.39 CV 8 10.84 S 9.0.7000 Image: Section between 1400 33.00 CV 8 10.84 S 9.0.7000 Image: Section between 1400 17.78 CV 8 10.31 S 9.0.7000 Image: Section between 1400 17.78 CV 8 10.000 S 7.00000 S 7.00000 S Image: Section between 1400 17.78 CV 8 10.000 S 7.00000 S 7.00000 S 7.00000 S Image: Section between 1400 17.80000 S 7 5 10.000 S 5 7.00000 S Image: Section between 1400 17.80000 S 5 11.30 S 5 3.11 S 2.20000 Image: Section between 1400 17.8000 S 5 3.11 S 2.20000 10.000 S				Overburden above el. 1470	367,381 CY	\$ 11.53	4,236,000	
Image: Section of the sectio				Overburden below el. 1470	964,693 CY	\$ 11.06 \$	10,670,000	
Image: Second								
Image: Constraint of the second of				Rock Usable below el. 1470		\$ 43.72	3,790,000	
Image: Second								
Image: Section of the sectin of the section of the section	-	0.212		Rock Waste below el. 1470	157,669 CY	\$ 50.18	7,912,000	
Image: Constraint of the second se	-	0.312	2		7 600 000 CY	\$ 100.00	760.000.000	
Image: Section Provides P				Base RCC		\$ 100.00		
Image: Section Programme in the section of the sectin of the sectin of the section of the section of the section of th		0.313	3			φ 100.00 (,	
Image: Second				Surface Preparation				
Image: Solution of the second secon				Under Core/Filters above el. 1500	911,200 SF	\$ 3.11 \$	2,834,000	
Image: Second								
Image: Second	-		_	Under Shell above el. 1500	2,821,184 SF		6,066,000	
Image: Second					1,405,696 SF	\$ 2.15	3,022,000	
Image: Second	-		_	Consolidation Grout	100 400 LE	¢ 11.01	2 268 000	
Image: second								
Image: Sector of the				Grout Curtain	130,400 01	φ 07.01 ξ	12,511,000	
Image: Second					252.960 LF	\$ 26.76	6.769.000	
Image Image <th< td=""><td></td><td></td><td></td><td></td><td>101,184 CF</td><td></td><td>8,206,000</td><td></td></th<>					101,184 CF		8,206,000	
Image Image <th< td=""><td></td><td></td><td></td><td>Dental Concrete</td><td></td><td></td><td></td><td></td></th<>				Dental Concrete				
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $				Dental Concrete	85,000 CY	\$ 365.33 \$	31,053,000	
Image: Contract Road Deck Image		0.317	7	Drainage				
Image: Second Second Second Deck 22,500 CY \$ 544.85 \$ 13,894,000 Image: Second Second Deck 5,400 CY \$ 544.85 \$ 2,942,000 Image: Second Deck 5,000 CY \$ 544.85 \$ 2,942,000 Image: Second Deck Soud CY \$ 544.85 \$ 2,942,000 Image: Second Deck Soud CY \$ 544.85 \$ 2,942,000 Image: Second Deck Soud CY \$ 544.85 \$ 2,942,000 Image: Second Deck Excavation Image: Second Deck \$ 54.85 \$ 2,942,000 Image: Second Deck Excavation Image: Second Deck \$ 54.85 \$ 2,942,000 Image: Second Deck Image: Second Deck Excavation Image: Second Deck Second Deck \$ 54.85 \$ 2.942,000 Image: Second Deck Excavation Image: Second Deck Second Deck Second Deck Second Deck Second Deck Image: Second Deck Rock Horizontal 0 CY \$ 394.80 \$ 510,000 Image: Second Deck Second Deck Image: Second Deck Rock Horizontal 1,300 CY \$ 394.80 \$ 510,000 Image: Second Deck Second Deck Second Deck Second Deck <td></td> <td></td> <td>+</td> <td></td> <td>73,984 LF</td> <td>\$ 51.32</td> <td>3,797,000</td> <td></td>			+		73,984 LF	\$ 51.32	3,797,000	
Image: Second		0.318		Druge Precest Bridge Beams	25 500 CV	\$ EAA OF	13 904 000	
Image: book of the second o			+ +					
0.32Grout Galeries/PortalsMMM <td></td> <td></td> <td></td> <td>Piers</td> <td>500 CY</td> <td>\$ 544.85</td> <td>272.000</td> <td></td>				Piers	500 CY	\$ 544.85	272.000	
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $		0.32	0				,	
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $		0.321	1	Excavation		9	-	
Image: constraint of the system of the sy				Tunnels/ Shafts- Core Area		3	; -	
Image: Second								
Image: Sector of the								
Image: Section of the section of t		+ $+$ $+$ $-$			0 CY	\$ 536.19	-	
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $			+ +	I unnels/ Shatts- Access	1 200 /02	\$ 204.00	- E10.000	
Image: constraint of the sector of the se			+ +					
Image: Concrete and Shotcrete Overburden Rock 2,900 CY \$ 17.16 \$ 50,000 0.323 Surface Preparation 800 CY \$ 49.16 \$ 40,000 0.323 Surface Preparation \$ - \$ - 0 Portals 24 SF \$ 2.30 \$ - 1 Inclined 160 SF \$ 3.33 \$ - 0 0.324 Concrete and Shotcrete \$ - 0 Ununels- Core Area \$ - 1 Concrete Plugs 267 CY \$ 428.25 \$ 10,000					200 01	÷ 332.33 3		
Image: Second					2.900 CY	\$ 17.16		
Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Preparation Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Preparation Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Preparation Image: Surface Preparation Image: Surface Preparation Image: Surface Preparation Image: Preparation Image: Preparation Image: Preparation Image: Preparation Image: Preparation						\$ 49.16	40,000	
Image: Concrete Plugs Concrete Plugs Concrete Plugs Concrete Plugs Concrete Plugs Source Plugs		0.323	3	Surface Preparation				
Image: Concrete and Shotcrete Image: Concrete and Shotcrete Image: Concrete and Shotcrete S Image: Conconcr								
Image: Concrete and Shotcrete S - 0.324 Concrete and Shotcrete \$ - 1 Tunnels- Core Area \$ - 1 Concrete Plugs 267 CY \$ 428.22 \$ 110,000					24 SF	\$ 2.30 \$	-	
0.324 Concrete and Shotcrete \$ - - - Tunnels-Core Area \$ - - - Concrete Plugs 267 CY \$ 428.32 \$ 10,000				Inclined	160 SF	\$ 3.33		
Image: Second state		0.00	.	Constate and Shotorate				
Concrete Plugs 267 CY \$ 428.32 \$ 110,000		0.324	+				-	
					267 CY	\$ 428.22	110.000	
			+ +	Concrete Slab	600 CY			
Concrete Overbreak 6* OCY \$ 755.66 \$ -			+ +					
Operation Operation <t< td=""><td></td><td></td><td></td><td></td><td>21 TON</td><td></td><td></td><td></td></t<>					21 TON			

					Low Watana RCC (Expandable) Altornative	e (4 Turbines + 2 Additional Bave)				Denotes Qty Adjustment by RST
FERC Line #	Sub Cateo	ories			Low Watana RCC (Expandable) Alternative Description	Quantity Units	Unit Price	Line Price	Total	Notes / Remarks
					2" Shotcrete		\$ 5.26 \$	-		
				Tunn	els-Access		\$	-		
					Concrete Slab	160 CY	\$ 944.82 \$	150,000		
					Concrete Overbreak 6"		\$ 755.86 \$	60,000		
					Reinforcing Steel		\$ 2,887.51 \$	20,000		
					2" Shotcrete	538 SF	\$ 5.26 \$	-		
				Shaf	2" Shotcrete	4,000 SF	\$ 5.26 \$	- 20,000		
				Dorte		4,000 SF	\$ 5.26 \$	20,000		
				Porta	Concrete	16 CY	\$ 406.36 \$	10,000		
					Reinforcing Steel		\$ 2,887.51 \$	-		
		0.325		Support an	d Anchors	2 101	¢ 2,007.01 ¢	-		
				Tunn	els- Core Area		\$	-		
					Rockbolts 3/4" @6'	0 EA	\$ 327.15 \$	-		
					Steel Mesh		\$ 5.37 \$	-		
					Steel Support	0 TON	\$ 12,801.49 \$	-		
				Tunn	els- Access		\$	-		
					Rockbolts 3/4" @6'		\$ 327.15 \$	40,000		
					Steel Mesh		\$ 5.37 \$	-		
			+	Shaf	Steel Support	2 TON	\$ 12,801.49 \$	30,000		
		-	+ +	onar	Rockbolts 3/4" @6'	280 EA	\$ 327.15 \$	90,000		
					Steel Mesh		\$ 5.37 \$	-		
				Porta			φ <u>5.57</u> \$	-		
		1			Rockbolts 1" @15'	24 EA	\$ 735.81 \$	20,000		
		0.329		Architectura	al Portal Doors		\$	-		
				Porta	al Doors	1 LS	\$ 33,900.00 \$	30,000		
	0.			strumentation			\$	-		
		0.331		Instrumenta	ation	1 LS	\$ 8,657,610.00 \$	8,660,000		
	0.4	44	Relict Ch	annel			\$	-		
	0.	0.411		hore Protection Excavation			\$	-		
		0.411	+ +		burden Stripping 2' thick	2,200 CY	\$ 11.56 \$	30,000		
		0.412	+ +	Fill		2,200 01	\$ 11.50 \$ \$	- 30,000		
		0.112		Dum	p and Spread		ŝ	-		
					Filter Material - 2' layer	2,200 CY	\$ 31.93 \$	70,000		
					Rock Spalls/ Rip Rap- 3' Ave		\$ 9.86 \$	30,000		
				Shor	e Protection		\$	-		
					Rip Rap		\$ 24.26 \$	580,000		
					Waste Rock	24,000 CY	\$ 22.78 \$	550,000		
	0.			hannel Filter Blar	iket		\$	-		
		0.442		Fill	se Filter	2,900,000 CY	\$ 33.85 \$	- 98.170.000		
					Filter		\$ 33.85 \$ \$ 43.65 \$	95,160,000		
				Rip F			\$ 24.26 \$	4,420,000		
		0.443		Surface pre		102,000 01	φ 24.20 φ \$	-		
				Foun	dation Prep		ŝ	-		
					Clearing and Grubbing	460 ACRE	\$ 3,963.11 \$	1,820,000		
					Excavation	2,236,000 CY	\$ 15.62 \$	34,930,000		
	0.5		Outlet Fa	cilities						
	0.		0	utlet Facilities- (Ir	ntake Civil Work Include in Power Intake)					
		0.511	+ +	Excavation		a 1 1 1 000 01				
	+ $-$		+	Inlet		(Included in 332.611)				
	+ +	-	+ +	Outle		(Included in 332.521)				
	+ + -	-	+ +	Tunn	Rock Horizontal	0 CY	\$ 103.00 \$	-		
	+		+ +		Rock Inclined		\$ 183.49 \$	-		
		0.513		Surface Pre	eparation/ Grouting		. 100.10 V			
		1		Inlet		(Included in 332.613)				
				Outle	et	(Included in 332.523)				
				Tunn		0 SF	\$ 2.30 \$	-		
					act Grouting	0 LS	\$ 569,428.05 \$	-		
		0.514		Concrete a	nd Shotcrete					
		_	+	Inlet		(Included in 332.614)				
	+ $+$ $+$		+ $+$	Outle		(Included in 332.524)				
	+ +	-	+ +	Tunn	Concrete Lining	0 CY	\$ 944.82 \$			
		-	+ +		Concrete Overbreak 6"		\$ 944.82 \$ \$ 440.92 \$	-		
	+		+ +		2" Shotcrete		\$ 5.26 \$	-		
					3" Shotcrete		\$ 7.69 \$	-		
		0.515		Support an						
		1		Inlet		(Included in 332.615)				
				Outle	et	(Included in 332.525)				
				Tunn						
					Rock Bolts 1" @6'	0 EA	\$ 327.15 \$	-		
			_					-		
					Steel Mesh	0 SF	\$ 6.37 \$	-		
		0.516		Mechanical	- Low Level Outlet	0 SF	\$ 6.37 \$	-		
		0.516		Mechanical Inlet	- Low Level Outlet					
		0.516		Mechanical Inlet	- Low Level Outlet	1 LS	\$ 6.37 \$ \$ 1,540,500.00 \$ \$ 3,317,040.00 \$	- 1,541,000 6,634,000		

					Low Watana RCC (Expandable) Alternative (4 T	urbines + 2 Additional	Bavs)				Denotes Qty Adjustment by RST
FERC Line #	Sub C	ategori	es		Description	Quantity		Unit Price	Line Price		Notes / Remarks
				Outlet	•						
					Fixed Cone Valves 6 +1 Spare		LS	\$ 4,500,630.00	\$ 4,501,000		
				H	Ring Follower Gates Steel Manifold Liner	6	EA TON	\$ 1,936,494.80 \$ 8,952.53	\$ 11,619,000 \$ 9,848,000		
	_				Misc Mechanical Equipment		LS	\$ 8,952.53 \$ 948,000.00	\$ 9,848,000 \$ 948,000		
					Misc Electrical Systems	1	LS	\$ 237,000.00	\$ 237,000		
		0.52	Main (Chu		y (Includes Civil Works for Outlet Facilities)			•			
			0.522 St	epped Spillw	vay						
				Convent	tional Concrete - Steps	55,300		\$ 544.85	\$ 30,130,000		
					cing Steel - Steps	1,340		\$ 2,887.51			
	_			Reinford	tional Concrete - Training Walls sing Steel - Training Walls	3,600	TON	\$ 544.85 \$ 2.887.51	\$ 1,961,000 \$ 260,000		
			0.523 Sti	illing Basin		30	TON	φ 2,007.51	φ 200,000		
					tional concrete	8,400	CY	\$ 544.85	\$ 4,577,000		
					cing Steel	185	TON	\$ 2,887.51	\$ 534,000		
	_			Excavat		13,000	CY	\$ 50.18	\$ 652,000		
			0.524 Co	Drill Hole	Grouting	7,000	1.5	\$ 11.91	\$ 83,000		
				Cement	es	7,000		\$ 67.81	\$ 475,000		
				Grout C	urtain	7,000		φ 07.01	φ 4/3,000		
			0.525 St	upport and A	nchors						
				Drainag	e Tunnel						
					Steel Support		TON	\$ 12,801.49	\$ 90,000		
					Steel Mesh	1,000	SF	\$ 5.87	\$ 6,000		
					Its Drainage Gallery 3/4" @ 6'	576	EA	\$ 330.19	\$ 190,000		
					Its Approach	576		÷ 330.19	÷ 130,000		
					1" @ 15'	275	EA	\$ 741.28	\$ 204,000		
				Rockbol	Its Chute and Structure						
					1" @ 15'	112	EA	\$ 741.28	\$ 83,000		
					Its Valve Block/Bucket	46	EA	¢ 741.00	¢ 24.000		
	_				1" @ 15' all Anchors	46	EA	\$ 741.28	\$ 34,000		
					1" @ 10'	9,300	FA	\$ 474.06	\$ 4,409,000		
			0.527 Dr	rainage							
				Drill Hole	es						
					Box Drains (To Drain Tunnel)	54,000		\$ 47.95	\$ 2,589,000		
			0.52c Me	echanical	3" Relief	640	LF	\$ 49.50	\$ 32,000		
	_		0.520	Gate Eq	uinment	0	EA	\$ 4,249,280.00	\$ -		
				Stoplog			SETS	\$ 92,196.88	\$ -		
				Stoplog	s Includes Follower		SET	\$ 945,840.00	\$-		
				Misc Ele	ectrical		LS	\$ 237,000.00	\$-		
	0.6				and Inlet Structure Civil Works for Outlet)						(same as embankment dam)
		0.61	Intake Str	ucture and A	Approach						
			0.611 Ex	Overbur		19,100	CY	\$ 14.87	\$ 284,000		764,000 Cyd calculated Excavation Volume. Assume 25% is overburden
				Rock Us		573,000		\$ 40.27	\$ 23,075,000		764,000 Cyd calculated Excavation Volume. Assume 25% is overburden
			0.613 SL	urface Prepa							· · ·
				Horizont		125,000		\$ 2.30	\$ 288,000		Calculated 125,000 sq ft
				Inclined		151,000	SF	\$ 3.33	\$ 503,000		Calculated 60,300 sq ft
			0.614 Co	oncrete and							
				Structur	e Concrete Structure	121,000	CY	\$ 544.85	\$ 65.927.000		Same as embankment, as power intake and outlet structure intake will be similar
					Concrete - Apron Slab	3,500		\$ 545.85	\$ 1,910,000		Same as embankment, as power intake and outlet structure intake will be similar Same as embankment, as power intake and outlet structure intake will be similar
				(Concrete Overbreak 12" H/6" V	0	CY	\$ 336.99	\$-		No Overbreak if formed integral to dam
					Reinforcing Steel		TON	\$ 2,887.51			Same as embankment, as power intake and outlet structure intake will be similar
					Anchors- 1" @ 15'	400	EA	\$ 735.81	\$ 294,000		
			0.61c Me	echanical			SETS	\$ 1,080,960.00	\$ 4,324,000		
					cks and Guides guipment	4	SETS EA	\$ 1,080,960.00 \$ 1,902,720.00	\$ 4,324,000 \$ 7,611,000		
					d Gates Guides		SETS	\$ 1,902,720.00	\$ 901,000		
					d Gates inc Follower		SET	\$ 698,120.00	\$ 698,000		
				Shutter	with Guides	4	SETS	\$ 720,640.00	\$ 2,883,000		
					n with Hoist		SETS	\$ 1,238,600.00	\$ 4,954,000		
					n Guides		SETS	\$ 563,000.00	\$ 2,252,000		
				Bubbler	Service Crane		EA LS	\$ 693,700.00 \$ 948,000.00	\$ 694,000 \$ 948,000		
				Misc Ele			LS	\$ 237,000.00	\$ 237,000		
			0.61d Int	take Building			LS	\$ 237,000.00	\$ 237,000		
	0.7		Surge Chamber		·						
		0.71	Surge Ch	amber							
			0.711 Ex	cavation	2				•		
				Chambe Vent Sh			CY	\$ 90.12 \$ 601.04	\$- \$-		
			0.713 Su	urface Prepa			SF	\$ 601.04 \$ 2.30	φ - \$ -		
	1			oncrete and		0	5	φ 2.30	Υ.		
							1	1			
				Concret	e	0	CY	\$ 513.35	\$ -		
				Concrete	te Overbreak	0	CY	\$ 440.92	<u></u> - \$ -		
				Concrete	te Overbreak sing Steel	0			\$-		

RC Line # Sul	- Cotta	orio-			Low Watana RCC (Expandable) Alternative (4 1	Quantity	udys)	11-34 B-1	Line Bel		Denotes Qty Adjustment by RST
	b Categ	ories		-	Description	Quantity	Units	Unit Price	Line Price	lotal	Notes / Remarks
	-	-		+	Vent Shaft		05	-			
			_	_	2" Shotcrete	0	SF	\$ 5.26	\$-		
		0.71	5		Supports and Anchors						
					Rockbolts 1" @25' HY		EA	\$ 1,234.86			
					Rockbolts 1" @ 15'		EA	\$ 735.81	\$ -		
					Steel Mesh	0	SF	\$ 5.81			
					Steel Support	0	TON	\$ 12,671.94	\$ -		
					Vent Shaft						
					Rock bolts 3/4" @ 6'	0	EA	\$ 327.15	s -		
					Steel Mesh		SF	\$ 6.30			
		0.71	7		Drainage Holes (In Chamber)		LF	\$ 47.95			
		0.71			Mechanical	0		φ 47.55	- پ		
	_	0.71	C	_			0570	¢ 700.000.00	¢		
		_			Stoplog Guides		SETS	\$ 709,380.00	ş -		
					Stoplog Includes Follower	0	SET	\$ 3,558,160.00	ş -		
C).8		Pens	tocks							
	0.			Pensto							
		0.81	1		Excavation						
					Tunnels						
					Rock Horizontal	116,946	CY	\$ 144.77	\$ 16,930,000		Increase by ratio of penstock length (2350/1075) = 2.19
					Rock Inclined	54,000	CY	\$ 286.15			
		0.81	3		Surface Preparation/Grouting	01,000	1	. 200.10			Increase by ratio of penstock length (2350/1075) = 2.19
		0.01	-		Surface Preparation						Increase by ratio of pensiook length (2350/1075) = 2.19
						007.000	ee.	¢ 0.00	¢ 0.757.000		Increase by ratio of penetock length ($2250/1075$) = 2.19
					Tunnels	827,820	51	\$ 3.33	\$ 2,757,000		Increase by ratio of penstock length (2350/1075) = 2.19
					Contact Grouting						Increase by ratio of penstock length (2350/1075) = 2.19
					Contact Grouting	1	LS	\$ 1,258,336.33	\$ 1,258,000		Increase by ratio of penstock length (2350/1075) = 2.19
					Consolidation Grouting						Increase by ratio of penstock length (2350/1075) = 2.19
					Consolidation Grouting	1	LS	\$ 1,746,016.92	\$ 1,746,000		Increase by ratio of penstock length (2350/1075) = 2.19
		0.81	4		Concrete and Shotcrete						Increase by ratio of penstock length (2350/1075) = 2.19
					Concrete Liner	81,468	CY	\$ 970.01	\$ 79,025,000		Increase by ratio of penstock length (2350/1075) = 2.19
					Concrete Overbreak 6"	23,214	CY	\$ 692.87	\$ 16.084.000		Increase by ratio of penstock length (2350/1075) = 2.19
											Increase by ratio of pensious length (2350/1073) = 2.13
					Reinforcing Steel	59	TON	\$ 2,858.29			Increase by ratio of penstock length (2350/1075) = 2.19
					3" Shotcrete	74,460	SF	\$ 7.69			Increase by ratio of penstock length (2350/1075) = 2.19
					2" Shotcrete	45,552	SF	\$ 5.26	\$ 240,000		Increase by ratio of penstock length (2350/1075) = 2.19
		0.81	5		Support and Anchors						Increase by ratio of penstock length (2350/1075) = 2.19
					Rockbolts 1" @ 25'	329	EA	\$ 1,234.86	\$ 406,000		Increase by ratio of penstock length (2350/1075) = 2.19
					Rockbolts 1" @ 6'	9,198		\$ 327.15			Increase by ratio of penstock length (2350/1075) = 2.19
					Steel Mesh	422,670	SE	\$ 6.37			Increase by ratio of penstock length (2350/1075) = 2.19
		0.81	0		Structural Misc Steelwork	5,256	TON	\$ 9,673.24			Increase by ratio of penstock length (2350/1075) = 2.19
).9	0.01		an Work	s (1 Portal with Combined Tailrace/Diversion Tunnel	5,230	TON	φ 5,073.24	φ 30,0 4 3,000		increase by failo of peristock length (2350/10/5) = 2.15
L			Tallia								
	0.			I ailrac	Tunnels/Portals						
		0.91	1		Excavation						
					Tunnels						
					Rock	0	CY	\$ 103.00	\$-		
					Portals						
					Overburden	0	CY	\$ 17.14	s -		
					Rock Usable		CY	\$ 49.16			
		1			Rock Waste		CY	\$ 49.16			
		0.01	2			0	51	Ψ 43.10	÷ -	1	
		0.91	J		Surface Preparation		l	+			
	_	_		-	Tunnels		05				
		_			Tunnels	0	SF	\$ 3.33	s -		
					Portals						
					Horizontal		SF	\$ 2.30			
		1			Inclined		SF	\$ 3.33			
1		0.91	4		Concrete and Shotcrete	-					
	-	0.01	-		Tunnels			1			
		-		+	Concrete Lining		CY	\$ 440.92	\$	1	
		+			Concrete Overbreak 6"					1	
		+					CY				
					2" Shotcrete		SF	\$ 5.26	s -		
					Reinforcing Steel	0	TON	\$ 2,887.51	ş -		
					Portals						
					Concrete Base Slab	0	CY	\$ 651.93	\$ -		
					Concrete Walls		CY	\$ 651.93	\$-		
	-				Concrete Overbreak 12" H/6" V		CY	\$ 471.65			
				+	Reinforcing Steel		TON	\$ 2,887.51		1	
			-			0	1 OIN	ψ 2,007.51	ψ -		
				-	Support and Anchors			+			
		0.91	5		Tunnels		1				
		0.91	5				EA	\$ 528.34			
		0.91	5		Rockbolts 1" @ 12'		EA	\$ 432.12			
		0.91	5		Rockbolts 1" @ 12' Rockbolts 1" @ 9'		LA				
		0.91	5		Rockbolts 1" @ 9'	0	TONS		\$ -		
		0.91	5		Rockbolts 1" @ 9' Steel Support	0	TONS	\$ 12,801.49			
		0.91	5		Rockbolts 1" @ 9' Steel Support Steel Mesh	0					
		0.91	5		Rockbolts 1* @ 9' Steel Support Steel Mesh Portals	000000000000000000000000000000000000000	TONS SF	\$ 12,801.49 \$ 6.37	\$-		
					Rockholts 1* @ 9' Steel Support Steel Mesh Portals Rockholts 1* @ 15'	000000000000000000000000000000000000000	TONS	\$ 12,801.49	\$-		
		0.91			Rockbolts 1* @ 9' Steel Support Steel Mesh Portals Rockbolts 1* @ 15' Mechanical	000000000000000000000000000000000000000	TONS SF EA	\$ 12,801.49 \$ 6.37 \$ 735.81	\$ - \$ -		
					Rockholts 1* @ 9' Steel Support Steel Mesh Portals Rockholts 1* @ 15'		TONS SF EA SET	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00	\$ - \$ -		
					Rockbolts 1" @ 9' Steel Support Steel Mesh Portals Rockbolts 1" @ 15' Mechanical Stoplog Guides		TONS SF EA	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00	\$ - \$ -		
		0.91			Rockobits 1* @ 9' Steel Support Steel Mesh Portals Rockobits 1* @ 15' Mechanical Stoplog Guides Stoplogs Includes Follower		TONS SF EA SET	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00	\$ - \$ -		
	0.	0.91			Rockbolts 1* @ 9' Steel Support Steel Mesh Portals Rockbolts 1* @ 15' Mechanical Stoplog Guides Stoplogs Includes Follower Outlet Channel	000000000000000000000000000000000000000	TONS SF EA SET SET	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00 \$ 751,200.00	\$ - \$ - \$ - \$ -		Multiply by ratio of increased structure length (485/265) – 1 220
	0.	0.91			Rockbolts 1* @ 9' Steel Support Steel Mesh Pontals Rockbolts 1* @ 15' Mechanical Stoplog Guides Stoplogs includes Follower outlet Channel Tailrace Outlet Channel Concrete - Slab	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	TONS SF EA SET SET CY	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00 \$ 751,200.00 \$ 544.85	\$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$		Multiply by ratio of increased structure length (485/365) = 1.329
	0.	0.91			Rockolits 1* @ 9' Steel Support Steel Mesh Portals Rockobits 1* @ 15' Mechanical Stoplog Guides Stoplogs Includes Follower a Outlet Channel Tailrace Outlet Channel Concrete - Slab Tailrace Outlet Channel Concrete - Training Wallis	0 0 0 0 0 0 0 5,569 1,185	TONS SF EA SET SET CY CY	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00 \$ 751,200.00 \$ 544.85 \$ 544.85	\$ - \$ - \$ - \$ - \$ - \$ - \$ 3,030,000 \$ 650,000		
	0.	0.91			Rockbolts 1* @ 9' Steel Support Steel Mesh Pontals Rockbolts 1* @ 15' Mechanical Stoplog Guides Stoplogs includes Follower outlet Channel Tailrace Outlet Channel Concrete - Slab	0 0 0 0 0 0 0 5,569 1,185	TONS SF EA SET SET CY	\$ 12,801.49 \$ 6.37 \$ 735.81 \$ 112,600.00 \$ 751,200.00 \$ 544.85	\$ - \$ - \$ - \$ - \$ - \$ 3,030,000 \$ 650,000		Multiply by ratio of increased structure length (485/365) = 1.329 Used same Ratio of reinforcing steel to concrete volume for draft tubes (660/8000). for embankment dam \$ 3.202.800.000

					Low Watana RCC (Expandable) Alternative (4 Turb						Denotes Qty Adjustment by RST
FERC Line #	Sub C				Description	Quantity	Units	Unit Price	Line Price	Total	Notes / Remarks
		0.11		Turbi	nes and Governors						
			0.111		Supply						
			0.112		Install						
	0.2				and Exciters						
	_	0.21		Gene	rators and Exciters (Supply and Install)						
			0.211		Generators and Exciters				• • • • • • • • • • • •		
	0.3				om Vendor (includes all equipment in this category)	4	EA	\$ 74,200,000.00	\$ 297,000,000	\$ 297,000,000	*Still only purchase (4) 150 MW Units
				Average from	n acquired quotes						
004				Electrice	I Fouriement						
<u>334</u>	0.1		Access	ory Electrica	I Equipment						
	0.1				, Supports and Structures						
		0.11	0.111	Siluc	Structures (included Below)						
		0.12		Cond	uctors and Insulators						
		0.12	0.121	Cond	Generator Isolated Phase Bus	1	LS	\$ 5,056,000.00	\$ 5,060,000		
			0.121		HV Power Cables and Accessories		LS	\$ 2,054,000.00			
			0.122		LV Power Cables and Accessories		LS	\$ 948,000.00			
			0.123		Control Cables and Accessories		LS	\$ 1,738,000.00			
			0.124		Grounding System		LS	\$ 237,000.00			
		0.13			uits and Fittings			¢ 201,000.00	¢ 210,000		
	1	0.10	0.131	00110	Conduits and Fittings	1	LS	\$ 632,000.00	\$ 630,000		
	0.2		0.101	Switchgear a	and Control Equipment		20	¢ 002,000.00	φ 000,000		
	0.2	0.21			ary Transformers		1	1	1		
	1	5.21	0.211		Auxiliary Transformers	4	EA	\$ 83,811	\$ 340,000		*Assumes 2 additional systems would be purchased at time of expansion.
	1	0.22		Circu	it Breakers Generators		1		\$ -	İ	
	1	1	0.221		Circuit Breakers Generators	4	EA	\$ 1,504,300	\$ 6,020,000		*Assumes 2 additional transformers would be purchased at time of expansion.
	1	0.23		Sura	Protectors and Generator Cubicles		1				
			0.231		Surge Protectors and Generator Cubicles	1	LS	\$ 726,800.00	\$ 730,000		*Assumes 2 additional systems would be purchased at time of expansion.
		0.24	_		h boards						
			0.241		Switch boards	1	LS	\$ 1,232,400.00	\$ 1,230,000		*Assumes 2 additional systems would be purchased at time of expansion.
		0.25		Auxil	ary Power Equipment						
			0.251		Auxiliary Power Equipment	1	LS	\$ 347,600.00	\$ 350,000		*Assumes 2 additional systems would be purchased at time of expansion.
	0.3				Appurtenances						
		0.31		Conti	ol, relay and meter boards						
			0.311		Control, relay and meter boards	1	LS	\$ 1,422,000.00	\$ 1,420,000		*Assumes 2 additional systems would be purchased at time of expansion.
		0.32		Com	outer Control System						
			0.321		Computer Control System	(Included in Trans	-Ems)				
		0.33		Supe	rvisor and Telemeter System						
			0.331		Supervisor and Telemeter System	Included in Trans	EMS)				
	0.4			Power Trans							
		0.41		Powe	r Transformers	-	= .	\$ 2.000.000	• • • • • • • • • •		
			0.411		Power Transformers	/	EA	\$ 2,000,000	\$ 14,000,000		
	0.5			Lighting Cup							
	0.5	0.51		Lighting Sys	rhouse and Transformer Gallery						
		0.31	0.511	FOWe	Powerhouse and Transformer Gallery	1	LS	\$ 1,824,900.00	\$ 1,820,000		
		0.52		Acce	ss Tunnels and Roads	1	13	\$ 1,024,500.00	φ 1,020,000		
		0.52	0.521	AUCC	Access Tunnels and Roads	0	LS	\$ 402,900.00	\$ -		
			0.021		Access Fullines and roads		20	φ 402,500.00	Ψ		
	0.6			Misc. Electri	cal Equipment						
		0.61		Misc.	Electrical Equipment						
	1		0.611		Misc. Electrical Equipment	1	LS	\$ 625,680.00	\$ 630,000		
	1	1					-				
	0.7	1		Surface Acc	essory Equipment		1		İ	İ	
		0.71		34.5	kV and LV Equipment				1		
			0.711		Switchboard	1	LS	\$ 213,300			
			0.712		Cables	1	LS	\$ 450,300	\$ 450,000		
			0.713		Aux Transformers	1	LS	\$ 284,400	\$ 280,000		
-		0.73		Diese	I Generator- Standby						
			0.731		Diesel Generator- Standby	2	EA	\$ 347,550	\$ 700,000		
		0.74		Exter	ior Lighting						
			0.741		Exterior Lighting	1	LS	\$ 355,500	\$ 360,000		
		0.75		Mimie	Board- Control Building						
	-	I	0.751		Mimic Board- Control Building	1	LS	\$ 1,185,000	\$ 1,190,000		
4/-										\$ 40,000,000	
335	0.1	I	MISC PC	werplant Eq							Line Coll Materia Data
	0.1	0.11		Auxiliary Sys	stems- Underground						Used Full Watana Data
		0.11		Statio	n Water Systems	-	1.0	\$ 4,977,000.00	\$ 4,977,000		Used Full Watana Data
		0.12	0.111	Eire 1	Station Water Systems Protection Systems	1	LS	\$ 4,977,000.00	\$ 4,977,000		Used Full Watana Data Used Full Watana Data
		0.12	0.121	Fire	Fire Protection Systems	1	LS	\$ 2,844,000.00	\$ 2,844,000		Used Full Watana Data Used Full Watana Data
		0.13		Com	pressed Air Systems	1	10	⇒ ∠,844,000.00	φ 2,844,000		Used Full Watana Data
		0.13	0.131	Com	Compressed Air Systems	4	LS	\$ 3,555,000.00	\$ 3,555,000		Used Full Watana Data
						1	2.5	φ 3,355,000.00	φ 3,555,000		Used Full Watana Data
		0.14									
		0.14		Oil H	Andling Systems	1	15	\$ 2 370 000 00	\$ 2,370,000		
			0.141		Oil Handling Systems	1	LS	\$ 2,370,000.00	\$ 2,370,000		Used Full Watana Data
		0.14	0.141		Oil Handling Systems age & Dewatering						Used Full Watana Data Used Full Watana Data
		0.15	0.141	Drain	Oil Handling Systems age & Dewatering Drainage & Dewatering		LS LS	\$ 2,370,000.00 \$ 5,214,000.00			Used Full Watana Data Used Full Watana Data Used Full Watana Data
			0.141	Drain	Oil Handling Systems age & Dewatering	1			\$ 5,214,000		Used Full Watana Data Used Full Watana Data

					Low Watana RCC (Expandable) Alternative (4 Turbin	es + 2 Additional F	Bays)				Denotes Qty Adjustment by RST
Image: state in the	FERC Line #	Suh	ategor	es	Description	Quantity	Units	Unit Price	Line Price		
operation <	LING LINE #	Jub C	alegor							i Jidi	
Port Port <th< td=""><td></td><td>0.2</td><td></td><td></td><td></td><td></td><td></td><td>φ 2,310,000.00 \$</td><td>2,370,000</td><td></td><td></td></th<>		0.2						φ 2,310,000.00 \$	2,370,000		
Image: Problem into a state of sta		0.2	0.21	Auxiliary Systems- Surface	Purface Excilition						
			0.21	0 211 Auxiliary Systems- C	tome Surface Excilition	1	19	\$ 711.000.00 \$	711 000		
$ \begin{array}{ c c c c c } \hline c c c \\ c c c \\ c c c \\ c c c \\ c c c c$		0.3		Auxiliary Equipment			20	φ 711,000.00 φ	711,000		Used Full Watana Data
Image: state		0.5	0.31		8						
Image: Second frame and second fr			0.01	0 311 Powerbouse	Cranes	2	FΔ	\$ 1,783,800,00 \$	3 568 000		
			0.32		oranes	2	LA	φ 1,700,000.00 φ	0,000,000		
Image: Not set in the			0.02	0.321 Elevators		1	LS	\$ 545 100 00 \$	545 000		
			0.33		es and Hoists		20	φ 010,100.00 φ	010,000		
Image: state in the			0.00	0.331 Miscellaneou	Is Cranes and Hoists	1	LS	\$ 505,500,00 \$	506.000		
			0.34				20	φ 000,000.00 φ	000,000		
No. Resultant Compart Polade Interact Mark Control No.			0.01			1	LS	\$ 2.022.000.00 \$	2.022.000		
		0.4				(Included in Mecha	anical And		2,022,000		
100 100 100 100 100 100 100 100 1 1 1 100 100 100 100 100 100 100 100 1 1 100 100 100 100 100 100 100 100 1 1 1 100 100 100 100 100 100 100 1 1 1 1 100 100 100 100 100 100 1 1 1 1 100 100 100 100 100 100 1 1 1 100 1000 100 100 100 100 100 1 1 1 1000 1000 100 100 100 100 1 1 1 1000 1000 100 100 100 100 1 1 1 10000 10000 10000 10000 10000 1 1 1 100000 10000 10000 10000 1 1 100000 100000 100000 100000 1 1 1000000		0.5		Communications Equipment	at a second second second second second second second second second second second second second second second s	1	IS	\$ 213,300,00 \$	213 000		
Note Note Note Note Note Note Note Note I 1 1 Note Note Note Note Note I 1 1 Note Note Note Note Note I 1 1 1 Note Note		0.0		Contribution Equipmon			20	φ 210,000.00 φ	210,000		ood f dii ffatana bata
	336	Road	s. Rails	and Air Facilities						• •••••••••	
Image: style				Pioneer Roads and	Bridges						
Image: Section of the sectin of the section of the				0.111 Gold Creek-	Watana						
Image: Second						0	ACRE	\$ 11.416.62 \$	-		
						0	CY			†	
Image: Section of the section of t						0	CY	\$ 8.32 \$	-	†	
Image: Section of the section of th										1	
Image: Second						0	LS	\$ 32,760.98 \$	-	1	
Image: Section of the section of t						0	TON			†	
Image: Second						0	SY	\$ 6.73 \$	-	1	
				Mainte						1	
Image: Section of the section of t				0.112 Gold Creek-	Parks	-				1	
Image: Second										1	
Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Execution Image: Control Executio					Clearing	0	ACRE	\$ 11.416.62 \$	-	1	
Image: Section Sequence Image: Section Sequence Image: Section Section Sequence Image: Section Sectin Sectin Section Section Section Section Sectin Sectio					Waste Excavation					1	
Image: Section of the section of t										1	
Image: Second						0	LF	\$ 62.55 \$	-	1	
Image: Second					36" Culverts	0	LS		-	1	
Image: Second					D-1 Base Material	0			-	1	
Image: Second										-	
Image: Normal Problems Provided Costing (Solid Problems) Image: Normal Problems Problems Problems Image: Normal Problems Problems Image: Normal Problems Problems Problems Problems Problems Problems Problems Image: Normal Problems Problems Image: Normal Problems				Mainte					-	1	
Image: Construction of the second on the second o						-		• •,•••••		1	
Image: Second control backward on the second control backward control backw					ing (7.88 Miles)					1	
Image: Second						0	ACRE	\$ 11.416.62		1	
Image: Second					Waste Excavation					1	
Image: Section of the sectio										1	
Image: Section of the section of t						0	CY			-	
Image: Section of the section of th										-	
Image: Section of the section of th						0	LS	\$ 120.000.000.00		-	
Image: Second						0				-	
Image: Sector						0	MI/YR	\$ 11,258,74		-	
Image: Control of the second of the						-		•		-	
Image: Control of the second of the				0.114 Gold Creek	Watana (41.25 miles)	0	LS	\$ 28,132,000		-	
Image: Normal system Parks Highway to Watan (22 m) O MI \$ 3,000,000,00 \$ 0.125 Sutina Bridge 0 SF \$ 450,00 \$ 0.2 RalFacilities 0 SF \$ 450,00 \$ 0.24 Permanent Ralicod (ncluding ralibeds) 0.24 Permanent Ralicod (ncluding ralibeds) 0.24 Gold Creek to Watana Rali 0.24 Gold Creek to Watana Rali 0.24 Commo Excavation 1687883 CY \$ 9.51 \$ 16,051,766 0.24 Commo Excavation 307678 CY \$ 28.51 \$ 259,867 0.24 Borrow 44900 CY \$ 11.416.62 \$ 7,662,183 0.24 Borrow 44900 CY \$ 18.55 12.002,807 0.24 Borrow 44900 CY \$ 18.55 12.002,807 0.24 Dock Excavation 9014 CY \$ 3.85,600 \$ 3.11,455 0.24 Dock Lumber 16000 CY \$ 3.95,600 \$ 3.9						-		+		-	
Image: Market			0.12	Permanent Roads a	nd Bridges					†	
Image: Market						0	MI	\$ 3,000,000,00 \$	-	†	
Image: Control of the contro								\$ 450,00 \$	-	†	
Image: Non-Section of the constraint of the constrain						Ŭ		· · · · · · · · · · · · · · · · · · ·		†	
Image: Non-Section of the constraint of the constrain		0.2		Rail Facilities						1	
Image: Constraint of the constraint				Permanent Railroad	(including railheads)					1	
Image: Control of the control of th										1	
Image: Second										1	
Image: Second second						671	AC	\$ 11.416.62 \$	7.662.183	†	
Image: Sector of the sector						1687883	CY				
Image: Constraint of the second of the se						3307678	CY				
Image: Second						9114	CY	\$ 28.51 \$	259,867	1	
Image: Subballast 711055 CY \$ 18.15 \$ 12,902,807 Image: Subballast Grade 'A' Base Material 6665 CY \$ 35.45 \$ 235,729 Image: Subballast D-1 Base material 2400 TON \$ 43.20 \$ 103,680 Image: Subballast Subballast C.Surfacing 2200 TON \$ 198.00 \$ 435,600 Image: Subballast Subballast Dock Lumber 16MBF \$ 12,586,60 \$ 20,138 \$ 435,600 Image: Subballast Subballast Subballast Image: Subballast Subballast Subballast Subballast \$ 18,00 \$ 435,600 Image: Subballast Subballast Subballast Image: Subballast Subballast Subballast Subballast Subballast \$ 12,902,807 Image: Subballast Subballast Subballast Image: Subballast Subballast Subballast Subballast \$ 435,600 \$ 435,600 Image: Subballast Subballast Subballast Image: Subballast Subballast Image: Subballast Subballast \$ 12,902,807 Image: Subballast Subballast Subballast Image: Subballast Subballast Image: Subballast Subballast \$ 12,902,807 Image: Subballast Subb						449500	CY			1	
Image: Section of the second second section of the second section of the second		1				711055	CY			†	
Image: Constraint of the second of the se		1								†	
Image: Sector of the sector					D-1 Base material	2400				1	
Image: Second										†	
Image: Section of the section of th						16	MBF	\$ 1.258.60 \$	20.138	†	
Image: Constraint of the constr								\$ 68.26 \$	1,371,458		
Image: Section of the section of th					36" + Culverts			\$ 92.160.00 \$	-	†	
Image Image 1 Thave Pipes 41843 LF \$ 9.504 \$ 3.976,745 Image Topsoil & Seed 431 AC \$ 10,800.00 \$ 4.653,267 Image Rail Yard Control Devices 1 LS \$ 1,800.00 \$ 1.800 Image Bridges 0 SF \$ 900.00 \$ - Image Image 325940 LF \$ 350.00 \$ 114,079,000						12930	SY		116,369	†	
Image: Constraint of the state of					Thaw Pipes	41843	LF			†	
Image: Constraint of the constrated of the constraint of the constraint of the constraint of the											
Bridges 0 SF \$ 900.00 \$ - Image: Second					Rail Yard Control Devices						
Image Trackage 325940 LF \$ 350.00 \$ 114,079,000						0	SF		-	†	
									114.079.000	†	
						0_0010			,,	†	
Maintenance				Maintenance		İ				†	
Rail 406 Mile-year \$ 10,00.00 \$ 4,060,000						406	Mile-vear	\$ 10.000.00 \$	4,060.000	†	
								· · · · · · · · · · · · · · · · · · ·	,,	<u> </u>	

				Low Watana RCC (Expandable) Alternative (4 Turbine	as + 2 Additional	Bave)				Denotes Qty Adjustment by RST
FERC Line #	Sub (ategor	ies	Description	Quantity	Units	Unit Price	Line Price	Total	Notes / Remarks
		J		Railhead		years	\$ 75,000.00 \$	525,000		
		0.13								
	_		0.131 Construction R	Roads				15 000 000		
	_		Site Roa Mainten			Mile MI/YRS	\$ 750,000.00 \$ \$ 223,092.85 \$	15,000,000 22,755,000		
			0.132 Permanent Ro		102	IVII/ TRO	\$ 223,092.05 \$	22,755,000		
				ent Roads	6	MILE	\$ 1,287,997.42 \$	7,728,000		
								1		
	0.3		Airstrip							
		0.31								
			Permanent Air		1	LS LS	\$ 12,798,000.00 \$	12,798,000		
	_		9 years mainte Temporary Air	enance savings		LS	\$ 2,133,000.00 \$	2,133,000		
	0.4		Saved Maintenance	sup		LS	\$ (5,067,889.52) \$	(5,068,000)		
	0.1		Caroa Maintenance			20	¢ (0,007,000.02) ¢	(0,000,000)		
									\$ 254,700,000	
			Transmission Plant							
350	+		Land and Land Rights				+			
330	+		Land and Land Rights			<u> </u>	+ +			
	+		Transmission		33	MILE	\$ 86,720.00 \$	2,862,000		Copied from Low Watana Non Expandable
	1		Substations (4 Sites)			LS	\$ 2,607,000.00 \$	2,002,000		Left the same as Full Watana RCC
									\$ 2,862,000	
352			Substation and Switching Station							
	0.1		Switchyard							
		0.11	Switchyard		2	LS	\$ 14,000,000.00 \$	28,000,000	* ****	Left the same as Full Watana RCC
353	+		Substation/Switching Station Family	amont			+		\$ 28,000,000	
333			Substation/Switching Station Equip	inent	0	LS	\$ 57,922,800.00 \$			
			Willow		0	LS	\$ 3,613,020.00 \$			
			Knik Arm			LS	\$ 29,838,300.00 \$	-		
			University			LS	\$ 88,685,400.00 \$	-		
			Devil Canyon			LS	\$ 35,585,550.00 \$	-		
			Willow Energy Management	System (EMS)			• • • • • • • •			
-	_		Equipment and System			LS	\$ 27,326,100.00 \$ \$ 11,660,400.00 \$	-		
			Microwave Communic EMS Control Center B			LS LS	\$ 9,148,200.00 \$			
			Watana and Devil Car	nyon In-plant Monitor and Control Equipment	0	LS	\$ 8,619,690.00 \$	-		
					-		• •,•••,••••• •		\$-	
<u>354</u>			Steel Towers and Fixtures							
			Towers (Including Foundation	n and Hardware)	33	miles	\$ 4,500,000.00 \$	148,500,000		Used same length as Transmission Land Rights
									\$ 148,500,000	
356			Conductors and Devices Conductors		0	MILE	\$ 218,281.33 \$	-		
			Submarine Cables				\$ 218,281.33 \$ \$ 15,808,340.56 \$			
			Cabina into Cabios		0	2/10/1	¢ 10,000,010.00 ¢		\$-	
359			Roads and Trails							
			Roads and Trails			MILE	\$ 75,744.00 \$	15,149,000		Left the same as Full Watana RCC
			Clearing and Roads		340	MILE	\$ 37,872.00 \$	12,876,000	*	Left the same as Full Watana RCC
	_								\$ 28,000,000	\$ 207,362,000
	-					1	<u> </u>			
			General Plant				1			
						İ				
389			Land and Land Rights							
			Land and Land Rights				\$	-		
	_									
<u>390</u>	-		Structures and Improvements	•						
	+		Structures and Improvements	5			\$	-		
<u>391</u>	+		Office Furniture and Equipment			1				
<u></u>	1		Office Furniture and Equipme	ent			\$	-		
392			Transportation Equipment							
			Transportation Equipment				\$	-		
000			Stores Equipment			<u> </u>	+			
<u>393</u>	-		Stores Equipment				\$	-		
	+		Stores Equipment			<u> </u>	\$	-		
<u>394</u>	+		Tools Shop and Garage Equipment			1				
	1		Tools Shop and Garage Equipment	ipment			\$	-		
				·			Ť			
<u>395</u>			Laboratory Equipment							
			Laboratory Equipment				\$	-		
<u>396</u>	_		Power-Operated Equipment			I	1			

FERC Line #	Sub C	ategories	Low Watana RCC (Expandable) Alternative (4 Turbin Description	Quantity	Units	Unit Price	Line Price	Tota	Denotes Qty Adjustment by RST Notes / Remarks
FERG Line #	Sub C	Power-Operated Equipme		Quantity	Units		-	TOLA	Notes / Remarks
	_	Power-Operated Equipme	ent			\$	-		
397	_	Communications Equipment							
397	-	Communications Equipment				S	-		
	_	Communications Equipm	ent			\$	-		
200	_	Minaritan and Fredrigant							
<u>398</u>	_	Miscellaneous Equipment							
	_	Miscellaneous Equipmen				\$	-		
	_								
399		Other Tangible Property							
		Other Tangible Property			LS	\$ 16,000,000 \$	16,000,000		Copied from Low Watana Non Expandable
		Saved Maintence		1	LS	\$ (231,220) \$	(231,000)		Copied from Low Watana Non Expandable
								\$ 15,800,000	
		Indirect Costs							
<u>61</u>		Temporary Construction Faciliti							
		Temporary Construction	acilities						
<u>62</u>		Construction Equipment							
		Construction Equipment							
63		Main Construction Camp							
	0.1	Main Construction Camp		1	LS	\$ 316,340,280			Reduce Unit price by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
		Saved Maintence			LS	\$ (6,172,493.27)			
		Site Preparation		3270533					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
		Buildings		15019120					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
		utilities		12172667					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = $(7.6/15.0)$
		dunidoo		30462320		\$ 152,311,600.00			Reduce Qty by ratio of Low Watana Volume to High Watana Volume = $(7.6/15.0)$
				00102020		\$ 102,011,000.00			
		MAIN CONSTRUCTION	//ULAGE						
		site prep	TELAGE	3540080					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
	-	buildings		10008187					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0) Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
	_	utilities		4914160					Reduce Qty by ratio of Low Watana Volume to High Watana Volume = (7.6/15.0)
	-	utilities		18462426.67		\$ 92,312,133.33			Reduce Qty by fallo of Low Watana Volume to High Watana Volume = (7.6/15.0)
	_			10402420.07	0	\$ 92,312,133.33 \$	450 044 000	¢ 400.000.000	Camp cost to reflect lower volume (0.8125) *Previous Estimate doesn't total Con. Car
	_	Labor Francis				\$	152,311,600	\$ 123,800,000	Camp cost to reflect lower volume (0.8125) "Previous Estimate doesn't total Con. Cal
64	_	Labor Expense		. .					
	_	Labor Expense		(Included In Direc	t Costs)				
<u>65</u>		Superintendence							
		Superintendence		(Included In Direc	t Costs)				
66		Insurance			1				
		Insurance		(Included In Direct	t Costs)				
<u>68</u>		Mitigation Fishery, Terrestrial ar	d Recrational						
		Mitigation		(Not included in 1	982 study)	\$	-		
<u>69</u>		Fees							
		Fees							
Subtotal						Direct Co	instruction Cost	\$ 3,113,300,000	
	Conti	ngency		21.313	%			\$ 663,500,000	Used Same Contingency as Full RCC
Subtotal									· ·
<u>71A</u>		Engineering (4%), Enviornmenta	I (2%), Regulatory(1%) and Construction Management (4	2 7	%			\$ 217,900,000	
71B		Construction Management (4%)		4	%			\$ 124,500,000	
72		Legal Expenses			<u>%</u>			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
75		Taxes			%				
76		Administrative & Gen. Expenses			%				
77		Interest	•	<u>, , , , , , , , , , , , , , , , , , , </u>	%				
	-	Earnings/Expenses During Cons	struction		%				
80 tal Project C		Earnings/Expenses During Cons	situction		70			\$ 4.119.200.000	

of Years for Full Watana

20.5 years 16.5 years

HDR/AEA Susitna Hydroelectric Project Cost Estimates for 1982 quantities- Alternatives

Cost Estimates for 1982 quantities - Alternatives By: DTA By: Leanne Andruszkiewicz, EIT Date: 1/25/09 Reviewed By: David Elwood, EIT Date: 1/25/09, <u>Modified by Hatch Acres mb 061109, R&M 11/16/09</u> Alternatives - 2008 Dollars Low Watana RCC (Non-Expandable) Estimate 10/28/10 used as basis Modified by Hatch Associates Consultants, Inc.,RST_10/28/10 Low Watana RCC Arch Alternative (<u>Turbines</u>) Description:

							Modified by Hatch Associates Consultants, Inc						
	0.1.4			1			Low Watana RCC Arch Alternative (4		1.1.14				Denotes Qty Adjustment by RST
FERC Line #	Sub (Catego		l			Description	Quantity	Units	Unit Price	Line Pric	e Total	Notes / Remarks
<u>330</u>			Land a	nd Land Righ	ts					-			
	0.1			Land					LS	\$ 120,870,000.00	\$ 120,870,00	0	
	0.2			Land Rights				Included Above					
	0.3			Misc Charges	s in Cr	redit	Above	Included Above					
												\$ 120,900,000	
331			Powerp	plant Structur	e Imp	rove	ements						
	0.1			Powerhouse									
		0.11		Power	house	e an	d Draft Tube						
			0.111		Exca								
							werhouse Rock	914,400	CY	\$ 43.72	\$ 39,978,00	0	
							werhouse Overburden	609,600		\$ 11.53			
							aft Tube Rock		CY	\$ 90.12			
Total	Total	Ectimo	0.113		Surf		Preparation/ Grouting			φ 30.12	Ψ		
Total	TUtai	Louina	0.113		June		werhouse	108,000	SE	\$ 3.33	\$ 360,00	1	
	-											5	
	_						aft Tube		SF	\$ 3.33			
							out Curtain- Drill holes	47,700		\$ 27.63			
					-		out Curtain- Cement	19,000	UCF	\$ 81.10	\$ 1,541,00	U L	
			0.114		Cond		and Shot Crete						
		1			1		werhouse Concrete	62,356		\$ 544.85		0	
		1					werhouse Concrete Overbreak		CY	\$ 447.21			
							werhouse Reinforcing Steel		TON	\$ 2,858.29		0	
							werhouse 4" Shotcrete) SF	\$ 10.14			
		1	1				aft Tube Concrete		CY	\$ 692.87			
						Dr	aft Tube Concrete Overbreak		CY	\$ 447.21	\$ -		
					1		aft Tube Reinforcing Steel		TON	\$ 2,858.29			
							aft Tube 2" Shotcrete		SF	\$ 5.45			
			0.115		Supr		and Anchors				•		
			0.110		Capp		werhouse Rockbolts 1" @ 25' Hy	148	EA	\$ 1,234.86	\$ 180,00	2	
							werhouse Rockbolts 1" @ 15'		EA	\$ 735.81			
							werhouse Steel Mesh	6,821		\$ 5.81			
							werhouse Steel Support		TON	\$ 12,671.94	\$ 270,00		
							aft Tube Rockbolts 1" @ 25' Hy					,	
									EA	\$ 1,234.86			
	_						aft Tube Rockbolts 1" @ 12'		EA	\$ 528.34			
							aft Tube Rockbolts 1" @ 9'		EA	\$ 432.12			
							aft Tube Steel Mesh		SF	\$ 6.55			
			0.117		Hole		/S of Powerhouse)		LF	\$ 51.32			
							eles (Powerhouse Crown)	0) LF	\$ 51.32			
			0.118		Struc		al- Misc Steelwork				\$-		
						Po	werhouse and Draft Tube- Steel Crane Rails		LS	\$ 10,276,309.00			
			0.119		Arch	itect	ural- Powerhouse	1	LS	\$ 5,500,000.00	\$ 5,500,00	D	
v			0.11c		Mech	hani	cal						
						Dr	aft Tube Gates	4	SETS	\$ 427,880.00	\$ 1,712,00	D	
							aft Tube Gate Guides		SETS	\$ 202,680.00			
							aft Tube Crane		LS	\$ 1,140,000.00			
	-	0.12		Acces	s Tun		and Portals		1	,,	,		
		52	0.121	1.0003	Exca				1			1	
		1	0.121				ain Tunnel	r	CY	\$ 97.45	\$ -		
		-			1		ansformer Gallery Tunnel		CY	\$ 97.45			
		1			+		outing Gallery Tunnel		CY	\$ 396.04			
		1		<u> </u>	+		rge Chamber Access Tunnel		CY	\$ 145.22			
L	_	1			1		nstock Access Tunnel					+	
		+			<u> </u>				CY	\$ 145.22			
		I		├ ── │	1		nstock Elbow Access Tunnel		CY	\$ 145.22		+	
					<u> </u>		cess Shaft Tunnel		CY	\$ 145.22			
					<u> </u>		nnector Tunnel		CY	\$ 379.26			
		1			1		rtals Overburden		CY	\$ 17.14			
		1					rtals Rock	0	CY	\$ 49.31	\$-		
			0.123		Surfa		Preparation						
							ain Tunnel Slab) SF	\$ 2.21	\$ -		
							instock Access Slab	C) SF	\$ 2.21			
						Hc	rizontal Portal	C) SF	\$ 2.30			
					1		clined Portal) SF	\$ 3.33			
			0.124		Conr		and Shot Crete						
		1			1		ain Portal	1	1			1	
		1			1		Concrete Slab	(CY	\$ 406.27	\$ -		
		 	1		+	+-	Concrete Walls		CY	\$ 406.27		1	
		+		<u> </u>	+	-	Concrete Overbreak		CY	\$ 368.48			
		+		<u> </u>	+	-	Reinforcing Steel		TON	\$ 2,887.51			
		1	<u> </u>	1 1	+	+		C	NUN	φ ∠,887.51	φ -	-	
		+		<u> </u>	<u> </u>	IU	nnels		01		^		
		1			I		Concrete Slab Main Tunnel	I (CY	\$ 503.90	\$ -	1	

FERC Line # Stoc Categories Description Quantity Unit Price Line Price Line Price Tota Image: Concrete Outprice Number Science Outprices Outprices Number Science Outprise Number Science Outprise Number Science Outprice	Notes / Remarks
Image: Second	
Image: Stell Reinforcing Stell O [70N \$ 2.887.51 \$ Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.526 \$ - Image: Stotzet Man Turnel OSF \$ 5.627 \$ - Image: Stotzet Man Turnel OSF \$ 6.637 \$ - Image: Stotzet Man Turnel OSF \$ 6.637 \$ - Image: Stotzet Man Turnel OSF \$ 6.637 \$ -	
Image: Solution of the Main Tunnel 0 SF \$ 5.26 \$ - Image: Solution Target Surge Chamber Acc 0 SF \$ 5.28 \$ - Image: Solution Target Surge Chamber Acc 0 SF \$ 5.28 \$ - Image: Solution Target Surge Chamber Acc 0 SF \$ 5.26 \$ - Image: Solution Target Surget Chamber Access 0 SF \$ 5.26 \$ - Image: Solution Target So	
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Image: Second	Image: Control of the sector of the
$ \left \begin{array}{c c c c c c c } & 2 & 3^{-} Shotore Forstock Elbow Acc & 0 & SF & $ 5.26 & $ \\ \hline 2 & 2^{-} Shotorete Grout Gallery & 0 & SF & $ 5.26 & $ \\ \hline 2 & 2^{-} Shotorete Grout Gallery & 0 & SF & $ 5.26 & $ \\ \hline 2 & 2^{-} Shotorete Grout Gallery & 0 & SF & $ 5.26 & $ \\ \hline 1 & 2 & Support and Anchors & 0 & $ & $ & $ & $ & $ & $ & $ & $ & $$	
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Main Tunnel Main Tunnel	
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Image: Steel Mesh OEA \$ 327.15 \$ Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 TON \$ 12,801.49 \$ - Steel Surge Chamber Access Tunnel Image: Steel Mesh 0 TON \$ 528.34 \$ Rockbolts 1* @ 12 0 EA \$ 528.34 \$ - Rockbolts 1* @ 12 0 EA \$ 432.12 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 TON \$ 12,801.49 \$ - Steel Mesh 0 TON \$ 12,801.49 \$ - Rockbolts 1* @ 12 0 EA \$ 528.34 \$ - Rockbolts 1* @ 12 0 EA \$ 432.12 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Rockbolts 1* @ 12 0 EA \$ 432.12 \$ -<	
Steel Mesh 0 SF \$ 6.37 \$ - Stree Support 0 TON \$ 12,801.49 \$ - Rockobits 1" @ 12" 0 EA \$ 528.34 \$ - Rockobits 1" @ 12" 0 EA \$ 432.12 \$ - Bitel Mesh 0 SF \$ 6.37 \$ - Perstock Access Tunnel 0 EA \$ 432.12 \$ - Perstock Access Tunnel 0 TON \$ 12,801.49 \$ - Perstock Access Tunnel 0 TON \$ 12,801.49 \$ - Perstock Access Tunnel - - - - Perstock Access Tunnel - - - - Rockobits 1" @ 12" 0 EA \$ 528.34 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Perstock Elboy Access Tunnel - - - - Perstock Elboy Access Tunnel - - - - Perstock Elboy Access Tunnel - -	
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Rockboils 1" @ 12' D EA \$ 528.34 \$ - Rockboils 1" @ 9' 0 EA \$ 432.12 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Support 0 TON \$ 12,801.49 \$ - Rockboils 1" @ 12' 0 EA \$ 528.34 \$ - Rockboils 1" @ 12' 0 EA \$ 432.12 \$ - Rockboils 1" @ 12' 0 EA \$ 528.34 \$ - Rockboils 1" @ 12' 0 EA \$ 528.34 \$ - Steel Mesh 0 SF \$ 6.37 \$ - - Steel Mesh 0 SF \$ 6.37 \$ - - Steel Mesh 0 SF \$ 6.37 \$ - - Steel Mesh 0 SF \$ 6.37 \$ - - Steel Mesh 0 SF \$ 6.37 \$ - -	
Rockobits 1* @ 9' 0 EA \$ 432.12 \$ - Steel Mesh 0 \$F \$ 6.37 \$ - Steel Steel Mesh 0 TON \$ 12,801.49 \$ - Penstock Elbow Access Tunnel 0 F \$ 528.34 \$ - Rockobits 1* @ 12' 0 EA \$ 528.34 \$ - - Rockobits 1* @ 9' 0 EA \$ 6.37 \$ - Steel Mesh 0 \$F \$ 6.37 \$ -	
Steel Mesh 0 SF \$ 6.37 \$ - Steel Support 0 TON \$ 12,801.49 \$ - Penstock Elbow Access Tunnel - - - Rockbolts 1* @ 12' 0 EA \$ 528.34 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 SF \$ 6.37 \$ - Steel Mesh 0 TON \$ 12,801.49 \$ -	
Steel Support O TON \$ 12,801.49 \$ - Penstock Elbow Access Tunnel - <t< td=""><td></td></t<>	
Penstock Elbow Access Tunnel Control Control <thcontrol< th=""> Control <thcont< td=""><td></td></thcont<></thcontrol<>	
Rockboits 1* @12' 0 EA \$ 528,34 \$ - Rockboits 1* @ 9 0 EA \$ 432,12 \$ - Steel Mesh 0 SF \$ 6,7 \$ - Steel Steel Mesh 0 TON \$ 12,801.49 \$ -	
Rockobits 1* @ 9' 0 EA \$ 432.12 \$ - Steel Mesh 0 \$F \$ 6.37 \$ - Steel Steel Support 0 TON \$ 12,801.49 \$ -	
Steel Support TON \$ 12,801.49 \$ -	
Access Shaft Tunnel	
Rockbolts 1" @12' 0 EA \$ 528.34 \$ -	
Rockbolts 1* @ 9' 0 EA \$ 432.12 \$ -	
Steel Mesh SF \$ 6.37 \$ -	
Image: Steel Support O TON \$ 12,801.49 \$ -	
Connector Tunnel	
Rockbolts 3/4" @ 6' 0 EA \$ 327.15 \$ -	
Steel Mesh 0 SF \$ 6.37 \$ -	
Steel Support 0 TON \$ 12,801.49 \$	
0.129 Architectural-Main Portal Doors 0[SETS \$ 158,371.90 \$ -	
0.12c Mechanical Ventilation System Included in (63.81 and 63.82) 0.13 Access Shaft Included in (63.81 and 63.82)	
0.13 ACCESS STAIL CESS	
0.131 L2.6294001100.4 005 \$ 221.0 \$ -	
0.134 Concrete and Shot Crete	
Concrete Lining 0 CY \$ 944.82 \$ -	
Concrete Overbreak 6* 0 CY \$ 551.14 \$ -	
0.135 Support and Anchors - Rockbolts 3/4" @ 6' OEA \$ 327.15 \$ -	
0.138 Structural Miss Steelwork 0 TON \$ 7,395.00 \$ 0.100 Architectural constra Dutling O TON \$ 7,395.00 \$	
0.139 Architectural- control Building	
0.13c Mechanical Elevators 0 LS \$ 2,368,815.00 \$ - 0.14 Fire Protection Head Tank	
0.14 rife Protection read rank 0/CY \$ 43.72 \$ -	
0.143 Surface Preparation 0 SF \$ 2.30 \$ -	
0.144 Concrete & Shotcrete	
Concrete 208 CY \$ 963.72 \$ 200,000	
Concrete Overbreak 6* 0 CY \$ 406.27 \$ -	
Image: Provide and the second secon	
0.145 Support and Anchors 0.145 Support and Anchors 0.146 Support 0.146 Suppor	
Rockbolts 1* @ 12' 0 EA \$ 528.34 \$ - Rockbolts 1* @ 9' 0 EA \$ 432.12 \$ -	
NOLADOIS 1 @ 9 U [2A 3 42,12 3 - Steel Mesh 0 [SF \$ 6.30 \$ -	
Steel initial 0 [3] 3 0.30 3 - Steel Support 0 [70 N] \$ 12,671,95 [\$ - - - -	
0.148 Misc StepPort 01LS \$ 73,297.50 \$ 70,000	

ERC Line #	Sub	ategories	T		Low Watana RCC Arch Alternative Description	Quantity Units		Unit Price	Line Price	Tota	Denotes Qty Adjustment by RST Notes / Remarks
LIG LINE #	Sub t			Masharia		Quantity Office		Unit Frice	LINEFICE	1018	Notes / Reinaiks
		0.14c			al Piping/Valves						
		0.15			als for 3 Bus Tunnels)						
		0.151		Excavation			\$	040 70			
					k Horizontal	0 CY 0 CY	Ψ	213.70 \$	<u> </u>		
		0.450			k Inclined		\$	601.04 \$			
		0.153			reparation-Tunnels	0 SF	\$	3.33 5	-		
		0.154			and Shotcrete						
					crete Slab	0 CY	\$	818.84			
					crete Overbreak 12"	0 CY	\$	472.41 \$	-		
					nforcing Steel	0 TON	\$	2,858.29			
					hotcrete	0 SF	\$	5.26	-		
		0.155		Supports a	and Anchors				-		
					kbolts 1" @ 25'	0 EA	\$	1,234.86			
					kbolts 1" @ 12'	0 EA	\$	528.34			
					kbolts 1" @ 9'	0 EA	\$	432.12			
					el Mesh	0 SF	\$	6.30			
					el Support	0 TON	\$	12,671.94	ş -		
		0.16		Transformer Galle							
		0.161		Excavation		0 CY	\$	87.44			
		0.163			reparation	0 SF	\$	2.30	ş -		
		0.164		Concrete a	and Shotcrete						
	L				crete Base Slab	0 CY	\$	544.85			
				Con	crete Overbreak 12"H/6"V	0 CY	\$	377.93			
			1		nforcing Steel	0 TON	\$	2,858.29			
		0.165	1		nd Anchors						
					kbolts 1" @ 25'	0 EA	\$	1,234.86	6 - I		
				Roci	kbolts 1" @ 15'	0 EA	\$	735.81	-		
			1		el Mesh	0 SF	\$	5.81 \$			
			1		el Support	0 TON	\$	12,671.94			
		0.167	1	Drainage H		0 LF	\$	47.95			
		0.17	<u> </u>	Cable Shafts			1				
		0.171		Excavation	n Bock	0 CY	\$	601.04	ы. —		
		0.173			reparation Shafts	0 SF	\$	3.33			
		0.173			and Shotcrete	001	Ψ	0.00	,		
		0.174			Icrete Lining	0 CY	\$	1,763.66	- 6		
				Con	crete Overbreak 6"	0 CY	\$	881.83			
		0.475					\$	327.15			
		0.175			and Anchors- Rockbolts 3/4" @ 6'	0 EA 12 TON	\$ \$	15.602.00			
					Steel Support Towers		-				
		0.179			ral- Enclosures	0 LS	\$	199,317.00			
		0.17c		Mechanica		0 EA	\$	476,960.00	s -		
		0.18		Dewatering (durin							
		0.181			g (Power Facilities)	1 LS	\$	1,336,798.50	\$ 1,340,000		
		0.19		Instrumentation							
		0.191		Instrument	tation	1 LS		1,714,813.50			
	0.2			Buildings (Control E	Buildings)	1 LS	\$ 4	4,433,085.00 \$	\$ 4,430,000		
	0.3		Perma	anent Town		(included in 63.5)					
			_						\$	121,219,000	
<u>332</u>	0.4			voir, Dams and W	vaterways						
	0.1			voir		00.000 1005	•	0.005.05	00 405 000		
		0.11		Reservoir Clearin		23,000 ACRE	\$	3,005.85	69,135,000		
	0.2		Divers	ion Schemes /Coff							
		0.21		Diversion Tunnels				9			
		0.211		Excavation				5			
				Corr	nbined Tunnels			5	-		
					Rock	171,580 CY	\$	92.33			Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100
				Corr	nbined Upstream Portals						
					Rock	35,000 CY	\$	49.16	\$ 1,720,000		
				Corr	nbined Downstream Portals			0,			
-					Rock Usable	75,000 CY	\$	49.16	\$ 3,690,000		
				Eme	ergency Release Chambers			5			
					Excavate Concrete for Plugs	1,139 CY	\$	101.98	\$ 120,000		
					Gate Chamber	2,975 CY	\$	110.73	\$ 330,000		
					ess Tunnel to Gate Chamber			5			
				Acce	ess runner to Gate Chamber		\$	97.15	- S		
				Acce	Rock	0 CY	Φ				1
		0.212			Rock		э \$		\$ 270.000		
		0.212		Fill- Temp	Rock for Coffer Dam to Construct Upstream Portals	0 CY 23,000 CY	\$	11.66			
				Fill- Temp Surface Pr	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting		\$	11.66	ş -		
				Fill- Temp Surface Pr	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal	23,000 CY	э \$ \$	11.66	6 - 6 -		
				Fill- Temp Surface Pr	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal	23,000 CY 3,200 SF	\$	11.66 \$ 2.30 \$	6 - 6 - 6 10,000		
				Fill- Temp Surface Pr Upsi	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal Inclined	23,000 CY	\$	11.66	- -		
				Fill- Temp Surface Pr Upsi	Rock for Coffer Dam to Construct Upstream Portals reparation V. grouting tream Upper Portal Horizontal Inclined tream Lower Portal	23,000 CY 3,200 SF 8,600 SF	\$	11.66 5 2.30 5 3.33 5	6 - 5 - 5 10,000 5 30,000 5 -		
				Fill- Temp Surface Pr Upsi	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal Inclined tream Lower Portal Honizontal	23,000 CY 3,200 SF 8,600 SF 1,300 SF	\$ \$ \$ \$	11.66 § 2.30 § 3.33 § 2.30 §	5 - 5 - 5 10,000 5 30,000 5 - 5 - 5 -		
				Fill- Temp Surface Pr Upst	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal Inclined tream Lower Portal Horizontal Inclined Inclined	23,000 CY 3,200 SF 8,600 SF	\$ \$ \$	11.66 \$ 2.30 \$ 3.33 \$ 2.30 \$ 2.30 \$ 3.33 \$	\$ - \$ 10,000 \$ 30,000 \$ - \$ 5 \$ 5 \$ 5 \$ 50,000		
				Fill- Temp Surface Pr Upst	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal Inclined tream Lower Portal Horizontal Inclined stream Lower Portal Inclined stream Upper Portal	23,000 CY 3,200 SF 8,600 SF 1,300 SF 14,900 SF	\$ \$ \$ \$ \$	11.66 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 3.33 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 3.33 \$ 5.30 \$ 5	\$ - \$ - \$ 10,000 \$ 30,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -		
				Fill- Temp Surface Pr Upst	Rock for Coffer Dam to Construct Upstream Portals reparation \ grouting tream Upper Portal Horizontal Inclined Horizontal Inclined Inclined Inclined Horizontal Inclined	23,000 CY 3,200 SF 8,600 SF 1,300 SF 14,900 SF 6,100 SF	\$ \$ \$ \$ \$ \$	11.66 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 3.33 \$ 2.30 \$ 2.30 \$	\$ - \$ - \$ 10,000 \$ 30,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 10,000		
				Fill- Temp Surface Pri Upsi Upsi	Rock for Coffer D am to Construct Upstream Portals reparation V. grouting tream Upper Portal Horizontal Inclined tream Lower Portal Horizontal Inclined Inclined Horizontal Inclined Inclined Inclined	23,000 CY 3,200 SF 8,600 SF 1,300 SF 14,900 SF	\$ \$ \$ \$ \$	11.66 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 3.33 \$ 2.30 \$ 3.33 \$	\$ - \$ - \$ 10,000 \$ 30,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ 10,000 \$ 70,000		
				Fill- Temp Surface Pri Upsi Upsi	Rock for Coffer Dam to Construct Upstream Portals for Coffer Dam to Construct Upstream Portals tream Upper Portal Horizontal Inclined Horizontal Horizontal Horizontal Horizontal Horizontal Inclined Horizontal Inclined Horizontal Inclined Inclined Inclined Instream Lower Portal Inclined Instream Lower Portal	23,000 CY 3,200 SF 8,600 SF 1,300 SF 14,900 SF 6,100 SF 20,500 SF	\$ \$ \$ \$ \$ \$ \$	11.66 \$ 2.30	\$ - \$ 10,000 \$ 30,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -		
				Fill- Temp Surface Pri Upsi Upsi	Rock for Coffer D am to Construct Upstream Portals reparation V. grouting tream Upper Portal Horizontal Inclined tream Lower Portal Horizontal Inclined Inclined Horizontal Inclined Inclined Inclined	23,000 CY 3,200 SF 8,600 SF 1,300 SF 14,900 SF 6,100 SF	\$ \$ \$ \$ \$ \$	11.66 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 2.30 \$ 3.33 \$ 2.30 \$ 3.33 \$	\$ - \$ 10,000 \$ 30,000 \$ - \$ - \$ - \$ 50,000 \$ - \$ - \$ 10,000 \$ 70,000 \$ - \$ -		

Low Watana RCC Arch Alternativ Description		Units		Unit Price	Line Pri	e Total	Denotes Qty Adjustment by RST Notes / Remarks
	Quantity	Units			-	e iotai	Notes / Remarks
er Tunnel Plugs					\$ -	-	
Holes	4,100		\$	26.76			
nent	820	CF	\$	81.10	\$ 70,0		
er Tunnel Permanent Plugs					\$ -		
Holes	2,050		\$	26.76	\$ 50,00		
nent	410	CF	\$	81.10	\$ 30,0	00	
otcrete					\$-		
Tunnels					\$-		
ncrete Lining	31,280		\$	566.89	\$ 17,730,0		Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
crete Lining Overbreak 6"	13,800		\$	314.94	\$ 4,350,0		Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
nforcing Steel		TON	\$	2,887.51			Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
crete Lining for Plug	6,200		\$	428.32			
Shotcrete	44,620	SF	\$	5.26	\$ 230,00	00	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
Jpper Portal					\$-		
ncrete Headwall	3,200		\$		\$ 2,090,0		
ncrete Lining	1,300		\$	651.93	\$ 850,00	00	
ncrete Slab	750	CY	\$	651.93	\$ 490,00	00	
ncrete Piers	800	CY	\$	651.93	\$ 520,00	00	
ncrete Overbreak 12" H/6"V	300	CY	\$	472.41	\$ 140,00	00	
nforcing Steel	400	TON	\$	2,887.51	\$ 1,160,0	00	
ower Portal					\$ -		
ncrete Headwall	4,500	CY	\$	651.93	\$ 2,930,0	00	
crete Lining	3,000	CY	\$	651.93	\$ 1,960,0	00	
ncrete Slab	300	CY	\$	651.93	\$ 200,00	00	
ncrete Piers	700	CY	\$	651.93	\$ 460,00	00	
crete Overbreak 12" H/6"V	350	CY	\$	472.41	\$ 170,00	00	
nforcing Steel	600	TON	\$	2,887.51	\$ 1,730,0	00	
m Upper Portal					\$ -		
crete Headwall	500	CY	\$	651.93	\$ 330,00	00	
ncrete Slab	100		\$	651.93	\$ 70,0		
crete Overbreak 12" H/6"V	100	CY	\$	472.41	\$ 50,00	00	
nforcing Steel		TON	\$	2,887.51			
m Lower Portal			1 ·		\$ -		
ncrete Headwall	2,500	CY	\$	651.93	\$ 1,630,0	00	
ncrete Slab	100		\$	651.93			
verete Overbrook 12" H/6"\/		OV	¢	472.41			

						Reinforcing Steel	10,000		\$	2,887.51	\$ 60,000	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.5
						Concrete Lining for Plug	6,200		\$	428.32		Malapied Non Expandable day by ratio of length becrease (0,11074,100) = 0.
						2" Shotcrete	44.620		\$	5.26	\$ 230,000	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
						am Upper Portal	44,020	0	φ	5.20	\$ -	Multiplied Not Expandable Qty by fallo of length Decrease (3,77074,100) = 0.3
							0.000	01/	•	054.00		
						Concrete Headwall	3,200		\$		\$ 2,090,000	
						Concrete Lining	1,300		\$		\$ 850,000	
						Concrete Slab	750		\$	651.93		
						Concrete Piers	800		\$	651.93		
						Concrete Overbreak 12" H/6"V	300	CY	\$	472.41	\$ 140,000	
						Reinforcing Steel	400	TON	\$	2,887.51	\$ 1,160,000	
					Upstrea	am Lower Portal					\$ -	
						Concrete Headwall	4,500	CY	\$	651.93	\$ 2,930,000	
						Concrete Lining	3,000		\$		\$ 1,960,000	
						Concrete Slab	300		\$		\$ 200,000	
						Concrete Piers	700		\$		\$ 460,000	
						Concrete Overbreak 12" H/6"V	350		\$	472.41		
						Reinforcing Steel	600	TON	\$	2,887.51		
						tream Upper Portal					\$ -	
						Concrete Headwall	500		\$		\$ 330,000	
						Concrete Slab	100	CY	\$	651.93	\$ 70,000	
						Concrete Overbreak 12" H/6"V	100		\$		\$ 50,000	
						Reinforcing Steel		TON	\$	2,887.51		
	1					tream Lower Portal			Ť		\$ -	
 	<u> </u>					Concrete Headwall	2,500	CV	\$	651.93	-	
 						Concrete Slab	100		\$		\$ 70,000	
_	1					Concrete Overbreak 12" H/6"V	150		\$	472.41		
	1					Reinforcing Steel	170	TON	\$	2,887.51	\$ 490,000	
						tream Flip Bucket					\$ -	
						Concrete Slab		CY	\$		\$-	
						Concrete Walls	0	CY	\$	651.93	\$ -	
						Concrete Invert		CY	\$	651.93	\$ -	
						Concrete Overbreak 12" H/6"V		CY	\$	42.41		
						Reinforcing Steel			\$		\$ -	
_	-					tream Retaining Wall	0	ION	φ	2,007.01	ş - \$ -	
						Concrete Slab	200		\$		\$ 130,000	
						Concrete Walls	2,000		\$		\$ 1,300,000	
						Concrete Overbreak 12" H/6"V	110		\$		\$ 50,000	
						Reinforcing Steel	90	TON	\$	2,887.51	\$ 260,000	
					Emera	ency Release Chambers					\$ -	
						Concrete Plug	5,500	CY	\$	755.86	\$ 4,160,000	
						4" Shotcrete	1,000		\$	10.13	\$ 10,000	
						s Tunnel to Gate Chamber	1,000	01	Ψ	10.10	\$ -	
_	-					2" Shotcrete	0	SF	¢	5.26		
							0	SF	\$	5.20	\$ -	
	0.215					Anchors					\$ -	
						ned Tunnels					\$ -	
						Rockbolts 1" @ 12'	2,852		\$	528.34		Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.9
						Rockbolts 1" @ 9'	488		\$	432.12	\$ 210,000	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.
						Steel Mesh	171,120	SF	\$	6.37	\$ 1,090,000	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.
						Steel Support		TON	\$	12,801.49	\$ 2,240,000	Multiplied Non Expandable Qty by ratio of length Decrease (3,770 / 4,100) = 0.
						am Lower Portal	110		Ť	12,001.40	\$ -	(0,1074,100) = 0.
 	<u> </u>					Rockbolts 1" @ 15'	240	E۸	¢	735.81	\$ 180,000	
 	+								\$			
 						Anchors 1" @ 25'	290	EA	\$	1,234.86	\$ 360,000	
_	1					am Upper Portal			1		\$ -	
	1					Rockbolts 1" @ 15'					\$ -	
		L T	T	1		Anchors 1" @ 25'	130	EA	\$	735.81	\$ 100,000	
	1				Downs	tream Lower Portal		1		-	\$ -	
						Rockbolts 1" @ 15'	200	EA	\$	735.81	\$ 150,000	
	1					tream Upper Portal		1	Ť		\$ -	
 1	+					Rockbolts 1" @ 15'	100	FΔ	\$	735.81	\$ 70,000	
 						Retaining Wall Anchors 1" @25'	100			1,234.86		
 	+						100	EA	\$			
						ency Release Chambers			-		\$ -	
	1					Rockbolts 1" @ 25'		EA	\$.,=000	\$ 80,000	
						Rockbolts 1" @ 15'		EA	\$		\$ 60,000	
	1					Steel Mesh	2,279	SF	\$	6.37	\$ 10,000	
	1					Steel Support		TON	\$	12,801.49	\$ 110,000	
						Metal to Roof Anchors 3/4" @ 6'		EA	\$	342.42	\$ -	
							15	1	+ 4	572.72		
			1	1	Access	s Lunnel to Gate Chamber						
						Tunnel to Gate Chamber Rockbolts 1" @ 12'		EA	\$	528.34	\$ - \$ -	

FERC Line # Sub Categories

0.214

Grout Upper Tunnel Plugs Drill Holes Cement Grout Lower Tunnel Permanent Plugs
Drill Holes
Cement
Concrete and Shotcrete

Concrete Lining Concrete Lining Overbreak 6"

Combined Tunnels

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					Low Watana RCC Arch Alternative							Denotes Qty Adjustment by RST
RC Line #	Sub Categor	ries			Description	Quantity	Units		Unit Price	Line P	ice Total	
				1	Rockbolts 1" @ 9'		0 EA	\$	432.12	6	-	
				1	Steel Mesh		0 SF	¢	6.37 5		. 1	
				_				φ			-	
		0.6.1		-	Steel Support		0 TON	\$	12,801.49		-	
		0.218			tural- Misc Steelwork	2,77	5 SF	\$	93.61		000	
		0.21c		Mec	anical				5	6	-	
					Upstream Lower Gates				9		-	
					Gate Equipment		2 EA	\$	5,073,120.00	§ 10,150,	000	
					Upstream Upper Gates				5	6	-	
					Gate Equipment		2 EA	\$	2,840,080.00	5,680,	000	
					Trashracks		1 LS	\$				
					Downstream Lower Outlet		1 20	Ψ	1,777,000.00	1,700,	500	
									440.000.00	P	-	
					Stoplog Guides		1 LS	\$	142,200.00			
					Stoplogs includes follower		1 LS	\$	1,967,100.00	\$ 1,970,	000	
					Downstream Upper Outlet				9	6	-	
					Stoplog Guides		1 LS	\$	82,950.00	§ 80,	000	
					Low Level Release				5	6	-	
			1		Slide Gates Include Steel Liner		9 EA	\$	3,517,470.00	31,660,	000	
				1					2,2 , 11 0.00	. 01,000,		
	0.22		Lincte	aam C	offerdam							
	0.22		Opstr									
		0.221			rdam				100.53			
					RCC	978,00	UCY	\$	100.00			
		0.222			offerdam							
					Rock Fill	23,40	0 CY	\$	10.90	§ 255,	000	
		0.223			Cutoff Slurry Wall							
					excavation	5,10	0 CY	\$	4.88	§ 25,	000	
				1	slurry wall	46,00		\$	72.44			
		0.22d	├ ── ├ ──	Dow		40,00		\$	12.44	y 3,332,	500	
		0.22d	├───	Dew	Itering		410	-	E 007 005 00		200	
				_	Initial Dewatering		1 LS	\$	5,807,685.00	5,808,		
					Dewatering Maintenance		1 LS	\$	22,377,990.00	22,378,	000	
	0.23		Down	Strea	n Cofferdam							
		0.231		Coffe	rdam							
					RCC	261,30	0 CY	\$	100.00			
		0.232		Pre-	offerdam			- 1 [*]				
		0.202			Rock Fill	23,40		¢	10.90	§ 255,	000	
		0.233	├ ── ├ ──			23,40		\$	10.90	y ∠00,		
		0.233	└── 	-	Cutoff Slurry Wall		0.0					
					Excavation	5,10		\$	4.60 \$	23,		
					Slurry Wall	46,00	0 SF	\$	72.44	\$ 3,332,	000	
	0.0		Main Dam									
	0.3			Dam								
	0.3	0.311	Main		vation							
		0.311			vation	057.40	7 01/		44.50	0.005		
		0.311			Overburden above el. 1470	257,16		\$	11.53			
		0.311			Overburden above el. 1470 Overburden below el. 1470	675,28	5 CY	\$	11.06	5 7,469,	000	
		0.311			Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470	675,28 163,61	5 CY 7 CY	\$	11.06 43.03	7,469 , 7,040 ,	000	
		0.311			Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470	675,28 163,61 60,67	5 CY 7 CY 4 CY		11.06 \$ 43.03 \$ 43.72 \$	7,469, 7,040, 2,653,	000 000	
		0.311			Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470	675,28 163,61	5 CY 7 CY 4 CY		11.06 43.03	7,469, 7,040, 2,653,	000 000	
		0.311			Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470	675,28 163,61 60,67 247,52	5 CY 7 CY 4 CY 0 CY		11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$	7,469, 7,040, 2,653, 10,651,	000 000 000	Reduce Low Watana Non Exnandable by 0.7 (Downstream Since
		0.311		Exca	Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470	675,28 163,61 60,67	5 CY 7 CY 4 CY 0 CY		11.06 \$ 43.03 \$ 43.72 \$	7,469, 7,040, 2,653, 10,651,	000 000 000	Reduce Low Watana Non Expandable by 0.7 (Downstream Slope
		0.311			Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470	675,28 163,61 60,67 247,52 110,36	5 CY 7 CY 4 CY 0 CY 8 CY	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$	7,469, 7,040, 2,653, 10,651, 5,538,	000 000 000 000	
		0.311		Exca	Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY		11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$	5 7,469, 5 7,040, 5 2,653, 5 10,651, 5 5,538, 6 600,000,	000 000 000 000	Reduce Low Watana Non Expandable by 0.7 (Downstream Slope End Area Calculations
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Base RCC	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$	5 7,469, 5 7,040, 5 2,653, 5 10,651, 5 5,538, 6 600,000,	000 000 000 000	
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Base RCC Base RCC E Prey/ Grouting	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$	5 7,469, 5 7,040, 5 2,653, 5 10,651, 5 5,538, 6 600,000,	000 000 000 000	Reduce Low Watana Non Expandable by 0.7 (Downstream Slope End Area Calculations
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Surdace Preparation	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$ 100.00 \$	5 7,469, 5 7,040, 5 2,653, 5 10,651, 5 5,538, 600,000,	000 000 000 000 000 -	End Area Calculations
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Base RCC Base RCC E Prey/ Grouting	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$	5 7,469, 5 7,040, 5 2,653, 5 10,651, 5 5,538, 600,000,	000 000 000 000 000 -	
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Guidage Preparation Under Core/Filters above el. 1500	675,28 163,61 60,67 247,52 110,36 6,000,00 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$ 100.00 \$ 3.11 \$	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ 1,984,	000 000 000 000 000 000 000 000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Surdace Preparation	675,28 163,61 60,67 247,52 110,36 6,000,00	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF	\$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$ 100.00 \$	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$	000 000 000 000 000 - - 000 000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Under Core/Filters above el. 1500 Under Core/Filters above el. 1500	675,28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 637,84 429,10 1,974,82	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 9 SF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 (43.03 (43.72 (43.03 (50.18 (100.00 (3.11 (3.11 (2.15 (\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246,	000 000 000 000 000 - - 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Under Core/Filters above el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500	675,28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 637,84 429,10	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 9 SF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 \$ 43.03 \$ 43.72 \$ 43.03 \$ 50.18 \$ 100.00 \$ 100.00 \$ 3.11 \$	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246,	000 000 000 000 000 - - 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Core/Filters below el. 1500 Under Shell below el. 1500 Under Shell below el. 1500 Under Shell below el. 1500	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 7 SF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 43.03 50.18 100.00 100.00 3.11 3.11 2.15 2.15 2.15	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246, \$ 2,116,	000 000 000 000 000 - - - 000 00	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Under Core/Filters above el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Consolidation Grout [Drill Holes	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 7 SF 7 SF 0 LF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 100.00 100.00 3.11 2.15 2.15 11.91 1.91	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ 1,984, \$ 1,335, \$ 4,246, \$ 2,116, \$ 1,587,	000 000 000 000 000 000 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden above el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Roc Base RCC Base RCC De Prep/ Grouting Surface Preparation Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 7 SF 7 SF 0 LF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 43.03 50.18 100.00 100.00 3.11 3.11 2.15 2.15 2.15	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246, \$ 2,116,	000 000 000 000 000 000 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Surface Preparation Under Core/Filters above el. 1500 Under Core/Filters above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cernent Grout Curtain	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 9 SF 7 SF 0 LF 0 CF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 50.18 100.00 100.00 100.00 100.00 5 100.00 100.00 100.00 100.00 100.00 100.00 100 1	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,984, \$ 1,984, \$ 2,116, \$ 2,116, \$ 2,116, \$ 2,653, \$ 3,000,000, \$ 2,000,000, \$ 2,000,000,000,000,000,000,000,000,000,0	000 000 000 000 000 000 000 000 000 00	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden above el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Roc Base RCC Base RCC De Prep/ Grouting Surface Preparation Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 9 SF 7 SF 0 LF 0 CF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 100.00 100.00 3.11 2.15 2.15 11.91 1.91	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,984, \$ 1,984, \$ 2,116, \$ 2,116, \$ 2,116, \$ 2,653, \$ 3,000,000, \$ 2,000,000, \$ 2,000,000,000,000,000,000,000,000,000,0	000 000 000 000 000 000 000 000 000 00	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Base RCC Ce Prep/ Grouting Surface Preparation Under Core/Filters above el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Consolidation Grout Drill Holes Cement Grout Curtain [Drill Holes	675,28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 6,000,00 10,974,82 983,98 133,28 133,28 133,28 177,07	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 0 SF 7 SF 0 LF 0 LF 2 LF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 43.03 50.18 100.00 3.11 2.15 2.15 67.81 67.81 2.676	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246, \$ 2,116, \$ 1,587, \$ 9,038, \$ 4,738,	000 000 000 000 000 000 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
		0.311		Dam	Overburden above el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Base ROC Ger Prey/ Grouting Surface Preparation Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement Grout Curtain Drill Holes Cement	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28	5 CY 7 CY 4 CY 0 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 SF 0 SF 7 SF 0 LF 0 LF 2 LF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 50.18 100.00 100.00 100.00 100.00 5 100.00 100.00 100.00 100.00 100.00 100.00 100 1	\$ 7,469, \$ 7,040, \$ 2,653, \$ 10,651, \$ 5,538, \$ 600,000, \$ \$ 1,984, \$ 1,335, \$ 4,246, \$ 2,116, \$ 1,587, \$ 9,038, \$ 4,738,	000 000 000 000 000 000 000 000	End Area Calculations End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope)
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		0.311 0.312 0.313 0.313 0.317		Exca	Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Sheil above el. 1500 Under Sheil below el. 1500 Consolidation Grout Drill Holes Cement Grement Cement Dental Concrete age Holes	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,96 133,28 133,28 133,28 59,50 51,78	5 CY 7 CY 4 CY 0 CY 8 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 SF 0 CY 0 SF 0 SF 0 SF 0 SF 0 SF 0 SF 0 SF 0 SF	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 50.18 100.00 100000000	\$ 7,469,6 \$ 7,469,6 \$ 2,653,5 \$ 10,651,5 \$ 5,538,5 \$ 600,000,5 \$ 1,365,5 \$ 4,246,5 \$ 1,368,5 \$ 4,246,5 \$ 2,176,7 \$ 9,038,5 \$ 4,738,5 \$ 2,737,3 \$ 2,658,5 \$ 2,658,	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
		0.311 0.312 0.313 0.313 0.317		Exca	Overburden above el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell below el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement Dental Concrete Dental Concrete age Holes e Precast Bridge Beams	675,28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 6,000,00 10,1974,82 983,98 133,28 133,28 133,28 133,28 133,28 5,550 51,78 25,50	5 CY 7 CY 7 CY 7 CY 7 CY 7 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 SF 9 SF 0 SF 9 SF 0 SF 0 SF 0 CY 2 LF 0 CF 0 CF 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 50.18 100.00 100.00 100.00 5 100.00 5 100.00 5 11.91 2.15 5 2.15 5 11.91 2.67.6 8 11.01 5 5 1.32 5 5 44.85	\$ 7,469,6 \$ 7,469,6 \$ 7,040,6 \$ 2,653,8 \$ 10,651,5 \$ 600,000,5 \$ 600,000,5 \$ 1,984,4 \$ 1,395,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 2,158,7 \$ 2,2,737 \$ 2,658,5 \$ 13,894,5	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
		0.311 0.312 0.313 0.313 0.317		Exca	Overburden above el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable above el. 1470 Rock Waste below el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell above el. 1500 Consolidation Grout Drill Holes Cement Cement Correte Dental Concrete age Precast Bridge Beams Concrete Road Deck	675.28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 6,000,00 10,974,82 983,98 133,28 133,28 133,28 133,28 59,50 51,78 55,50 5,40 5,40	5 CY 7 CY 7 CY 7 CY 8 CY 8 CY 0 CY 0 CY 0 CY 0 SF 0 SF 0 SF 7 SF 0 CF 2 LF 0 CF 2 LF 9 CF 0 CY 9 LF 0 CY	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.03 50.18 100.00 3.11 2.15 2.15 11.91 67.81 2.676 81.10 3.67.81 51.32 51.32 544.85 544.85	\$ 7,469,6 \$ 7,040,6 \$ 2,653,5 \$ 10,651,5 \$ 5,538,5 \$ 10,651,5 \$ 5,538,5 \$ 600,000,5 \$ 1,355,5 \$ 1,335,5 \$ 4,246,5 \$ 1,587,5 \$ 9,038,5 \$ 4,738,5 \$ 2,658,5 \$ 13,894,5 \$ 13,894,5 \$ 13,894,5	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable
		0.311	Main	Exceeded and a second and a sec	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell above el. 1500 Under Shell above el. 1500 Consolidation Grout Drill Holes Cerment Bental Concrete age Holes e Precast Bridge Beams Concrete Road Deck Piers	675.28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 6,000,00 10,974,82 983,98 133,28 133,28 133,28 133,28 59,50 51,78 55,50 5,40 5,40	5 CY 7 CY 7 CY 7 CY 7 CY 7 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 SF 9 SF 0 SF 9 SF 0 SF 0 SF 0 CY 2 LF 0 CF 0 CF 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.72 50.18 50.18 100.00 100.00 100.00 5 100.00 5 100.00 5 11.91 2.15 5 2.15 5 11.91 2.67.6 8 11.01 5 5 1.32 5 5 44.85	\$ 7,469,6 \$ 7,469,6 \$ 7,040,6 \$ 2,653,8 \$ 10,651,5 \$ 600,000,5 \$ 600,000,5 \$ 1,984,4 \$ 1,395,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 2,158,7 \$ 2,2,737 \$ 2,658,5 \$ 13,894,5	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana Non Expandable
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		0.311	Main	Exce	Overburden below el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement Grout Curtain Drill Holes Cement Dental Concrete age Precast Bridge Beams Condrete Road Deck Piers es/Portals	675.28 163,61 60,67 247,52 110,36 6,000,00 6,000,00 6,000,00 6,000,00 10,974,82 983,98 133,28 133,28 133,28 133,28 59,50 51,78 55,50 5,40 5,40	5 CY 7 CY 7 CY 7 CY 8 CY 8 CY 0 CY 0 CY 0 CY 0 SF 0 SF 0 SF 7 SF 0 CF 2 LF 0 CF 2 LF 9 CF 0 CY 9 LF 0 CY	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.02 50.18 50.18 100.00 100.00 100.00 3.11 3.11 3.11 2.15 2.15 67.81 67.81 67.81 67.81 54.85 544.85 544.85	\$ 7,469,6 \$ 7,469,6 \$ 2,653,5 \$ 10,651,5 \$ 5,538,5 \$ 600,000,5 \$ 1,385,5 \$ 4,246,5 \$ 1,385,5 \$ 4,246,5 \$ 1,385,5 \$ 4,246,5 \$ 21,737,5 \$ 2,658,5 \$ 2,942,5 \$ 2,942	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
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		0.311	Main	Exce	Overburden below el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement Grout Curtain Drill Holes Cement Dental Concrete age Precast Bridge Beams Condrete Road Deck Piers es/Portals	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28 133,28 133,28 133,28 55,50 51,78 25,50 5,40 5,40 50	5 CY 7 CY 7 CY 7 CY 8 CY 8 CY 0 CY 0 CY 0 CY 0 SF 0 SF 0 SF 7 SF 0 CF 2 LF 0 CF 2 LF 9 CF 0 CY 9 LF 0 CY	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.02 50.18 50.18 100.00 100.00 100.00 3.11 3.11 3.11 2.15 2.15 67.81 67.81 67.81 67.81 54.85 544.85 544.85	\$ 7,469,5 \$ 7,469,5 \$ 2,653,5 \$ 10,651,5 \$ 600,000,5 \$ 7,465,5 \$ 7,465,5 \$ 7,465,5 \$ 7,465,5 \$ 7,465,5 \$ 7,744,5 \$ 7,737,5 \$ 2,658,5 \$ 1,3894,5 \$ 2,942,5 \$ 3,944,5 \$ 3,94	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
		0.311	Main	Exce	Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell below el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cernent Grout Curtain Dental Concrete Dental Concrete age Piers Piers Best Bridge Beams Concrete Road Deck Piers Bertal Softs-Core Area	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28 133,28 133,28 59,50 51,78 59,50 51,78 55,50 5,40 50 50 50 50 50 50 50 50 50 5	5 CY 7 CY 7 CY 7 CY 7 CY 7 CY 7 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.03 50.18 50.18 100.00 100.00 100.00 100.00 51.25 21.15	\$ 7,469,5 \$ 7,040,6 \$ 2,653,5 \$ 10,651,5 \$ 600,000,5 \$ 7,464,5 \$ 7,464	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
		0.311	Main	Exce	Overburden below el. 1470 Overburden below el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters below el. 1500 Under Shell below el. 1500 Under Shell below el. 1500 Under Shell below el. 1500 Consolidation Grout Drill Holes Cement Doral Concrete age Holes Precast Bridge Beams Concrete Road Deck Piers es/Portals ration Tunnels/ Shafts- Core Area Rock Horizontal Rock Inclined	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28 133,28 59,50 51,78 25,50 5,400 50 50 50 50 50 50 50 50 50	5 CY 7 CY 7 CY 7 CY 7 CY 7 CY 7 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.07 50.18 50.18 100.00 100	\$ 7,469,5 \$ 7,469,5 \$ 2,653,5 \$ 10,651,5 \$ 5,538,5 \$ 5,538,5 \$ 600,000,6 \$ 1,984,5 \$ 1,984,5 \$ 1,984,5 \$ 1,984,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 4,246,5 \$ 21,737,5 \$ 2,658,5 \$ 21,737,5 \$ 2,658,5 \$ 2,342,5 \$ 2,722,5 \$ 5,55 \$ 5,55,55,55,55,55,55,55,55,55,55,55,55,5	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana
		0.311	Main	Exce	Overburden slove el. 1470 Overburden slove el. 1470 Overburden below el. 1470 Rock Usable below el. 1470 Rock Usable below el. 1470 Rock Waste above el. 1470 Rock Waste above el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1470 Rock Waste below el. 1500 Under Core/Filters above el. 1500 Under Shell above el. 1500 Under Shell above el. 1500 Consolidation Grout Drill Holes Cement Grout Curtain Dorill Holes Percast Bridge Beams Concrete Road Deck Piers Piera Pierast Rock Borts-Core Area Rock Horizontal	675,28 163,61 60,67 247,52 110,36 6,000,00 637,84 429,10 1,974,82 983,98 133,28 133,28 133,28 59,50 51,78 25,50 5,400 50 50 50 50 50 50 50 50 50	5 CY 7 CY 7 CY 7 CY 7 CY 7 CY 7 CY 8 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0 CY 0	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	11.06 43.03 43.03 50.18 100.00 3.00 3.11 2.15 2.15 2.15 3.11 2.15 2.15 3.11 2.15 3.11 2.15 3.11 5.2.15 3.11 5.2.15 3.11 5.2.15 5.2.25 5.2.55 5.2.55	\$ 7,469,5 \$ 7,469,5 \$ 2,653,5 \$ 10,651,5 \$ 600,000,5 \$ 7,464,5 \$ 7,465,6 \$ 7,464,5 \$ 7,465,6 \$ 7,465,6 \$ 7,465,6 \$ 7,465,6 \$ 7,764,5 \$ 7,775,5 \$ 7,775	000	End Area Calculations Reduce Low Watana Non Expandable by 0.7 (Downstream Slope) Reduce Low Watana

					Low Watana RCC Arch Alterna	ative (4 Turbines)						Denotes Qty Adjustment by RST
FERC Line #	Sub Ca	ategorie	s		Description	Quantity U	nits		Price	Line Price	Total	Notes / Remarks
					Rock Inclined	200 C	Υ	\$	552.93			
					Portals					\$ -		
					Overburden Rock	2,900 C	Y	\$	17.16	\$ 50,000		
			0.000		Rock	800 C	Y	\$	49.16			
			0.323		Surface Preparation Portals					\$ - \$ -		
					Horizontal	24 S	F	\$	2.30			
					Inclined	160 S		\$	3.33			
										\$ -		
			0.324		Concrete and Shotcrete					\$ -		
					Tunnels- Core Area					\$ -		
					Concrete Plugs	267 C	Y	\$	428.32	\$ 110,000		
					Concrete Slab	600 C			944.82			
					Concrete Overbreak 6" Reinforcing Steel	0 C 21 T		\$ 2,	755.86 387.51	\$ 60,000		
					2" Shotcrete	0 S		\$ <u>2,</u>	5.26	\$ -		
					Tunnels-Access			•		\$ -		
					Concrete Slab	160 C	Y	\$	944.82	\$ 150,000		
					Concrete Overbreak 6"	80 C		\$	755.86	\$ 60,000		
					Reinforcing Steel	6 T	ON		387.51	\$ 20,000		
	+ +				2" Shotcrete	538 S	F	\$	5.26			
	+ +				Shafts	4 000 0	_	\$		\$ - \$ 20.000		
	+ +				2" Shotcrete Portals	4,000 S	r i	φ	5.26	\$ 20,000 \$ -		
	+ +				Concrete	16 C	Y	\$	406.36			
					Reinforcing Steel	2 T			387.51			
	1 1		0.325		Support and Anchors	1				\$ -		
					Tunnels- Core Area					\$ -		
					Rockbolts 3/4" @6'	0 E	A		327.15			
					Steel Mesh	0 S		\$	5.37			
					Steel Support	0 T	ON	\$ 12,	301.49			
					Tunnels- Access Rockbolts 3/4" @6'	120 E	٨	\$	327.15			
					Steel Mesh	110 S		\$	5.37			
					Steel Support	2 T		\$ 12,	301.49	\$ 30,000		
					Shafts			, ,		\$ -		
					Rockbolts 3/4" @6'	280 E		\$	327.15	\$ 90,000		
					Steel Mesh	800 S	F	\$	5.37			
					Portals					\$ -		
			0.329		Rockbolts 1" @15'	24 E	A	\$	735.81	\$ 20,000		
			0.329		Architectural Portal Doors Portal Doors	11	9	\$ 33.	900.00	\$ 30.000		
		0.33			Instrumentation		0	φ 00,	00.00	\$ -		
			0.331		Instrumentation	1 L	S	\$ 8,657,	510.00	\$ 8,660,000		
	0.4			Relict (Channel					\$ -		
		0.41			Shore Protection					\$ -		
			0.411		Excavation					\$ -		
			0.412		Overburden Stripping 2' thick	2,200 C	Y	\$	11.56			
			0.412		Dump and Spread					\$ - \$ -		
					Filter Material - 2' layer	2,200 C	Y	\$	31.93	\$ 70,000		
					Rock Spalls/ Rip Rap- 3' Ave	3,300 C		\$	9.86			
					Shore Protection					\$ -		
					Rip Rap	24,000 C		\$	24.26			
					Waste Rock	24,000 C	Y	\$	22.78			
	+ +	0.44	0.440		Channel Filter Blanket					\$ -		
	+ +		0.442		Fill Coarse Filter	2,900,000 C	v	\$	33.85	\$ - \$ 98,170,000		
					Fine Filter	2,900,000 C		э \$	43.65	\$ 95,160,000		
<u> </u>					Rip Rap	182,000 C	Y	\$	24.26	\$ 4,420,000		
	1 1		0.443		Surface preparation					\$ -		
	1 1				Foundation Prep					\$ -		
					Clearing and Grubbing	460 A			963.11			
					Excavation	2,236,000 C	Y	\$	15.62	\$ 34,930,000		
	0.5	0.51			Facilities							
	+ +	0.51	0.511		Outlet Facilities- (Intake Civil Work Include in Power Intake)							
	+ +		0.511		Excavation Inlet	(Included in 332.611	D					
					Outlet	(Included in 332.52)	<u>0</u>					
	+ +				Tunnels	(·/					
					Rock Horizontal	0 0	Y	\$	103.00	\$ -		
					Rock Inclined	0 C			183.49			
			0.513		Surface Preparation/ Grouting							
	1]		Inlet	(Included in 332.613]			
	+ +				Outlet	(Included in 332.523		۴	0.00	¢		
	+ +				Tunnels Contact Grouting	0 S	r 9	\$ \$ 569.	2.30 428.05	\$ - \$ -		
	+ +		0.514		Concrete and Shotcrete	UL	~	φ 309,	-20.00	Ψ -		
	1		0.014			1						

								Low Watana RCC Arch Alternative (4	Turbines)					Denotes Qty Adjustment by RST
FERC Line #	Sub 0	atego	ries					Description	Quantity	Units		Unit Price	Line Price	Total Notes / Remarks
							Ini		(Included in 332					
								utlet	(Included in 332	.524)				
							Tu	Concrete Lining		0 CY	\$	944.82	\$ -	
								Concrete Overbreak 6"		0 CY	\$	440.92		
								2" Shotcrete		0 SF	\$	5.26		
								3" Shotcrete		0 SF	\$	7.69	\$ -	
			0.515			Supp	oort	and Anchors						
								et	(Included in 332		_			
								utlet innels	(Included in 332	.525)				
							Tu	Rock Bolts 1" @6'		0 EA	\$	327.15	\$ -	
								Steel Mesh		0 SF	\$	6.37		
			0.516			Mech	hani	cal - Low Level Outlet		-	· ·			
							Inl	et						
								Trash Racks/Guides		1 LS	\$	1,540,500.00		
								Gate Equipment		2 EA	\$	3,317,040.00		
-							0	Stoplog Guides		2 SETS	\$	213,940.00	\$ 428,000	
							0	Itlet Fixed Cone Valves 6 +1 Spare		1 LS	\$	4.500.630.00	\$ 4,501,000	
							-	Ring Follower Gates		6 EA	\$	1,936,494.80		
		_						Steel Manifold Liner		0 TON	\$	8,952.53		Req'd steel liner quantity approx 873 tons, added 10% to get 960 tons
								Misc Mechanical Equipment		1 LS	\$	948,000.00	\$ 948,000	
							L	Misc Electrical Systems		1 LS	\$	237,000.00	\$ 237,000	
		0.52			Main (Chute	e) S	pillway (Includes Civil Works for Outlet Facilities)						
			0.522		1	Stepp		Spillway			-		¢ 00.000.000	
								onventional Concrete - Steps	47,72	4 CY 6 TON	\$	544.85 2,887.51	\$ 26,002,000 \$ 3,339,000	
								einforcing Steel - Steps priventional Concrete - Training Walls	1,15	6 TON 17 CY	\$ \$	2,887.51 544.85		
								einforcing Steel - Training Walls		8 TON	\$	2,887.51		
			0.523			Stillin			,		Ψ	2,007.01	φ 224,000	reduced by faile of spinway length, (0717776) = 0.000
			0.020			-		onventional concrete	8,40	0 CY	\$	544.85	\$ 4,577,000	
								einforcing Steel	18	5 TON	\$	2,887.51		
								cavation Rock	13,00	10 CY	\$	50.18	\$ 652,000	
			0.524					lation Grouting						
								ill Holes		0 LF	\$	11.91		
								ement rout Curtain	7,00	0 CF	\$	67.81	\$ 475,000	
			0.525					and Anchors						
			0.020					ainage Tunnel						
							1	Steel Support		7 TON	\$	12,801.49	\$ 90,000	
								Steel Mesh	1,00	0 SF	\$	5.87	\$ 6,000	
							Ro	ockbolts Drainage Gallery						
								3/4" @ 6'	57	6 EA	\$	330.19	\$ 190,000	
							Rc	1" @ 15'		5 EA	¢	741.28	\$ 204,000	
							Pr	ockbolts Chute and Structure	21	SEA	\$	741.28	\$ 204,000	
							RC	1" @ 15'	11	2 EA	\$	741.28	\$ 83,000	
							Ro	ockbolts Valve Block/Bucket		2 LA	Ψ	741.20	φ 00,000	
								1" @ 15'	4	6 EA	\$	741.28	\$ 34,000	
							Sla	ab/Wall Anchors						
		_						1" @ 10'	9,30	IO EA	\$	474.06	\$ 4,409,000	
			0.527		I	Drain								
	-		-	-			Dr	ill Holes	F / 00		e	47.05	¢ 0.500.000	
	-				 	 	+	Box Drains (To Drain Tunnel) 3" Relief	54,00	0 LF	\$	47.95 49.50		
	+		0.52c	-	-	Mech	hani		64		φ	49.50	φ 32,000	
	1		0.020	1	1			ate Equipment	1	0 EA	\$	4,249,280.00	\$ -	
					1	1	Sto	oplog Guides		0 SETS	\$	92,196.88	\$ -	
							Sto	oplogs Includes Follower		0 SET	\$	945,840.00	\$ -	
					1			sc Electrical		0 LS	\$	237,000.00	\$ -	
	0.6		L	Powe				exec and Inlet Structure Civil Works for Outlet)						
		0.61			Intake			and Approach		-	_			
	-		0.611		 	Exca			60.00		¢	14.87	¢ 1.011.000	
	-				+		R/	verburden ock Usable	68,00		\$	14.87 40.27		
	-		0.613	-				Preparation	204,00		φ	40.27	φ 0,210,000	
			2.010		1			prizontal	112,50	0 SF	\$	2.30	\$ 259,000	
								clined	60,30	0 SF	\$	3.33	\$ 201,000	
			0.614			Conc	crete	e and Shotcrete						
			L		-	-	Sti	ructure		-	-			
	-			-	1	I	1	Concrete Structure	121,00		\$	544.85		
	-			-	1	1	+	Concrete - Apron Slab Concrete Overbreak 12" H/6" V		0 CY 0 CY	\$ \$	545.85 336.99		
	-				 	1	+	Reinforcing Steel		0 CY 0 TON	\$	2,887.51		
			0.615		1	Supp	l	s and Anchors- 1" @ 15'		0 EA	\$	735.81		
			0.61c		1	Mech	hani	ical		1	*	100.01	. 201,000	
								ashracks and Guides		4 SETS	\$	1,080,960.00	\$ 4,324,000	
														·

						Low Watana RCC Arch Alternative (4		I				Denotes Qty Adjustment by RST
FERC Line #	Sub Catego	ries	ļ			Description		Units	Unit Price	Line Price	Total	Notes / Remarks
	<u> </u>					Gate Equipment		EA	\$ 1,902,720.00			
			$ \downarrow \downarrow$			Bulkhead Gates Guides		SETS	\$ 225,200.00			
						Bulkhead Gates inc Follower			\$ 698,120.00			
	┥──┤───	I	+			Shutter with Guides			\$ 720,640.00			
						Iceboom with Hoist Iceboom Guides			\$ 1,238,600.00 \$ 563,000.00			
						Intake Service Crane		EA	\$ 693,700.00			
						Bubbler System		LS	\$ 948,000.00			
						Misc Electrical			\$ 237,000.00			
		0.61d				Building	1	LS LS	\$ 237,000.00			
	0.7	0.010	Surge C			Duriding		20	φ 201,000.00	φ 201,000		
	0.71		eurge e	Surge (Cham	per						
	0.71	0.711				ration						
						Chamber Rock	0	CY	\$ 90.12	\$-		
						Vent Shaft Rock		CY	\$ 601.04			
		0.713			Surfac	ce Preparation	0	SF	\$ 2.30	\$ -		
		0.714			Concr	ete and Shotcrete						
						Concrete	0	CY	\$ 513.35	\$-		
						Concrete Overbreak		CY	\$ 440.92	\$-		
						Reinforcing Steel		TON	\$ 2,858.29	\$ -		
						4" Shotcrete	0	SF	\$ 10.13	\$ -		
						Shaft			-			
	<u> </u>					2" Shotcrete	0	SF	\$ 5.26	\$-		
	<u> </u>	0.715				orts and Anchors		L				
	<u> </u>					Rockbolts 1" @25' HY		EA	\$ 1,234.86	\$ -		
	+		\vdash			Rockbolts 1" @ 15'		EA	\$ 735.81	\$ -		
	┥──┤───		+			Steel Nesh		SF TON	\$ 5.81 \$ 12.671.94	\$ - \$ -		
	<u> </u>					Steel Support	0	IUN	a 12,671.94	ъ -		
	+ $-$				vent	Shaft Rock bolts 3/4" @ 6'	0	EA	\$ 327.15	\$ -		
	<u>↓ </u>					Steel Mesh		SF	\$ 327.15 \$ 6.30			
		0.717				age Holes (In Chamber)		LF	\$ 47.95			
		0.71c			Mech	anical	0	L.I	φ 41.55	Ψ		
		0.110				Stoplog Guides	0	SETS	\$ 709,380.00	\$-		
						Stoplog Includes Follower		SET	\$ 3,558,160.00			
	0.8		Penstoo	ks			-		+ -,,	÷		
	0.81			ensto	cks							
		0.811			Excav	ation						
						Tunnels						
						Rock Horizontal	34,283	CY	\$ 144.77	\$ 4,963,000		Decrease by ratio of total penstock length (690/1075)
						Rock Inclined	54,000	CY	\$ 286.15	\$ 15,452,000		
		0.813				ce Preparation/Grouting						Decrease by ratio of total penstock length (690/1075)
						Surface Preparation						Decrease by ratio of total penstock length (690/1075)
						Tunnels	242,676	SF	\$ 3.33	\$ 808,000	1	Decrease by ratio of total penstock length (690/1075)
						Contact Grouting			-	-		Decrease by ratio of total penstock length (690/1075)
						Contact Grouting	1	LS	\$ 368,882.16	\$ 369,000		Decrease by ratio of total penstock length (690/1075)
						Consolidation Grouting			-	-		Decrease by ratio of total penstock length (690/1075)
					_	Consolidation Grouting	1	LS	\$ 511,846.06	\$ 512,000		Decrease by ratio of total penstock length (690/1075)
		0.814				ete and Shotcrete		01/				Decrease by ratio of total penstock length (690/1075)
						Concrete Liner	23,882		\$ 970.01			Decrease by ratio of total penstock length (690/1075)
						Concrete Overbreak 6"	6,805		\$ 692.87			Decrease by ratio of total penstock length (690/1075)
						Reinforcing Steel 3" Shotcrete	21,828	TON	\$ 2,858.29 \$ 7.69			Decrease by ratio of total penstock length (690/1075) Decrease by ratio of total penstock length (690/1075)
						2" Shotcrete	13,354		\$ 7.69	\$ 70,000		Decrease by ratio of total penstock length (690/1075)
		0.815			Suppo	2 Shotcrete	13,354	51	ψ 5.26	φ 70,000		Decrease by ratio of total penstock length (690/1075)
		0.013				Rockbolts 1" @ 25'	90	EA	\$ 1,234.86	\$ 119,000		Decrease by ratio of total penstock length (690/1075)
						Rockbolts 1" @ 6'	2,696		\$ 327.15			Decrease by ratio of total penstock length (690/1075)
						Steel Mesh	123,906	SF	\$ 6.37			Decrease by ratio of total penstock length (690/1075)
		0.818				ural Misc Steelwork	1,541		\$ 9,673.24	\$ 14,905,000		Decrease by ratio of total penstock length (690/1075)
	0.9		Tailrace			ortal with Combined Tailrace/Diversion Tunnel						
	0.91			ailrace	e Tunr	nels/Portals						
		0.911				ration						
						Tunnels						
						Rock	0	CY	\$ 103.00	\$-		
						Portals						
						Overburden		CY	\$ 17.14			
	<u> </u>					Rock Usable		CY	\$ 49.16			
1	<u> </u>					Rock Waste	0	CY	\$ 49.16	\$-		
		0.913				ce Preparation						
		1				Tunnels	-	05	¢	¢		
						Tunnels	0	SF	\$ 3.33	\$ -		
						Portals		05	¢ 0	¢		
						Portals Horizontal		SF	\$ 2.30			
		0.014				Portals Horizontal Inclined		SF SF	\$ 2.30 \$ 3.33			
		0.914			Concr	Portals Portals Inclined ete and Shotcrete						
		0.914			Concr	Portals Horizontal Inclined ete and Shotcrete Tunnels	0	SF	\$ 3.33	\$-		
		0.914			Concr	Portals Portals Inclined ete and Shotcrete	0			\$ - \$ -		

						Low Watana RCC Arch Alternative (4 1	<u> Turbines)</u>							Denotes Qty Adjustment by RST
FERC Line #	Sub Categor	ies				Description		Units	_	Unit Price		Line Price	Total	Notes / Remarks
						2" Shotcrete Reinforcing Steel		SF TON	\$ \$	5.26 2,887.51		-		
						Portals	0	TON	φ	2,007.51	φ	-		
						Concrete Base Slab	0	CY	\$	651.93	\$	-		
						Concrete Walls		CY	\$	651.93		-		
						Concrete Overbreak 12" H/6" V Reinforcing Steel	0	CY TON	\$ \$	471.65 2,887.51		-		
		0.915			Supp	ort and Anchors	0	TON	¢	2,007.51	¢	-		
		0.010			oupp	Tunnels								
						Rockbolts 1" @ 12'		EA	\$	528.34		-		
						Rockbolts 1" @ 9'		EA	\$	432.12	\$	-		
						Steel Support Steel Mesh		TONS SF	\$ \$	12,801.49 6.37	\$	-		
						Portals	0	0	φ	0.57	φ	-		
						Rockbolts 1" @ 15'	0	EA	\$	735.81	\$	-		
		0.91c				anical								
						Stoplog Guides		SET	\$	112,600.00		-		
	0.92		-	Tailrac	o Outl	Stoplogs Includes Follower et Channel	0	SET	\$	751,200.00	\$	-		
	0.52			Tainac		Tailrace Outlet Channel Concrete - Slab	4,190	CY	\$	544.85	\$	2,280,000		
						Tailrace Outlet Channel Concrete - Training WallIs	1,185	CY	\$	544.85		650,000		
						Tailrace Reinforcing Steel	440	TON	\$	2,858.29	\$	1,260,000		
				-					-		L		\$ 1,463,500,000	for embankment dam \$ 3,202,800,000
333	0.11	waterw				d Generators d Governors			+					
	0.11	0.111			s and Suppl				-					
		0.112			Instal									
	0.2		Genera	itors ar	nd Exc	biters								
	0.21	0.011	(Genera	ators a	and Exciters (Supply and Install)			_					
	0.3	0.211	Total Ri			rators and Exciters dor (includes all equipment in this category)	4	EA	¢	74,200,000.00	¢	297,000,000	\$ 297,000,000	
	0.5					red quotes	4	EA	φ	74,200,000.00	φ	297,000,000	\$ 297,000,000	
<u>334</u>		Accesso												
	0.1		Connec	ctions,	Suppo	orts and Structures			_					
	0.11	0.111		Structu		tures (included Below)								
	0.12	0.111	(and Insulators								
		0.121			Gene	rator Isolated Phase Bus		LS	\$	5,056,000.00		5,060,000		
		0.122				ower Cables and Accessories		LS	\$	2,054,000.00		2,050,000		
		0.123				ower Cables and Accessories ol Cables and Accessories		LS	\$	948,000.00	\$	950,000 1.740.000		
		0.124				of Cables and Accessories nding System		LS LS	\$	237,000.00		1,740,000 240,000		
	0.13	0.123	(d Fittings	1	10	φ	237,000.00	φ	240,000		
		0.131			Cond	uits and Fittings	1	LS	\$	632,000.00	\$	630,000		
	0.2					ntrol Equipment								
	0.21	0.211	/	Auxilia	ry I ra	nsformers ary Transformers	4	EA	\$	83,811	¢	340,000		
	0.22	0.211		Circuit	Break	ers Generators	4	EA	φ	03,011	э \$	- 340,000		
		0.221			Circui	it Breakers Generators	4	EA	\$	1,504,300	\$	6,020,000		
	0.23			Surge	Protec	ctors and Generator Cubicles								
		0.231	[Protectors and Generator Cubicles	1	LS	\$	726,800.00	\$	730,000		
	0.24	0.241	\$	Switch		ls h boards		LS	\$	1,232,400.00	¢	1,230,000		
	0.25	0.241				ver Equipment	1		\$	1,232,400.00	φ	1,230,000		
		0.251			Auxili	ary Power Equipment	1	LS	\$	347,600.00	\$	350,000		
	0.3			s and	Appur	tenances		-		-			-	
	0.31	0.011	(y and meter boards			-	4 400 000 00	¢	4 400 007		
	0.32	0.311		Come	uter C	ol, relay and meter boards ontrol System	1	LS	\$	1,422,000.00	\$	1,420,000		
	0.32	0.321	-			outer Control System	(Included in Trans	-Ems)						
	0.33			Superv	isor a	nd Telemeter System			1					
		0.331			Supe	rvisor and Telemeter System	Included in Trans	EMS)						
	0.4		Power			s formers								
	0.41	0.411				er Transformers	7	EA	\$	2,000,000	\$	14,000,000		
									Ľ	,	Ĺ	,,		
	0.5		Lighting											
	0.51	0.5.1		Power	nouse	and Transformer Gallery			-	4 004 000 55		4 000 005		
	0.52	0.511		Access	Tunn	rhouse and Transformer Gallery els and Roads	1	LS	\$	1,824,900.00	3	1,820,000		
	0.52	0.521	· · · · · ·			ss Tunnels and Roads	0	LS	\$	402,900.00	s	-		
							Ŭ		Ľ		Ĺ			
	0.6					ipment								
	0.61	0.644		Misc. E	lectric	cal Equipment		10	-	60E 000 00	¢	600.000		
		0.611			IVIISC.	Electrical Equipment	1	LS	\$	625,680.00	\$	630,000		
L	I I I				l	<u> </u>					I			

					Low Watana RCC Arch Alternat	ve (4 Turbines)					Denotes Qty Adjustment by RST
FERC Line #	Sub C				Description	Quantity	Units	Unit Price	Line Price	Total	
	0.7		cessory	y Equ	quipment						
		0.71 34.5	kV and	d LV	/ Equipment						
		0.711			oard		LS	\$ 213,300 \$	210,000		
		0.712		oles			LS	\$ 450,300 \$	450,000		
		0.713			Insformers		LS	\$ 284,400 \$	280,000		
		0.73 Dies 0.731		sel G	lor- Standby Generator- Standby		EA	\$ 347,550 \$	700,000		
			rior Lig					φ 017,000 φ	700,000		
		0.741			s Lighting		LS	\$ 355,500 \$	360,000		
			ic Boar	rd- Co	Control Building						
		0.751	Mim	nic Bo	Board- Control Building		LS	\$ 1,185,000 \$	1,190,000		
										\$ 40,000,000	
335		Misc Powerplant E									
	0.1		/stems-	- Unc	Iderground						
	_				Systems		1.0	\$ 2,488,500,00 \$	0.400.000		
		0.111 0.12 Fire			Water Systems Systems		LS	\$ 2,488,500.00 \$	2,490,000		
		0.12 0.121			otection Systems		LS	\$ 1,422,000.00 \$	1,420,000		
			presse	d Air	ir Systems		20	φ 1,422,000.00 φ	1,420,000		
		0.131	Con	npres	essed Air Systems		LS	\$ 1,777,500.00 \$	1,780,000		
		0.14 Oil H	landlin	g Sys	ystems						
		0.141	Oil I	Hand	dling Systems		LS	\$ 1,185,000.00 \$	1,190,000		
			nage &	Dew	watering						
		0.151			e & Dewatering	1	EA	\$ 1,738,000 \$	3,480,000		
		0.16 Hea	ting, Ve	entila	ation and Cooling System						
		0.161			, Ventilation and Cooling System		LS	\$ 1,777,500.00 \$	1,780,000		
			ellaneo	UUS			LS	\$ 1,185,000.00 \$	1,190,000		
	0.2	0.171	iviis	Sur	aneous Irface Facilities		LS	\$ 1,185,000.00 \$	1,190,000		
	0.2	0.21 Auxiliary S	liary Sv	vsten	ms- Surface Facilities		+				
		0.211	Aux	iliarv	y Systems- Surface Facilities		LS	\$ 711,000 \$	710,000		
	0.3	Auxiliary E	uipme	nt	, , , , , , , , , , , , , , , , , , , ,		1	,	,000		
		0.31 Pow	erhous	e Cra							
		0.311			ouse Cranes		EA	\$ 1,800,000 \$	3,600,000		
			ators								
		0.321	Elev	vators	rs		EA	\$ 181,700 \$	360,000		
					Cranes and Hoists			A 505 500 A	540.000		
	_	0.331			aneous Cranes and Hoists		LS	\$ 505,500 \$	510,000		
	-	0.34 Mac 0.341			Equipment e Shop Equipment		LS	\$ 2,022,000 \$	2,020,000		
	0.4							d Electrical Systems)	2,020,000		
	0.5						LS	\$ 106,650.00 \$	110,000		
				1						\$ 21,000,000	
336		s, Rails and Air Facilities									
	0.1										
					and Bridges						
		0.111	Golo		reek- Watana						
				RC	Clearing		ACRE	\$ 11,416.62 \$			
				_	Waste Excavation		CY	\$ 11,416.62 \$ \$ 9.51 \$			
	-		-		Common Excavation		CY	\$ 9.31 \$			
	-				18" Culverts		LF	\$ 62.55 \$			
					36" Culverts	(LS	\$ 32,760.98 \$			
					D-1 Base Material	(TON	\$ 45.47 \$	-		
					Fabric	() TON) SY	\$ 6.73 \$	-		
					laintenance	(MI/YR	\$ 9,008.99 \$	-		
	-	0.112	Golo		reek- Parks		-	-			
			_	Rc	toad (41.25 Miles)		ACDE	¢ 44.440.00 *			
				_	Clearing Waste Excavation		ACRE CY	\$ 11,416.62 \$ \$ 9.51 \$	-		
					Common Excavation		CY	\$ 9.51 \$ \$ 8.32 \$	-		
			_	+	18" Culverts			\$ 62.55 \$			
	-				36" Culverts		LS	\$ 35,451.31 \$			
	1				D-1 Base Material	(TON	\$ 45.47 \$			
					Fabric	() SY) MI/YR	\$ 6.73 \$	-		
					laintenance	(MI/YR	\$ 9,008.32 \$	-		
		0.113	Dev		anyon Low Level Crossing		1				
ļ				Cr	rossing (7.88 Miles)		1055				
				_	Clearing		ACRE	\$ 11,416.62			
			_	_	Waste Excavation		CY	\$ 9.51 \$ 8.32			
				_	Common Excavation Rock Excavation		CY CY	\$ 8.32 \$ 28.45			
					18" Culverts			\$ 28.45 \$ 62.55			
	-		-		Bridge		LF LS	\$ 120,000,000.00			
	1				D-1 Base Material		TON	\$ 45.47			
1				Ma	laintenance		MI/YR	\$ 11,258.74			
		0.114	Gold		reek- Watana (41.25 miles)		LS	\$ 28,132,000			

				1			Low Watana RCC Arch Alternative						_	Denotes Qty Adjustment by RST	
FERC Line #	Sub C	atego	ries			1	Description	Quantity	Units	Unit Pr	ice	Line Price	Total	Notes / Remarks	
		0.12		Perma	inent F	Roads a	nd Bridges						-		
		0.12	0.124	4 Parks	Highw	ay to W	latana (62 mi)	(мі	\$ 3,000,000	.00 \$; -	-		
			0.12	5 Susitn	a Bride	ge		() SF	\$ 450	.00 \$				
													-		
	0.2	0.24		Rail Facilities		Pailroad	(including railheads)						-		
		0.24	0.244				o Watana- Rail						-		
					R-1, ((33 Mi)									
							Clearing	67	1 AC	\$ 11,416		7,662,183	-		
							Waste Excavation Common Excavation	168788	3 CY	\$ 9 \$ 8	.51 \$.32 \$	16,051,766 27,519,880	-		
							Rock Excavation		4 CY		.32 \$				
							Borrow	449500	CY	\$ 11	.88 \$	5,340,060	-		
							Subballast	71105	5 CY	\$ 18	.15 \$	12,902,807			
-							Grade "A" Base Material		CY		.45 \$		-		
							D-1 Base material A.C. Surfacing		TON TON		.20 \$		-		
							Dock Lumber		6 MBF		.60 \$		-		
							18" Culvert	20093	3 LF	\$ 68	.26 \$	1,371,458			
							36" + Culverts	() LS	\$ 92,160	.00 \$	-	4		
	-						Fabric Thom Bings	12930			.00 \$.04 \$		4		
						1	Thaw Pipes Topsoil & Seed		I AC	\$ 95 \$ 10,800			1		
					1	1	Rail Yard Control Devices		I LS	\$ 1,800	.00 \$	4,055,257 1,800	1		
							Bridges	() SF	\$ 900	.00 \$	-	1		
							Trackage	325940	LF	\$ 350	.00 \$	114,079,000	4		
	-				Moir	tenance		-					4		
					waint	lenance	Rail	404	6 Mile-year	\$ 10,000	.00 \$	4,060,000	1		
							Railhead	10	7 years	\$ 75,000	.00 \$	525,000	-		
		0.13		Site R									-		
			0.131			struction Site Ro		21	Mile	\$ 750,000	00 \$	15,000,000	-		
						Mainte			2 MI/YRS	\$ 223,092					
			0.132		Perm	anent F				+					
						Perma	nent Roads	(6 MILE	\$ 1,287,997	.42 \$	7,728,000			
													-		
	0.3	0.31		Airstrip Airstrip									-		
		0.01		Anothy		anent A	irstrip		1 LS	\$ 12,798,000	.00 \$	12,798,000	-		
					9 yea	ars main	tenance savings		1 LS						
					Temp	oorary A	irstrip		1 LD	\$ 2,133,000			-		
	0.4			Saved Mainte	enance				1 LS	\$ (5,067,889	.52) \$	(5,068,000)			
													\$ 254,700,000		
			Transn	nission Plant											
350			l and a	nd Land Right	l	<u> </u>			-						
330			Lanu d	Land and Lar	nd Riał	hts		-	1						
				Transr	nissior	n		33	3 MILE	\$ 86,720	.00 \$	2,862,000			
				Substa	ations	(4 Sites		(LS	\$ 2,607,000	.00 \$	-			
352	-		Subete	tion and Swite	hing	Station			1				\$ 2,862,000		
332	0.1		Jubsla	Switchyard				-	1						
	0.1	0.11		Switch		1		:	2 LS	\$ 14,000,000	.00 \$	28,000,000			
													\$ 28,000,000		
353			Substa	tion/Switching	g Stati	ion Equ	lipment			¢ 57.000.000					
				Ester Willow					D LS D LS	\$ 57,922,800 \$ 3,613,020					
				Knik Arm		1			DLS	\$ 29,838,300					
				University				() LS	\$ 88,685,400	.00 \$; -			
		-	1	Devil Canyon		1		() LS	\$ 35,585,550	.00 \$	-			
				MGH-11 T		<u> </u>	t Curtery (EMO)	+	-						
				VVIIIOW Energ	y Man nent o	agemer	em Costs		LS	\$ 27,326,100	00 ¢	-			
				Microv	vave C	Commur	nication Equipment		DLS	\$ 11,660,400					
				EMS 0	Control	I Center	Building	() LS	\$ 9,148,200	.00 \$	i -			
		-	1	Watan	a and	Devil C	anyon In-plant Monitor and Control Equipment) LS	\$ 8,619,690	.00 \$	-			
254			Steel 7	owore and Fi	durec			+					\$-		
<u>354</u>			Sider I	Towers and Fix	idina F	oundati	on and Hardware)	2'	3 miles	\$ 4,500,000	.00 \$	148,500,000			
					Jung I	Janual		5.		- 1,000,000	φ		\$ 148,500,000		
356			Condu	ctors and Dev	ices										
				Conductors				(MILE	\$ 218,281	.33 \$	-			

							Low Watana RCC Arch Alternative (4	Turbines)						Denotes Qty Adjustment by RST
FERC Line #	Sub Categories						Description	Quantity	Units	Unit Pric	e	Line Price	Total	
			Submarine (Cables	5		•			\$ 15,808,340.5				
													\$-	
359	Ro	ads a	Ind Trails											
			Roads and T Clearing and	I Pood	łc			200	MILE MILE	\$ 75,744.0 \$ 37,872.0	0 \$	15,149,000 12,876,000		
			Cleaning and	Road	15			340		\$ 31,012.0	φ	12,070,000	\$ 28,000,000	\$ 207,362,000
													•	• 201,002,000
-														
	Ge	neral	Plant											
389	La	nd an	d Land Rigi Land and La	nts Dia							\$			
			Lanu anu La		JIIIS						φ	-		
<u>390</u>	St	uctu	res and Imp	rovem	ents									
			Structures a	nd Imp	provem	nents	3				\$	-		
<u>391</u>	Of	ice F	urniture and	l Equi	pment	t								
			Office Furnit	ure an	na Equi	ipme	ent				\$	-		
392	Tr	insno	ortation Equ	inmen	nt									
			Transportati	on Eau	uipmen	nt		1	1	1	\$	-		
					Ĺ									
<u>393</u>	Ste	ores E	Equipment											
	+ $+$ $+$		Stores Equip	oment							\$	-		
204		ole C	hon and C-	1202 5	iquin~	2000		+	+		_			
<u>394</u>	10	015 5	hop and Ga Tools Shop	and G	arage I	Faui	pment	+	+		\$	-		
			. 5013 01100		alayer	-qui	phon	1	1		ψ	-		
395	La	oorat	ory Equipm	ent										
			Laboratory E	quipn	nent						\$	-		
<u>396</u>	Po	wer-C	Operated Eq	uipme	ent			-			¢			
			Power-Oper	ated E	quipm	ent					\$	-		
<u>397</u>	Co	mmu	nications E	nuipm	ent									
			Communica	tions E	quipm	ent					\$	-		
<u>398</u>	Mi	scella	ineous Equi	pmen	t									
			Miscellaneo	us Equ	uipmen	nt					\$	-		
399	01	or T	angible Prop	orty							-			
			Other Tangi	ble Pro	operty			1	LS	\$ 16,000,00	0 \$	16,000,000		
			Saved Main	tence					I LS	\$ (231,22	0) \$			
			-								_		\$ 15,800,000	
	Inc	lirect	Costs					-						
<u>61</u>	То	mnor	ary Constru	ction	Faciliti	ioe								
01	10	npoi	Temporary (Constru	uction	Faci	lities							
<u>62</u>	Co	nstru	ction Equip	ment										
			Construction	1 Equip	oment									
C 2					_	_					_			
<u>63</u>	0.1		Main Constr	uction	Camp			1	LS	\$ 316,340,28	0			
			Saved Main	tence	Junp	+			LS	\$ (6,172,493.2				
											1			
			Site Prepara	ition				3270533						
	+ $+$ $+$		Buildings	-	-			15019120			-			
			utilities		_	+		12172667 30462320	5	\$ 152,311,600.0	0			
		_		-				50-52520	1	φ 102,011,000.0				
			MAIN CONS	STRUC	CTION	VILL	LAGE							
			site prep					3540080						
			buildings					10008187						
			utilities					4914160	7 5	\$ 92,312,133.3	2			
								10402420.07	5	φ 92,312,133.3	IJ \$	152,311,600	\$ 123,800,000	Camp cost to reflect lower volume (0.8125) *Previous Estimate doesn't total
<u>64</u>	La	bor E	xpense								4		- 120,000,000	samples to renew tense relation of the relation statistic doesn't total
			Labor Exper	nse				(Included In Direc	ct Costs)					
<u>65</u>	Su	perin	tendence											
			Superintend	ence	-			(Included In Direc	ct Costs)		_			
<u>66</u>	Ins	uran	ce Insurance	-	-			(Included In Dired	rt Coste)		-			
68	Mi		on Fishery,	Terres	strial a	nd F	Recrational	L'IIOIGGGG III DILEC			+			
			Mitigation			Ť		(Not included in 1	982 study)	\$	-		
<u>69</u>	Fe	es						1		1				

								Low Watana RCC Arch Alternative (4	Denotes Qty Adjustment by RST					
FERC Line #	Sub C	ategor	ies					Description	Quantity	Units	Unit Price	Line Price	Tot	al Notes / Remarks
				Fees										
Subtotal											Dire	ct Construction Cost	\$ 2,665,300,0	00
	Conti	ngency							21.31	3%			\$ 568,100,00	00 Used Same Contingency as Full RCC
Subtotal														
<u>71A</u>			Enginee	neering (4%), Enviornmental (2%), Regulatory(1%) and Construction Managemen				(2%), Regulatory(1%) and Construction Management		7 %			\$ 186,600,0	00
<u>71B</u>			Constru	truction Management (4%)						4 %			\$ 106,600,0	00
<u>72</u>			Legal E	Expenses						0 %				
75			Taxes							0 %				
76			Adminis	strative	& Gei	n. Expe	enses			0 %				
77			Interest							0 %				
<u>80</u>			Earnings/Expenses During Construction					truction		0 %				
Total Project C	otal Project Cost												\$ 3,526,600,0	00
r of Years for Ba	ase Ca	se						20.5	years					

r of Years for Base Case of Years for Full Watana

16.5 years