Lowell Creek Flood Diversion Feasibility Study

Appendix E - Cost Engineering

Seward, Alaska

U.S. Army Corps of Engineers

Alaska District

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1. APPENDIX PURPOSE

This Appendix is the cost estimate basis for the proposed modifications to the Lowell Creek Flood Control Project. It provides the cost assumptions for materials, labor, equipment, and markups utilized in the cost estimate.

2. PROJECT ALTERNATIVES AND MEASURES

The alternatives below with structural (S) measures and nonstructural (NS) measures were evaluated for this report. Below is the summary of the alternatives and its measures:

I. Alternative #1 – No Action
II. Alternative #2 - Improve Existing Flood Diversion System
    a. NS3 - Tree removal
    b. S26 - Improve Low Flow Diversion System
    c. NS1 - Implement Early Warning System and Evacuation Plan
    d. S18 - Protect Tunnel Inlet from Landslide Blockage
    e. S14 - 10': 150' Extend Tunnel Outlet into Resurrection Bay
    f. S3 - Refurbish Existing Tunnel
III. Alternative #3A - Enlarge Existing Flood Diversion System – 18' Tunnel
    a. NS3 - Tree removal
    b. S26 - Improve Low Flow Diversion System
    c. NS1 - Implement Early Warning System and Evacuation Plan
    d. S18 - Protect Tunnel Inlet from Landslide Blockage
    e. S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay
    f. S4 - Enlarge Existing Tunnel to 18'
IV. Alternative #3B - Enlarge Existing Flood Diversion System – 24' Tunnel
    a. NS3 - Tree removal
    b. S26 - Improve Low Flow Diversion System
    c. NS1 - Implement Early Warning System and Evacuation Plan
    d. S18 - Protect Tunnel Inlet from Landslide Blockage
    e. S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay
    f. S4 - Enlarge Existing Tunnel to 24'
V. Alternative #4A - Construct New Flood Diversion System – 18' Tunnel
    a. NS3 - Tree removal
    b. S1 & S8 - Construct Additional 18' Tunnel and Diversion Dam
    c. NS1 - Implement Early Warning System and Evacuation Plan
    d. S18 - Protect Tunnel Inlet from Landslide Blockage

e. S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay
f. S3 - Refurbish Existing Tunnel

VI. Alternative #4B - Construct New Flood Diversion System – 24' Tunnel
a. NS3 - Tree removal
b. S1 & S8 - Construct Additional 24' Tunnel and Diversion Dam
c. NS1 - Implement Early Warning System and Evacuation Plan
d. S18 - Protect Tunnel Inlet from Landslide Blockage
e. S14 - 24': 150' Extend Tunnel Outlet into Resurrection Bay
f. S3 - Refurbish Existing Tunnel

Please see the Hydraulic and Hydrology (H&H) Appendix for the detailed scope of work.

3. ALTERNATIVES COST SUMMARY

The summary of alternative costs is shown in Table 1. The estimated contract cost does not include escalation to the mid-point of construction.

Table 1. Alternative Costs

Alternative #	Estimated Contract Cost	Contingency	Total Costs
1	$ -	$ -	$ -
2	$ 42,157,265	$ 10,903,956	$ 53,061,221
3A	$ 121,646,936	$ 35,635,879	$ 157,282,815
3B	$ 241,807,536	$ 73,038,490	$ 314,846,026
4A	$ 92,784,771	$ 30,143,392	$ 122,928,162
4B	$ 130,027,204	$ 42,579,479	$ 172,606,683

4. QUANTITIES

Assumptions and concept quantities for each of the structural measures and nonstructural measures were provided from CEPOA-EC-G-HH Structural Designer. Please see the H&H Appendix for the detailed concept quantity.

5. ESTIMATE SOFTWARE AND DATA SOURCES

The construction cost estimate was developed using the following software, labor library, and equipment library:

- MCACES 2nd Generation (MII) version 4.4
- 2018 Davis Bacon Wage Rates (South of 63rd)
- 2016 EP1110-1-8, Equipment Region 9
- 2016 MII English Cost Book

6. PROJECT MARKUPS

- Prime Markups
  - HOOH (Running %)=6%
  - Profit (Profit Weighted Guidelines) =8%
  - Bond (Running %)=1%
- Contingency – Varies from 28% to 33% for each alternative based on the Abbreviated Risk Analysis (ARA)
- Planning, Engineering, and Design (PED) – Assume 15% of the total construction costs
- Construction Management – Assume 7.94% of the total construction costs

7. ESTIMATE ASSUMPTIONS

- Work schedule: 6/12
- Class 4 cost estimate per ARA, ASTM E2516-11 Standard Cost Estimate Classification System, and ER 1110-2-1302 Civil Works Cost Engineering
- 2016 to 2019 cost book material price escalation = 6% running
- 2016 to 2019 equipment library escalation = 6% running
- 2018 to 2019 labor library escalation = 2% running
- S14 - Extend Tunnel Outlet into Resurrection Bay – Precast concrete flume fabricates and delivers to Seward from Tacoma, Washington. Steel piles are available in Alaska.
- S18 Protect Tunnel Inlet from Landslide Blockage - Steel girders fabricate and deliver to Seward from Anchorage, AK
- Concrete and rebar for all structural measures are from Soldotna deliver to Seward
- Mob/demob costs are included under Prime Division 01 General Requirements or as a percent allowance in the prime contractor markups for Field Office Overhead
- Assume reduction labor productivity to 50% for measure S14 – 10'/18’/24’: 150' Extend Tunnel Outlet into Resurrection Bay and 20% to measure S4 Enlarge Existing Tunnel, from 10' to 18' or 10' to 24' due to:
  - The tunnel construction would be constrained to a short season when water could be successfully diverted from the tunnel
  - Winter and spring months requiring the contractor to maintain a winter site
  - At the end of each construction season, the contractor would need to protect the portion of the work that had been

completed from damage while the tunnel diverts summer flows.

- Summer flows may cause damage to the work between construction seasons necessitating repairs.

8. REFERENCES

ASTM Standard E2516-11, "Standard Classification for Cost Estimate Classification System," ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA.

USACE. 2016. "Civil Works Cost Engineering," Engineer Regulation ER 1100-2-1302.

9. ATTACHMENTS – ARA RESULTS AND MCACES COST REPORTS

Abbreviated Risk Analysis

Project (less than $40M): **Lowell Creek** **Alternative: #2**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: ---**

Total Estimated Construction Contract Cost = **$ 34,324,430**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	01 LANDS AND DAMAGES	NS3 - Tree removal	$ 1,479,986		12%	$ 177,219	$ 1,657,205
2	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S26 - Improve Low Flow Diversion System	$ 10,171,513		16%	$ 1,614,464	$ 11,785,977
3	02 RELOCATIONS	NS1 - Implement Early Warning System and Evacuation Plan	$ 30,328		29%	$ 8,858	$ 39,186
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S18 - Protect Tunnel Inlet from Landslide Blockage	$ 4,284,496		38%	$ 1,634,260	$ 5,918,756
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S14 - 10': 150' Extend Tunnel Outlet into Resurrection Bay	$ 8,959,846		38%	$ 3,389,788	$ 12,349,634
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S3 - Refurbish Existing Tunnel	$ 9,398,261		33%	$ 3,056,525	$ 12,454,786
7					0%	$ -	$ -
8					0%	$ -	$ -
9					0%	$ -	$ -
10					0%	$ -	$ -
11					0%	$ -	$ -
12	All Other		$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 5,107,475		12%	$ 631,868	$ 5,739,343
14	31 CONSTRUCTION MANAGEMENT	Construction Management	$ 2,725,360		14%	$ 390,974	$ 3,116,334
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ -	0%	$ -	$ -	
Total Construction Estimate	$ 34,324,430	29%	$ 9,881,113	$ 44,205,543	
Total Planning, Engineering & Design	$ 5,107,475	12%	$ 631,868	$ 5,739,343	
Total Construction Management	$ 2,725,360	14%	$ 390,974	$ 3,116,334	
Total Excluding Real Estate	**$ 42,157,265**	**26%**	**$ 10,903,956**	**$ 53,061,221**	

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$42,157k	$48,699k	$53,061k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Sub Bid Direct	Cost	Sub CMU Cost	To Prime	Prime CMU	Contract Cost
Contract Summary Cost Report			**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**
Measure NS3. Remove Trees	**52.00**	**ACR**	**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**

Currency in US dollars

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost	SubCMU Cost To Prime	Prime CMU Cost	Contract Cost
Contract Summary Cost Report			**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Measure S26. Improve Low Flow Diversion System	**1.00**	**EA**	**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Concrete Sump	**2,916.00**	**SF**	**41,892**	**3,988**	**12,726**	**0**	**58,606**	**17,473**	**76,079**	**90,585**	**166,663**
(2) 48" Culvert	**900.00**	**LF**	**196,543**	**106,203**	**238,405**	**0**	**541,150**	**137,526**	**678,676**	**809,542**	**1,488,218**
(1) 72" Culvert	**4,200.00**	**LF**	**1,106,516**	**620,894**	**1,392,510**	**0**	**3,119,920**	**763,080**	**3,883,000**	**4,633,632**	**8,516,632**

Currency in US dollars

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost	SubCMU Cost	ToPrime Prime	CMU Contract	Cost
Contract Summary Cost Report			**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**
Measure NS1. Implement Early Warning System and Evacuation Plan	**1.00**	**EA**	**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Measure S18. Protect Tunnel Inlet from Landslide Blockage	1.00	EA	264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Scaling Excavation	1.00	EA	18,148	8,922	0	0	27,069	0	27,069	77,074	104,143
Foundation Concrete	1,280.00	SF	105,593	7,429	81,761	0	194,784	68,866	263,649	741,113	1,004,762
Steel Girders	94.30	TON	24,050	5,905	383,339	0	413,294	146,120	559,414	1,572,502	2,131,916
Site Cast Roof Panels (fill irregular areas)	64.00	CY	55,073	1,185	20,168	0	76,426	27,020	103,446	290,785	394,231
Precast roof panels (prestressed for crack control)	4,613.00	SF	61,195	20,845	43,861	0	125,901	44,512	170,414	479,030	649,444

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU Cost	ToPrime	PrimeCMU	ContractCost	
Contract Summary Cost Report			**1,249,293**	**332,720**	**418,642**	**0**	**2,000,655**	**707,157**	**2,707,812**	**6,252,034**	**8,959,846**
Measure S14 - 10': 150' Extend Tunnel Outlet into Resurrection Bay	**1.00**	**LS**	**1,249,293**	**332,720**	**418,642**	**0**	**2,000,655**	**707,157**	**2,707,812**	**6,252,034**	**8,959,846**
Drilled Piers - Rolled and Welded Pipe Can	**1.00**	**LS**	**400,882**	**106,761**	**191,813**	**0**	**699,456**	**247,293**	**946,749**	**2,185,931**	**3,132,679**
Concrete Pile Caps	**11.00**	**LS**	**115,192**	**2,475**	**41,133**	**0**	**158,800**	**56,144**	**214,944**	**496,280**	**711,224**
Cast-In_Place Flume Foundations	**1.00**	**EA**	**11,392**	**2,143**	**3,930**	**0**	**17,465**	**6,001**	**23,465**	**54,195**	**77,660**
Precast Concrete Flume Sections	**1.00**	**EA**	**721,828**	**221,341**	**181,765**	**0**	**1,124,934**	**397,720**	**1,522,654**	**3,515,628**	**5,038,283**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU Cost	ToPrime	PrimeCMU	ContractCost	
Contract Summary Cost Report			544,334	61,155	427,311	0	1,032,800	365,147	1,397,947	6,026,307	7,424,254
Measure S3: Refurbish Existing Tunnel	1.00	EA	544,334	61,155	427,311	0	1,032,800	365,147	1,397,947	6,026,307	7,424,254
Demolition of Existing 10,000 psi concrete	450.00	CY	132,766	34,549	0	0	167,316	59,154	226,470	976,273	1,202,743
Demolition of Existing 4,000 psi concrete	1.00	EA	8,502	4,704	129	0	13,335	4,715	18,050	77,811	95,861
Repair Invert with Armor and Concrete	1.00	EA	359,591	15,484	406,981	0	782,056	276,496	1,058,552	4,563,237	5,621,789
Wall and Crown Surface - Linear Repairs	1.00	EA	2,812	161	188	0	3,161	1,118	4,279	18,447	22,726
Wall and Crown Surface - Surface Repairs	1.00	EA	15,230	5,413	159	0	20,802	7,354	28,156	121,376	149,532
Contact Grout Crown	1.00	EA	25,432	845	19,853	0	46,130	16,309	62,439	269,162	331,601

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Abbreviated Risk Analysis

Project (less than $40M): **Lowell Creek** **Alternative: #3A**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: ---**

Total Estimated Construction Contract Cost = **$ 99,044,892**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	01 LANDS AND DAMAGES	NS3 - Tree removal	$ 1,479,986		12%	$ 177,219	$ 1,657,205
2	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S26 - Improve Low Flow Diversion System	$ 10,171,513		16%	$ 1,614,464	$ 11,785,977
3	02 RELOCATIONS	NS1 - Implement Early Warning System and Evacuation Plan	$ 30,328		29%	$ 8,858	$ 39,186
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S18 - Protect Tunnel Inlet from Landslide Blockage	$ 4,284,496		38%	$ 1,634,260	$ 5,918,756
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay	$ 10,512,214		38%	$ 3,977,097	$ 14,489,311
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S4 - Enlarge Existing Tunnel to 18'	$ 72,566,355		35%	$ 25,272,516	$ 97,838,871
7					0%	$ -	$ -
8					0%	$ -	$ -
9					0%	$ -	$ -
10					0%	$ -	$ -
11					0%	$ -	$ -
12	All Other		$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 14,737,880		12%	$ 1,823,288	$ 16,561,168
14	31 CONSTRUCTION MANAGEMENT	Construction Management	$ 7,864,164		14%	$ 1,128,177	$ 8,992,341
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ -	0%	$ -	$ -	
Total Construction Estimate	$ 99,044,892	33%	$ 32,684,414	$ 131,729,306	
Total Planning, Engineering & Design	$ 14,737,880	12%	$ 1,823,288	$ 16,561,168	
Total Construction Management	$ 7,864,164	14%	$ 1,128,177	$ 8,992,341	
Total Excluding Real Estate	**$ 121,646,936**	**29%**	**$ 35,635,879**	**$ 157,282,815**	
			Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)			$121,647k	$143,029k	$157,283k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Sub Bid Direct	Cost	Sub CMU Cost	To Prime	Prime CMU	Contract Cost
Contract Summary Cost Report			**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**
Measure NS3. Remove Trees	**52.00**	**ACR**	**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**

Currency in US dollars

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost	SubCMU Cost To Prime	Prime CMU Cost	Contract Cost
Contract Summary Cost Report			**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Measure S26. Improve Low Flow Diversion System	**1.00**	**EA**	**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Concrete Sump	**2,916.00**	**SF**	**41,892**	**3,988**	**12,726**	**0**	**58,606**	**17,473**	**76,079**	**90,585**	**166,663**
(2) 48" Culvert	**900.00**	**LF**	**196,543**	**106,203**	**238,405**	**0**	**541,150**	**137,526**	**678,676**	**809,542**	**1,488,218**
(1) 72" Culvert	**4,200.00**	**LF**	**1,106,516**	**620,894**	**1,392,510**	**0**	**3,119,920**	**763,080**	**3,883,000**	**4,633,632**	**8,516,632**

Currency in US dollars

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost	SubCMU Cost	ToPrime Prime	CMU Contract	Cost
Contract Summary Cost Report			**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**
Measure NS1. Implement Early Warning System and Evacuation Plan	**1.00**	**EA**	**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Measure S18. Protect Tunnel Inlet from Landslide Blockage	1.00	EA	264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Scaling Excavation	1.00	EA	18,148	8,922	0	0	27,069	0	27,069	77,074	104,143
Foundation Concrete	1,280.00	SF	105,593	7,429	81,761	0	194,784	68,866	263,649	741,113	1,004,762
Steel Girders	94.30	TON	24,050	5,905	383,339	0	413,294	146,120	559,414	1,572,502	2,131,916
Site Cast Roof Panels (fill irregular areas)	64.00	CY	55,073	1,185	20,168	0	76,426	27,020	103,446	290,785	394,231
Precast roof panels (prestressed for crack control)	4,613.00	SF	61,195	20,845	43,861	0	125,901	44,512	170,414	479,030	649,444

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost Sub	CMU Cost	ToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			1,909,221	424,819	645,478	0	2,979,519	1,052,437	4,031,956	6,480,259	10,512,214
Measure S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay	1.00	EA	1,909,221	424,819	645,478	0	2,979,519	1,052,437	4,031,956	6,480,259	10,512,214
Drilled Piers - Rolled and Welded Pipe Can	3.00	EA	483,019	125,443	255,028	0	863,490	305,287	1,168,777	1,878,467	3,047,243
Concrete Pile Caps	3.00	EA	80,427	4,250	36,244	0	120,921	42,752	163,673	263,057	426,730
Cast-In_Place Flume Foundations	1.00	EA	49,047	8,732	20,720	0	78,499	26,781	105,280	169,275	274,555
Precast Concrete Flume Sections	4.00	EA	1,296,729	286,394	333,487	0	1,916,609	677,617	2,594,226	4,169,460	6,763,686

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost Sub	CMU Cost To Prime	Prime CMU	Contract Cost
Contract Summary Cost Report			30,206,229	7,857,572	5,082,525	0	43,146,325	13,661,637	56,807,962	15,758,393	72,566,355
Measure S4 Enlarge Existing Tunnel, from 10' to 18'	2,189.00	LF	30,206,229	7,857,572	5,082,525	0	43,146,325	13,661,637	56,807,962	15,758,393	72,566,355
Remove existing 8" concrete lining	77,928.40	SF	5,468,572	2,207,385	0	0	7,675,957	2,430,477	10,106,433	2,803,501	12,909,934
Rock Excavation	2,189.00	LF	4,554,873	1,770,231	14,168	0	6,339,273	2,007,236	8,346,509	2,315,302	10,661,810
New 18' Tunnel	2,189.00	LF	20,182,783	3,879,956	5,068,357	0	29,131,095	9,223,924	38,355,020	10,639,591	48,994,611

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Abbreviated Risk Analysis

Project (less than $40M): **Lowell Creek** **Alternative: #3B**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: ---**

Total Estimated Construction Contract Cost = **$ 196,879,609**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	01 LANDS AND DAMAGES	NS3 - Tree removal	$ 1,479,986		12%	$ 177,219	$ 1,657,205
2	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S26 - Improve Low Flow Diversion System	$ 10,171,513		16%	$ 1,614,464	$ 11,785,977
3	02 RELOCATIONS	NS1 - Implement Early Warning System and Evacuation Plan	$ 30,328		29%	$ 8,858	$ 39,186
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S18 - Protect Tunnel Inlet from Landslide Blockage	$ 4,284,496		38%	$ 1,634,260	$ 5,918,756
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S14 - 24': 150' Extend Tunnel Outlet into Resurrection Bay	$ 24,301,073		38%	$ 9,193,850	$ 33,494,923
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S4 - Enlarge Existing Tunnel to 24'	$ 156,612,213		35%	$ 54,542,972	$ 211,155,185
7					0%	$ -	$ -
8					0%	$ -	$ -
9					0%	$ -	$ -
10					0%	$ -	$ -
11					0%	$ -	$ -
12	All Other		$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	Planning, Engineering, & Design	$ 29,295,686		12%	$ 3,624,298	$ 32,919,984
14	31 CONSTRUCTION MANAGEMENT	Construction Management	$ 15,632,241		14%	$ 2,242,569	$ 17,874,810
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ -	0%	$ -	$ -	
Total Construction Estimate	$ 196,879,609	34%	$ 67,171,623	$ 264,051,232	
Total Planning, Engineering & Design	$ 29,295,686	12%	$ 3,624,298	$ 32,919,984	
Total Construction Management	$ 15,632,241	14%	$ 2,242,569	$ 17,874,810	
Total Excluding Real Estate	**$ 241,807,536**	**30%**	**$ 73,038,490**	**$ 314,846,026**	

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$241,808k	$285,631k	$314,846k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Sub Bid Direct	Cost	Sub CMU Cost	To Prime	Prime CMU	Contract Cost
Contract Summary Cost Report			**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**
Measure NS3. Remove Trees	**52.00**	**ACR**	**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**

Currency in US dollars

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost	SubCMU Cost To Prime	Prime CMU Cost	Contract Cost
Contract Summary Cost Report			**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Measure S26. Improve Low Flow Diversion System	**1.00**	**EA**	**1,344,950**	**731,085**	**1,643,641**	**0**	**3,719,676**	**918,079**	**4,637,755**	**5,533,759**	**10,171,513**
Concrete Sump	**2,916.00**	**SF**	**41,892**	**3,988**	**12,726**	**0**	**58,606**	**17,473**	**76,079**	**90,585**	**166,663**
(2) 48" Culvert	**900.00**	**LF**	**196,543**	**106,203**	**238,405**	**0**	**541,150**	**137,526**	**678,676**	**809,542**	**1,488,218**
(1) 72" Culvert	**4,200.00**	**LF**	**1,106,516**	**620,894**	**1,392,510**	**0**	**3,119,920**	**763,080**	**3,883,000**	**4,633,632**	**8,516,632**

Currency in US dollars

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost	SubCMU Cost To Prime	Prime CMU Cost	Contract Cost
Contract Summary Cost Report			**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**
Measure NS1. Implement Early Warning System and Evacuation Plan	**1.00**	**EA**	**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Measure S18. Protect Tunnel Inlet from Landslide Blockage	1.00	EA	264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Scaling Excavation	1.00	EA	18,148	8,922	0	0	27,069	0	27,069	77,074	104,143
Foundation Concrete	1,280.00	SF	105,593	7,429	81,761	0	194,784	68,866	263,649	741,113	1,004,762
Steel Girders	94.30	TON	24,050	5,905	383,339	0	413,294	146,120	559,414	1,572,502	2,131,916
Site Cast Roof Panels (fill irregular areas)	64.00	CY	55,073	1,185	20,168	0	76,426	27,020	103,446	290,785	394,231
Precast roof panels (prestressed for crack control)	4,613.00	SF	61,195	20,845	43,861	0	125,901	44,512	170,414	479,030	649,444

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			2,742,592	641,459	959,500	0	4,343,551	1,535,258	5,878,809	18,422,264	24,301,073
Measure S14 - 24': 150' Extend Tunnel Outlet into Resurrection Bay	1.00	EA	2,742,592	641,459	959,500	0	4,343,551	1,535,258	5,878,809	18,422,264	24,301,073
Drilled Piers - Rolled and Welded Pipe Can	1.00	EA	908,283	203,319	467,555	0	1,579,157	558,311	2,137,469	6,698,111	8,835,579
Concrete Pile Caps	4.00	EA	250,783	6,319	101,483	0	358,586	126,778	485,363	1,520,967	2,006,330
Cast-In_Place Flume Foundations	1.00	EA	20,686	3,554	8,410	0	32,649	11,138	43,788	137,261	181,048
Precast Concrete Flume Sections	3.00	EA	1,562,840	428,268	382,052	0	2,373,159	839,030	3,212,189	10,065,926	13,278,115

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost Sub	CMU Cost To Prime	Prime CMU	Contract Cost
Contract Summary Cost Report			30,206,229	7,857,572	5,082,525	0	43,146,325	13,661,637	56,807,962	15,758,393	72,566,355
Measure S4 Enlarge Existing Tunnel, from 10' to 18'	2,189.00	LF	30,206,229	7,857,572	5,082,525	0	43,146,325	13,661,637	56,807,962	15,758,393	72,566,355
Remove existing 8" concrete lining	77,928.40	SF	5,468,572	2,207,385	0	0	7,675,957	2,430,477	10,106,433	2,803,501	12,909,934
Rock Excavation	2,189.00	LF	4,554,873	1,770,231	14,168	0	6,339,273	2,007,236	8,346,509	2,315,302	10,661,810
New 18' Tunnel	2,189.00	LF	20,182,783	3,879,956	5,068,357	0	29,131,095	9,223,924	38,355,020	10,639,591	48,994,611

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost Sub	CMU CostToPrime	Prime	PrimeCMU	ContractCost
Contract Summary Cost Report			57,658,766	13,110,912	23,441,492	0	94,211,170	33,308,359	127,519,530	29,092,684	156,612,214
Measure S4 Enlarge Existing Tunnel, from 10' to 24'	2,189.00	LF	50,036,774	10,609,274	6,861,408	0	67,507,457	23,867,261	91,374,719	20,846,500	112,221,218
Remove existing 8" concrete lining	77,928.40	SF	8,966,299	2,979,970	0	0	11,946,269	4,223,603	16,169,872	3,689,043	19,858,914
Rock Excavation	2,189.00	LF	7,603,003	2,391,364	19,127	0	10,013,495	3,540,271	13,553,766	3,092,196	16,645,962
New 24' Tunnel	2,189.00	LF	33,467,472	5,237,940	6,842,281	0	45,547,694	16,103,387	61,651,081	14,065,261	75,716,342
S8 Construct New Diversion Dam 30 ft Height	1.00	EA	7,621,991	2,501,638	16,580,084	0	26,703,713	9,441,098	36,144,811	8,246,184	44,390,995
Soil Excavation	150,500.00	CY	2,159,935	847,246	0	0	3,007,181	1,063,189	4,070,370	928,626	4,998,996
Roller Compacted Concrete	67,000.00	CY	4,956,043	1,430,438	16,422,330	0	22,808,811	8,064,055	30,872,866	7,043,427	37,916,294
Backfill with Excavated material	83,500.00	CY	253,715	193,715	0	0	447,430	158,189	605,619	138,168	743,786
Bedrock excavation	350.00	CY	4,152	2,146	0	0	6,298	2,227	8,525	1,945	10,470
Concrete - Intake Transition for 24' Diameter Tunnel	400.00	CY	248,147	28,093	157,753	0	433,993	153,438	587,431	134,018	721,449

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Abbreviated Risk Analysis

Project (less than $40M): **Lowell Creek** **Alternative: #4A**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: ---**

Total Estimated Construction Contract Cost = **$ 75,545,327**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	01 LANDS AND DAMAGES	NS3 - Tree removal	$ 1,479,986		12%	$ 177,219	$ 1,657,205
2	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S1 & S8 - Construct Additional Tunnel and Diversion Dam	$ 49,840,042		38%	$ 19,038,239	$ 68,878,281
3	02 RELOCATIONS	NS1 - Implement Early Warning System and Evacuation Plan	$ 30,328		29%	$ 8,858	$ 39,186
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S18 - Protect Tunnel Inlet from Landslide Blockage	$ 4,284,496		38%	$ 1,634,260	$ 5,918,756
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay	$ 10,512,214		38%	$ 3,977,097	$ 14,489,311
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S3 - Refurbish Existing Tunnel	$ 9,398,261		33%	$ 3,056,525	$ 12,454,786
7					0%	$ -	$ -
8					0%	$ -	$ -
9					0%	$ -	$ -
10					0%	$ -	$ -
11					0%	$ -	$ -
12	All Other		$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ 11,241,145		12%	$ 1,390,692	$ 12,631,836
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ 5,998,299		14%	$ 860,503	$ 6,858,802
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ -	0%	$ -	$ -	
Total Construction Estimate	$ 75,545,327	37%	$ 27,892,197	$ 103,437,524	
Total Planning, Engineering & Design	$ 11,241,145	12%	$ 1,390,692	$ 12,631,836	
Total Construction Management	$ 5,998,299	14%	$ 860,503	$ 6,858,802	
Total Excluding Real Estate	**$ 92,784,771**	**32%**	**$ 30,143,392**	**$ 122,928,162**	

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$92,785k	$110,871k	$122,928k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Sub Bid Direct	Cost Sub	CMU Cost To Prime	Prime	CMU	Contract Cost
Contract Summary Cost Report			**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**
Measure NS3. Remove Trees	**52.00**	**ACR**	**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl Direct	SubBid	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			**10,134,570**	**2,943,881**	**14,684,926**	**0**	**27,763,377**	**9,815,742**	**37,579,119**	**12,260,924**	**49,840,043**
S1 Construct New Tunnel	**2,220.00**	**LF**	**4,832,303**	**1,195,706**	**3,098,564**	**0**	**9,126,574**	**3,226,700**	**12,353,274**	**4,030,498**	**16,383,771**
Rock Excavation	**2,220.00**	**LF**	**1,123,951**	**469,610**	**18,227**	**0**	**1,611,788**	**569,848**	**2,181,636**	**711,801**	**2,893,437**
New 18' Tunnel	**2,220.00**	**LF**	**3,708,352**	**726,096**	**3,080,337**	**0**	**7,514,786**	**2,656,852**	**10,171,638**	**3,318,696**	**13,490,334**
S8 Construct New Diversion Dam 30 ft Height	**1.00**	**EA**	**5,302,267**	**1,748,175**	**11,586,362**	**0**	**18,636,804**	**6,589,042**	**25,225,845**	**8,230,426**	**33,456,272**
Soil Excavation	**150,500.00**	**CY**	**1,501,977**	**592,066**	**0**	**0**	**2,094,043**	**740,349**	**2,834,391**	**924,776**	**3,759,167**
Roller Compacted Concrete	**67,000.00**	**CY**	**3,448,601**	**999,607**	**11,476,122**	**0**	**15,924,330**	**5,630,047**	**21,554,377**	**7,032,538**	**28,586,915**
Backfill with Excavated material	**83,500.00**	**CY**	**176,601**	**135,371**	**0**	**0**	**311,971**	**110,297**	**422,269**	**137,773**	**560,042**
Bedrock excavation	**350.00**	**CY**	**2,885**	**1,500**	**0**	**0**	**4,385**	**1,550**	**5,935**	**1,936**	**7,871**
Concrete - Intake Transition for 18' Diameter Tunnel	**400.00**	**CY**	**172,203**	**19,632**	**110,240**	**0**	**302,075**	**106,798**	**408,873**	**133,403**	**542,276**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost	SubCMU Cost	ToPrime Prime	CMU Contract	Cost
Contract Summary Cost Report			**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**
Measure NS1. Implement Early Warning System and Evacuation Plan	**1.00**	**EA**	**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Measure S18. Protect Tunnel Inlet from Landslide Blockage	1.00	EA	264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Scaling Excavation	1.00	EA	18,148	8,922	0	0	27,069	0	27,069	77,074	104,143
Foundation Concrete	1,280.00	SF	105,593	7,429	81,761	0	194,784	68,866	263,649	741,113	1,004,762
Steel Girders	94.30	TON	24,050	5,905	383,339	0	413,294	146,120	559,414	1,572,502	2,131,916
Site Cast Roof Panels (fill irregular areas)	64.00	CY	55,073	1,185	20,168	0	76,426	27,020	103,446	290,785	394,231
Precast roof panels (prestressed for crack control)	4,613.00	SF	61,195	20,845	43,861	0	125,901	44,512	170,414	479,030	649,444

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost Sub	CMU Cost	ToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			1,909,221	424,819	645,478	0	2,979,519	1,052,437	4,031,956	6,480,259	10,512,214
Measure S14 - 18': 150' Extend Tunnel Outlet into Resurrection Bay	1.00	EA	1,909,221	424,819	645,478	0	2,979,519	1,052,437	4,031,956	6,480,259	10,512,214
Drilled Piers - Rolled and Welded Pipe Can	3.00	EA	483,019	125,443	255,028	0	863,490	305,287	1,168,777	1,878,467	3,047,243
Concrete Pile Caps	3.00	EA	80,427	4,250	36,244	0	120,921	42,752	163,673	263,057	426,730
Cast-In_Place Flume Foundations	1.00	EA	49,047	8,732	20,720	0	78,499	26,781	105,280	169,275	274,555
Precast Concrete Flume Sections	4.00	EA	1,296,729	286,394	333,487	0	1,916,609	677,617	2,594,226	4,169,460	6,763,686

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	Cost SubCMU	CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			777,621	87,364	427,311	0	1,292,296	456,891	1,749,187	7,649,075	9,398,262
Measure S3: Refurbish Existing Tunnel	1.00	EA	777,621	87,364	427,311	0	1,292,296	456,891	1,749,187	7,649,075	9,398,262
Demolition of Existing 10,000 psi concrete	450.00	CY	189,666	49,356	0	0	239,022	84,506	323,529	1,414,769	1,738,297
Demolition of Existing 4,000 psi concrete	1.00	EA	12,146	6,720	129	0	18,995	6,716	25,711	112,432	138,143
Repair Invert with Armor and Concrete	1.00	EA	513,702	22,119	406,981	0	942,803	333,328	1,276,131	5,580,433	6,856,564
Wall and Crown Surface - Linear Repairs	1.00	EA	4,018	230	188	0	4,436	1,568	6,004	26,255	32,260
Wall and Crown Surface - Surface Repairs	1.00	EA	21,758	7,732	159	0	29,649	10,482	40,131	175,490	215,621
Contact Grout Crown	1.00	EA	36,331	1,207	19,853	0	57,391	20,291	77,681	339,696	417,377

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Abbreviated Risk Analysis

Project (less than $40M): **Lowell Creek** **Alternative: #4B**

Project Development Stage/Alternative: **Feasibility (Recommended Plan)**

Risk Category: **Moderate Risk: Typical Project Construction Type** **Meeting Date: ---**

Total Estimated Construction Contract Cost = **$ 105,868,103**

	CWWBS	Feature of Work	Estimated Cost		% Contingency	$ Contingency	Total
	01 LANDS AND DAMAGES	Real Estate	$ -		0%	$ -	$ -
1	01 LANDS AND DAMAGES	NS3 - Tree removal	$ 1,479,986		12%	$ 177,219	$ 1,657,205
2	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S1 & S8 - Construct Additional Tunnel and Diversion Dam	$ 66,373,959		38%	$ 25,353,977	$ 91,727,936
3	02 RELOCATIONS	NS1 - Implement Early Warning System and Evacuation Plan	$ 30,328		29%	$ 8,858	$ 39,186
4	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S18 - Protect Tunnel Inlet from Landslide Blockage	$ 4,284,496		38%	$ 1,634,260	$ 5,918,756
5	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S14 - 24': 150' Extend Tunnel Outlet into Resurrection Bay	$ 24,301,073		38%	$ 9,193,850	$ 33,494,923
6	15 FLOODWAY CONTROL AND DIVERSION STRUCTURES	S3 - Refurbish Existing Tunnel	$ 9,398,261		33%	$ 3,056,525	$ 12,454,786
7					0%	$ -	$ -
8					0%	$ -	$ -
9					0%	$ -	$ -
10					0%	$ -	$ -
11					0%	$ -	$ -
12	All Other		$ -	*0.0%*	0%	$ -	$ -
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	$ 15,753,174		12%	$ 1,948,895	$ 17,702,068
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	$ 8,405,927		14%	$ 1,205,897	$ 9,611,824
XX	FIXED DOLLAR RISK ADD (EQUALLY DISPERSED TO ALL, MUST INCLUDE JUSTIFICATION SEE BELOW)					$ -	

Totals					
Real Estate	$ -	0%	$ -	$ -	
Total Construction Estimate	$ 105,868,103	37%	$ 39,424,688	$ 145,292,791	
Total Planning, Engineering & Design	$ 15,753,174	12%	$ 1,948,895	$ 17,702,068	
Total Construction Management	$ 8,405,927	14%	$ 1,205,897	$ 9,611,824	
Total Excluding Real Estate	**$ 130,027,204**	**33%**	**$ 42,579,479**	**$ 172,606,683**	

	Base	**50%**	**80%**
Confidence Level Range Estimate ($000's)	$130,027k	$155,575k	$172,607k

* 50% based on base is at 5% CL.

Fixed Dollar Risk Add: (Allows for additional risk to be added to the risk analsyis. Must include justification. Does not allocate to Real Estate.	

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Sub Bid Direct	Cost Sub	CMU Cost To Prime	Prime	CMU	Contract Cost
Contract Summary Cost Report			**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**
Measure NS3. Remove Trees	**52.00**	**ACR**	**554,040**	**225,539**	**0**	**0**	**779,579**	**0**	**779,579**	**700,408**	**1,479,987**

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Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl Direct	SubBid	DirectCost	SubCMU	CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			**13,707,724**	**3,974,239**	**19,824,650**	**0**	**37,506,614**	**13,260,463**	**50,767,077**	**15,606,883**	**66,373,959**
S1 Construct New Tunnel	**2,220.00**	**LF**	**6,538,349**	**1,614,204**	**4,183,062**	**0**	**12,335,614**	**4,361,256**	**16,696,870**	**5,132,974**	**21,829,844**
Rock Excavation	**2,220.00**	**LF**	**1,520,673**	**633,974**	**24,606**	**0**	**2,179,253**	**770,475**	**2,949,728**	**906,809**	**3,856,537**
New 24' Tunnel	**2,220.00**	**LF**	**5,017,676**	**980,230**	**4,158,455**	**0**	**10,156,361**	**3,590,781**	**13,747,143**	**4,226,165**	**17,973,308**
S8 Construct New Diversion Dam 30 ft Height	**1.00**	**EA**	**7,169,375**	**2,360,036**	**15,641,588**	**0**	**25,171,000**	**8,899,207**	**34,070,207**	**10,473,908**	**44,544,115**
Soil Excavation	**150,500.00**	**CY**	**2,031,368**	**799,289**	**0**	**0**	**2,830,657**	**1,000,779**	**3,831,435**	**1,177,865**	**5,009,300**
Roller Compacted Concrete	**67,000.00**	**CY**	**4,662,189**	**1,349,470**	**15,492,764**	**0**	**21,504,423**	**7,602,889**	**29,107,312**	**8,948,209**	**38,055,520**
Backfill with Excavated material	**83,500.00**	**CY**	**238,703**	**182,750**	**0**	**0**	**421,453**	**149,005**	**570,458**	**175,371**	**745,829**
Bedrock excavation	**350.00**	**CY**	**3,904**	**2,024**	**0**	**0**	**5,928**	**2,096**	**8,024**	**2,467**	**10,491**
Concrete - Intake Transition for 24' Diameter Tunnel	**400.00**	**CY**	**233,212**	**26,503**	**148,824**	**0**	**408,538**	**144,439**	**552,977**	**169,997**	**722,974**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	Direct Labor	Direct EQ	Direct Matl	Direct SubBid	Direct Cost	SubCMU Cost To Prime	Prime CMU Cost	Contract Cost
Contract Summary Cost Report			**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**
Measure NS1. Implement Early Warning System and Evacuation Plan	**1.00**	**EA**	**3,482**	**0**	**6,758**	**0**	**10,240**	**3,620**	**13,860**	**16,468**	**30,328**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Measure S18. Protect Tunnel Inlet from Landslide Blockage	1.00	EA	264,059	44,286	529,129	0	837,474	286,519	1,123,992	3,160,504	4,284,497
Scaling Excavation	1.00	EA	18,148	8,922	0	0	27,069	0	27,069	77,074	104,143
Foundation Concrete	1,280.00	SF	105,593	7,429	81,761	0	194,784	68,866	263,649	741,113	1,004,762
Steel Girders	94.30	TON	24,050	5,905	383,339	0	413,294	146,120	559,414	1,572,502	2,131,916
Site Cast Roof Panels (fill irregular areas)	64.00	CY	55,073	1,185	20,168	0	76,426	27,020	103,446	290,785	394,231
Precast roof panels (prestressed for crack control)	4,613.00	SF	61,195	20,845	43,861	0	125,901	44,512	170,414	479,030	649,444

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	SubBid Direct	Cost SubCMU		CostToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			2,742,592	641,459	959,500	0	4,343,551	1,535,258	5,878,809	18,422,264	24,301,073
Measure S14 - 24': 150' Extend Tunnel Outlet into Resurrection Bay	1.00	EA	2,742,592	641,459	959,500	0	4,343,551	1,535,258	5,878,809	18,422,264	24,301,073
Drilled Piers - Rolled and Welded Pipe Can	1.00	EA	908,283	203,319	467,555	0	1,579,157	558,311	2,137,469	6,698,111	8,835,579
Concrete Pile Caps	4.00	EA	250,783	6,319	101,483	0	358,586	126,778	485,363	1,520,967	2,006,330
Cast-In_Place Flume Foundations	1.00	EA	20,686	3,554	8,410	0	32,649	11,138	43,788	137,261	181,048
Precast Concrete Flume Sections	3.00	EA	1,562,840	428,268	382,052	0	2,373,159	839,030	3,212,189	10,065,926	13,278,115

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4

Description	Quantity	UOM	DirectLabor	DirectEQ	DirectMatl	DirectSubBid	DirectCost Sub	CMU Cost	ToPrime	PrimeCMU	ContractCost
Contract Summary Cost Report			**777,621**	**87,364**	**427,311**	**0**	**1,292,296**	**456,891**	**1,749,187**	**7,649,075**	**9,398,262**
Measure S3: Refurbish Existing Tunnel	**1.00**	**EA**	**777,621**	**87,364**	**427,311**	**0**	**1,292,296**	**456,891**	**1,749,187**	**7,649,075**	**9,398,262**
Demolition of Existing 10,000 psi concrete	**450.00**	**CY**	**189,666**	**49,356**	**0**	**0**	**239,022**	**84,506**	**323,529**	**1,414,769**	**1,738,297**
Demolition of Existing 4,000 psi concrete	**1.00**	**EA**	**12,146**	**6,720**	**129**	**0**	**18,995**	**6,716**	**25,711**	**112,432**	**138,143**
Repair Invert with Armor and Concrete	**1.00**	**EA**	**513,702**	**22,119**	**406,981**	**0**	**942,803**	**333,328**	**1,276,131**	**5,580,433**	**6,856,564**
Wall and Crown Surface - Linear Repairs	**1.00**	**EA**	**4,018**	**230**	**188**	**0**	**4,436**	**1,568**	**6,004**	**26,255**	**32,260**
Wall and Crown Surface - Surface Repairs	**1.00**	**EA**	**21,758**	**7,732**	**159**	**0**	**29,649**	**10,482**	**40,131**	**175,490**	**215,621**
Contact Grout Crown	**1.00**	**EA**	**36,331**	**1,207**	**19,853**	**0**	**57,391**	**20,291**	**77,681**	**339,696**	**417,377**

Labor ID: AK160001 EQ ID: EP16R09 Currency in US dollars TRACES MII Version 4.4