



CONSULTANT AGREEMENT

THIS AGREEMENT is made and entered into this ____ day of _____, 2019, by and between the **CITY OF BILLINGS, MONTANA**, a municipal corporation organized and existing under the laws of the State of Montana, P.O. Box 1178, Billings, Montana 59103, hereinafter referred to as “**CITY**,” and Advanced Engineering and Environmental Services, Inc. (AE2S) at 2624 Minnesota Ave, First Floor; Billings, MT 59101 hereinafter referred to as “**CONSULTANT**.”

WITNESSETH:

WHEREAS, the **CITY** proposes to assess the flood and drought risk of the Water Treatment Plant (WTP) and make changes to the WTP Flood Response Plan. Portions of the WTP and in the 100-year flood plain. **CITY** also desires to hire **CONSULTANT** as an independent contractor to perform the services as described in the Scope of Work attached hereto as Exhibit “A” and by this reference made a part hereof.

WHEREAS, the **CITY** has authority to contract for such services, and;

WHEREAS, the **CONSULTANT** represents that he/she is fully qualified to perform such services personally and is in compliance with the Montana Statutes relating to the provisions of such services.

NOW THEREFORE, in consideration of the mutual covenants and agreements herein contained, the receipt and sufficiency whereof being hereby acknowledged, the parties hereto agree as follows:

1. **PURPOSE**: **CITY** agrees to hire **CONSULTANT** as an independent contractor to perform the services as described in the Scope of Work attached hereto as Exhibit “A” and by this reference made a part hereof. In performing these services, the **CONSULTANT** shall at all times comply with all federal, state and local statutes, rules and ordinances applicable. These services and all duties incidental or necessary therefore, shall be performed diligently and completely and in accordance with professional standards of conduct and performance.

2. **TERM**: This **AGREEMENT** shall be for a period of one (1) year, from the execution of this **AGREEMENT**. This **AGREEMENT** may be extended for one year by mutual agreement of both parties, in writing, thirty (30) days prior to termination.

3. **PAYMENT**: In consideration of the services provided by the **CONSULTANT** under this **AGREEMENT**, the **CITY** agrees to pay **CONSULTANT** a price not to exceed One Hundred Forty-Nine Thousand Seven Hundred Ninety-Seven Dollars (\$149,797.00).

Except as otherwise specified herein, the **CONSULTANT** shall invoice the **CITY** monthly (or on such other basis as the Parties may mutually determine) for all services rendered pursuant to



this **AGREEMENT**. Such invoices shall specify the services provided to the **CITY** during the preceding month and identify the applicable fees, and shall be accompanied by reasonable documentation or other reasonable explanations supporting such charges.

Except as otherwise specified herein, the **CITY** shall pay, net of applicable withholding tax, if any, the **CONSULTANT** for said invoice within thirty (30) days after receipt.

In the event scope of work issues arise, the **CONSULTANT** shall immediately discuss them with the Project Manager for the **CITY**. It is understood that the **CONSULTANT** will not perform any work that the **CITY** deems outside the scope prior to receiving written approval from the **CITY**, and at a rate agreed upon by both parties. Any payment for work not agreed upon by the **CITY** shall be denied.

4. INDEPENDENT CONTRACTOR STATUS: The parties agree that **CONSULTANT** is an independent contractor for purposes of this **AGREEMENT** and is not to be considered an employee of the **CITY** for any purpose. **CONSULTANT** is not subject to the terms and provisions of the **CITY**'s personnel policies handbook and may not be considered a **CITY** employee for workers' compensation or any other purpose. **CONSULTANT** is not authorized to represent the **CITY** or otherwise bind the **CITY** in any dealings between **CONSULTANT** and any third parties.

5. INDEMNITY AND INSURANCE:

- A. The **CONSULTANT** agrees to indemnify, defend and save **CITY**, its officers, agents and employees harmless from any and all losses, damage and liability occasioned by, growing out of, or in any way arising or resulting from any intentional or negligent act on the part of **CONSULTANT** or its agents or employees.
- B. The **CONSULTANT** shall not indemnify, defend, save and hold the **CITY** harmless from claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses or attorneys' fees and costs arising from wrongful or negligent acts, error or omission solely of the **CITY** occurring during the course of or as a result of the performance of the **AGREEMENT**.
- C. Where claims, lawsuits or liability, including attorneys' fees and costs arise from wrongful or negligent act of both the **CITY** and the **CONSULTANT**, the **CONSULTANT** shall indemnify, defend, save, and hold the **CITY** harmless from only that portion of claims, causes of action, lawsuits, damages, judgments, liabilities, and litigation costs and expenses including attorneys' fees and costs, which result from the **CONSULTANT'S** or any subcontractor's wrongful or negligent acts occurring as a result from the **CONSULTANT'S** performance pursuant to this **AGREEMENT**.
- D. The **CONSULTANT** shall maintain in good standing the insurance described in this Section. Before rendering any services under this **AGREEMENT**, the



CONSULTANT shall furnish the **CITY** with proof of insurance in accordance with this Section.

The **CONSULTANT** shall provide the following insurance:

1. Workers' compensation and employer's liability coverage as required by Montana law.
2. Commercial general liability, including contractual and personal injury coverage's -- \$750,000 per claim and \$1,500,000 per occurrence.
3. Automobile liability -- \$1,500,000 per accident.
4. Professional liability in the amount of \$1,500,000 per claim.

Each policy of insurance required by this Section shall provide for no less than 30 days' advance written notice to the **CITY** prior to cancellation.

The **CITY** shall be listed as an additional insured on all policies except Professional Liability and Worker's Compensation Policies.

In addition, all policies except Professional Liability and Worker's Compensation shall contain a waiver of subrogation against the **CITY**.

CONSULTANT shall comply with the applicable requirements of the Workers' Compensation Act, Title 39, Chapter 71, MCA, and the Occupational Disease Act of Montana, Title 39, Chapter 71, MCA. **CONSULTANT** shall maintain workers' compensation insurance coverage for all members and employees of **CONSULTANT's** business, except for those members who are exempted as independent **CONSULTANTS** under the provisions of §39-71-401, MCA.

CONSULTANT shall furnish **CITY** with copies showing one of the following: (1) proof of registration as a registered contractor under Title 39, Chapter 9, MCA; (2) a binder for workers' compensation coverage by an insurer licensed and authorized to provide workers' compensation insurance in the State of Montana; or (3) proof of exemption from workers' compensation granted by law for independent contractors.

6. AGREEMENTS OF CONSULTANT: As an inducement to the execution of this **AGREEMENT** by the **CITY** and in consideration of the agreements to be performed by the **CITY**, the **CONSULTANT** agrees that:

A. Qualifications

The **CONSULTANT** is qualified to perform the services to be furnished under this **AGREEMENT** and is permitted by law to perform such services, and all personnel engaged in the work shall be qualified and so permitted to do the work they perform.



B. Solicitation of Agreement

The **CONSULTANT** has not employed any person to solicit this **AGREEMENT** and has not made, and will not make, any payment or any agreement for the payment of any commission, percentage, brokerage, contingent fee, or other compensation in connection with the procurement of this **AGREEMENT**.

C. Facilities and Personnel

The **CONSULTANT** has and will continue to have proper facilities and personnel to perform the services and work agreed to be performed.

D. Subcontracting

None of the work or services covered by this **AGREEMENT** shall be subcontracted without the prior approval of the **CITY**.

E. Affidavits of Compliance

The **CONSULTANT** will, if requested by the **CITY**, furnish the **CITY** affidavits certifying compliance with the provisions of this Section.

7. **AGREEMENTS OF CITY:**

- A. To furnish all labor, materials, equipment, supplies, and incidentals necessary to conduct and complete the **CITY'S** portion of the project as designated in the scope of work.
- B. Name a Project Manager who shall be the liaison between the **CONSULTANT** and the **CITY**. For this project, the Project Manager for **CONSULTANT** designated is David Carlson (406-403-8721) and the Project Manager for the **CITY** designated is Louis Engels (406-657-8349).

8. **NONDISCRIMINATION:**

- A. The **CONSULTANT** will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry, age, sex, or marital status or who is a "qualified individual with a disability" (as that phrase is defined in the Americans With Disabilities Act of 1990). The **CONSULTANT** will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, or mental or physical impairment/disability. Such action shall include, without limitation, employment, upgrading, demotion or transfer, recruitment or recruiting advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training including apprenticeship. The **CONSULTANT** agrees to post, in



conspicuous places available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

- B. The **CONSULTANT** shall state, in all solicitations or advertisements for employees to work on jobs, that all qualified applicants will receive equal consideration for employment without regard to race, color, religion, national origin, ancestry, age, sex or marital status, or mental or physical impairment/disability.

The **CONSULTANT** and subcontractor shall abide by the requirements of 41 CFR 60-300.5(a) and 41 CFR 60-741.5(a), which prohibit discrimination against qualified protected veterans and/or qualified individuals on the basis of disability, and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans and individuals with disabilities.

- C. The **CONSULTANT** shall comply with any and all reporting requirements that may apply to it that the **CITY** may establish by regulation.
- D. The **CONSULTANT** shall include the provisions of Subsections A through C of this Section in every subcontract or purchase order under this **AGREEMENT**, so as to be binding upon every such sub-consultant or vendor of the **CONSULTANT** under this **AGREEMENT**.
- E. The **CONSULTANT** shall comply with all applicable federal, state, and city laws concerning the prohibition of discrimination.

9. **PERMITS, LAWS, AND TAXES:** The **CONSULTANT** shall acquire and maintain in good standing all permits, licenses and other entitlements necessary to its performance under this **AGREEMENT**. All actions taken by the **CONSULTANT** under this **AGREEMENT** shall comply with all applicable statutes, ordinances, rules and regulations. The **CONSULTANT** shall pay all taxes pertaining to its performance under this **AGREEMENT**.
10. **NONWAIVER:** The failure of either party at any time to enforce a provision of this **AGREEMENT** shall in no way constitute a waiver of the provision, nor in any way affect the validity of this **AGREEMENT** or any part hereof, or the right of such party thereafter to enforce each and every provision hereof.
11. **CONFLICT OF INTEREST:** **CONSULTANT** shall exercise reasonable care and diligence to prevent any actions or conditions which could result in a conflict with **CITY'S** interest. During the term of this Agreement, **CONSULTANT** shall not accept any employment or engage in any consulting work which creates a conflict of interest with **CITY** or in any way compromises the services to be performed under this Agreement. **CONSULTANT** shall immediately notify **CITY** of any and all violations of this Section upon becoming aware of such violation.



12. **SUCCESSORS AND ASSIGNS:** This **AGREEMENT** and all of the covenants hereof shall inure to the benefit of and be binding upon the **CITY** and the **CONSULTANT** respectively and his partners, successors, assigns, and legal representatives. Neither the **CITY** nor the **CONSULTANT** shall have the right to assign, transfer, or sublet his interest or obligations hereunder without written consent of the other party.
13. **CHANGES IN WORK:** Any change in the scope of **CONSULTANT'S** services as stated in this **AGREEMENT** for whatever reason, will be negotiated between the **CITY** and the **CONSULTANT** and an amendment to this **AGREEMENT** will be issued with the appropriate change of services and **AGREEMENT** fee noted.
14. **LEGAL RELATIONS:** The **CONSULTANT** shall comply with all Federal, State, and local laws and ordinances applicable to the work to be done.
15. **TERMINATION OF AGREEMENT:** The right is reserved by the **CITY** to terminate this **AGREEMENT** at any time upon not less than thirty (30) days written notice to the **CONSULTANT**.

In the event the **CITY** terminates this **AGREEMENT**, the **CONSULTANT** shall be paid for the amount of work performed or services rendered to date of termination per the **AGREEMENT** fee.

16. **ENDORSEMENTS:** The **CONSULTANT** shall furnish signatures, statements, or other suitable means to signify responsible endorsement of work on all reports furnished by him.
17. **OWNERSHIP OF DOCUMENTS:** All information relating to the project and prepared under the terms of this **AGREEMENT**, including reports, data, recommendations, exhibits, analyses, and plans shall be deemed the property of the **CITY**. Reproducibles of all notes, reports, and plans shall be made available at the **CITY'S** request.
18. **PUBLIC INFORMATION:** The **CONSULTANT** shall not issue any statements, releases, or information for public dissemination without prior written approval of the **CITY**.
19. **PROPRIETARY RIGHTS:** If patentable discoveries or inventions should result from work required herein, all rights accruing from such discoveries or inventions shall be the property of the **CITY**.
20. **RECORDS:** The **CONSULTANT** shall maintain accounting records and other evidence pertaining to the cost incurred and to make the records available at all times during the **AGREEMENT** term and for three (3) years from the date of final payment. Such accounting records and other evidence pertaining to the cost incurred will be made available for inspections authorized by the **CITY** and copies thereof shall be furnished if requested.



- 21. **ATTORNEY’S FEES AND COSTS:** That in the event it becomes necessary for either Party to this **AGREEMENT** to retain an attorney to enforce any of the terms or conditions of the **AGREEMENT** or to give any notice required herein, then the prevailing Party or the Party giving notice shall be entitled to reasonable attorney’s fees and costs.

- 22. **LITIGATION LOCATION:** The parties agree that this **AGREEMENT** shall be governed in all respects by the laws of the state of Montana, and the parties expressly agree that venue shall be in the Montana Thirteenth Judicial District County for Yellowstone County and there shall be no other venue for resolution of disputes arising from the **AGREEMENT** or the performance of its terms.

- 23. **MODIFICATION AND AMENDMENTS:** That any amendment or modification of this **AGREEMENT** or any provisions herein shall be made in writing and executed in the same manner as this original document and shall after execution become a part of this **AGREEMENT**.

IN WITNESS WHEREOF, the parties hereto have executed this instrument the day and year first above written.

CITY OF BILLINGS, MONTANA

CONSULTANT (Print Name Above)

By _____
WILLIAM A. COLE,
MAYOR

By _____

Print Name _____

Print Title _____

APPROVED AS TO FORM:

By _____
BRENT BROOKS, CITY Attorney



**EXHIBIT “A”
SCOPE OF WORK**

W.O. 19-17: WTP Drought and Flood Control Plan
 City of Billings/AE2S
 3/8/2019

Phase 020 – Flood / Drought Risk Assessment

Task 1 – Project Management, Workshops, and Meetings	
<i>Tasks</i>	<ul style="list-style-type: none"> • Provide project team management and client coordination to keep project on schedule and on budget. • Coordinate with intake design team and provide input to design team based on findings from Flood / Drought Risk study. • Attend meetings as follows: <ul style="list-style-type: none"> ○ Kickoff Workshop ○ Data Collection Findings ○ Existing Conditions Risk Assessment Presentation <p>Kickoff and Existing Conditions Risk Assessment Meetings will be attended by both Project Manager and Lead Project Engineer. Data Collection Findings Meeting will be attended by Project Manager in person with Lead Project Engineer attending via video, conference call, screen sharing.</p>
<i>Deliverables</i>	<ul style="list-style-type: none"> • Monthly Project updates/Invoices, Work Shop Agendas, Meeting Minutes, Presentation Materials, Handouts
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$17,808 (Hourly)

Task 2 – Data Collection & Existing Conditions	
<i>Tasks</i>	<ul style="list-style-type: none"> • Collect bathymetric data along the river, as shown in Exhibit A. This effort will be combined with the Intake Redundancy Project. • During bathymetric data collection, collect water levels at various points along the river to support hydraulic model development. • Merge existing 2004 LiDAR and bathymetric surfaces to provide one, continuous surface. • Supplement already-collected survey data with additional survey of key ridgelines to supplement LiDAR data collection. • Coordinate with City staff on installation of pressure transducer / water level recorder to collect water levels at different flows (pressure transducer provided and installed by City).
<i>Deliverables</i>	<ul style="list-style-type: none"> • Merged topographic / bathymetric surface, included as part of Task 4.
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$32,645 (Hourly)



EXHIBIT “A” SCOPE OF WORK

W.O. 19-17: WTP Drought and Flood Control Plan
 City of Billings/AE2S
 3/8/2019

Task 3 – Hydrologic Analysis (“How much water”)	
<i>Tasks</i>	<ul style="list-style-type: none"> • Update hydrologic analysis of the Yellowstone gage record (USGS Gage No. 06214500) to determine flood frequency. • Evaluate the time it takes for floods to propagate down the Yellowstone based on upstream USGS gages • Based on historical gage record, evaluate seasonal low-flow occurrences expressed as a “percent chance of exceedance”
<i>Deliverables</i>	<ul style="list-style-type: none"> • Results of flood and low-flow conditions, presented in Existing Conditions Risk Assessment Presentation and included in hydraulic model provided as part of Task 4.
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$8,685 (Hourly)

Task 4 – Hydraulic Analysis (“How the Water Moves”)	
<i>Tasks</i>	<ul style="list-style-type: none"> • Prepare HEC-RAS 2D hydraulic model of Yellowstone River for the area defined in Exhibit B. • Calibrate model based on water levels recorded during bathymetric data collection. • Validate model based on water levels recorded with pressure transducer / water level recorder. • Develop water surface terrains and inundation for up to three flood events (anticipated to be 50-, 100-, and 500-year events) and up to three seasonal low-flows estimated as part of Task 3.
<i>Deliverables</i>	<ul style="list-style-type: none"> • Results of hydraulic analysis, presented as part of Existing Conditions Risk Assessment Presentation
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$26,271 (Hourly)

Task 5 – Long-Term Changes / Sensitivity Analysis	
<i>Tasks</i>	<ul style="list-style-type: none"> • Determine if geomorphic conclusions obtained as part of intake and previous studies warrant updating based on survey / bathymetric data collected in Task 2. • Based on available information on state-wide initiatives, qualitatively evaluate whether those state-wide initiatives could significantly alter conditions near the WTP (such as flow regime, etc.). • Complete brief sensitivity analysis of both flood and drought conditions to determine if uncertainties in analysis / data / future climate create significantly different conclusions (i.e. WTP facilities flooded vs. not flooded).
<i>Deliverables</i>	<ul style="list-style-type: none"> • Discussion of Long-term changes / sensitivity analysis, presented as part of Existing Conditions Risk Assessment Presentation
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$18,102 (Hourly)



**EXHIBIT “A”
SCOPE OF WORK**

W.O. 19-17: WTP Drought and Flood Control Plan
 City of Billings/AE2S
 3/8/2019

Task 6 – Ice Jam Analysis	
<i>Tasks</i>	<ul style="list-style-type: none"> - Prepare 1D hydraulic model of Yellowstone River to support ice jam analysis. - Determine model reasonableness based on qualitative past observations by WTP staff. - Complete ice jam analysis for various flows up to the 100-year event to determine potential for ice jams to create high water conditions. Note that the worst-case scenario for an ice jam can be at lower flows. - Summarize maximum water levels that could occur along the Yellowstone as a result of ice jams and compare to WTP facility and berm elevations.
<i>Deliverables</i>	<ul style="list-style-type: none"> • Section of the Final Flood/Drought Study
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$30,290 (Hourly)

Task 7 – Existing Conditions Flood and Drought Risk Analysis	
<i>Tasks</i>	<ul style="list-style-type: none"> - Evaluate flood / drought risk and implications of risk to existing and planned WTP operations and facilities. - Review risks with City Staff and develop scope for mitigation alternatives
<i>Deliverables</i>	<ul style="list-style-type: none"> • Risk Assessment presented as part of Existing Conditions Risk Assessment Presentation
<i>Total Fees</i>	<ul style="list-style-type: none"> • Estimated - \$15,996 (Hourly)

Task 8 – Conceptual Mitigation Alternatives	
<p>Since the scale and complexity of mitigation alternatives will depend on the outcome of Task 6, the scope and level of effort for the conceptual mitigation alternatives will be developed following completion of Task 6.</p>	
<i>Tasks</i>	<ul style="list-style-type: none"> • TBD
<i>Deliverables</i>	<ul style="list-style-type: none"> • TBD
<i>Total Fees</i>	<ul style="list-style-type: none"> • TBD



EXHIBIT "A" SCOPE OF WORK

Project Task/Description - Phase 1 Alternative Evaluation	2019									2019 Subtotal Budget Hours	AE25 Labor Fees	Expenses	Subconsultant w/Markup - WEST	River Geomorphology Subconsultant w/Markup - Karin Boyd	Subconsultant w/Markup - Territorial Landworks	Total Fee	Total Fee per Task and Phase		
	Project Manager IV	Lead Project Engineer V	Engineer VI (QA/QC)	Engineer II	Drought Engineer	Surveying Lead	Surveying	CADD	GIS										
Start Spring 2019	David Carlson	Amber Letters	QA/QC	E2	Scott B	Todd N	2-Person Survey Crew	CADD	Danielle Lee	\$178	\$194	\$218	\$132	\$218	\$218	\$235	\$150	\$126	
Project Study and Report (Phase 02)																			
Task 1 - Project Management																			
1.1 Overall Management Budget, Schedule and Scope Completion	14	8	4							26	\$ 4,916	\$ 50	\$ 2,323			\$ 7,289			
1.2 Meetings/Workshops	0									0	\$ -					\$ -			
a. Kick-Off Meeting	3	4								7	\$ 1,310	\$ 1,438				\$ 2,748			
c. Data Collection Results	3	4								7	\$ 1,310	\$ 25				\$ 1,335			
d. Ex Conditions Results	3	8		8						19	\$ 3,142	\$ 25	\$ 1,012			\$ 4,179			
e. Coord on Intake Design	6	6								12	\$ 2,232	\$ 25				\$ 2,257	\$ 17,808		
Task 2 - Data Collection, Site Reconnaissance, and Field Survey																			
2.1 Data Review										0	\$ -		\$ 3,146			\$ 3,146			
a. Review Already-Collected Survey Data		2		8						10	\$ 1,404					\$ 1,404			
b. USGS Streamflow Data		2								2	\$ 388					\$ 388			
c. Previous Yellowstone River Studies		2								2	\$ 388					\$ 388			
2.2 Site Reconnaissance											\$ -					\$ -			
a. Site Tour	2	8								10	\$ 1,908					\$ 1,908			
b. Travel		8								8	\$ 1,552					\$ 1,552			
2.3 Field Survey											\$ -					\$ -			
a. Survey Coordination	2	6								8	\$ 1,520	\$ 4,416				\$ 5,936			
b. Bathymetric Survey (Incremental from intake project)						4	33			37	\$ 8,627					\$ 8,627			
c. Coordinate with City on Pressure Transducer Intall	3	4								7	\$ 1,310					\$ 1,310			
d. Survey Shoreline / Water Levels										0	\$ -					\$ -			
e. Top of berm, WTP facilities										0	\$ -				\$ 2,990	\$ 2,990			
f. Process Topo / Bath Survey Data								10		10	\$ 1,500					\$ 1,500			
g. Merge LIDAR and Bathymetric surfaces	6			4					4	14	\$ 2,196					\$ 2,196			
h. QC merged surfaces	2		4							6	\$ 1,260					\$ 1,260	\$ 32,645		
Task 3 - Hydrology ("How much water")																			
a. Flood Frequency - LP3 Analysis		1								1	\$ 194		\$ 6,843			\$ 7,037			
b. Flood Timing		2								2	\$ 388					\$ 388			
c. Drought Severity - Seasonality of Low Flows		2			4					6	\$ 1,260					\$ 1,260	\$ 8,885		
Task 4 - Hydraulic Analysis ("How the Water Moves")																			
4.1 2D Model Development											\$ -		\$ 5,927			\$ 5,927			
a. RAS Terrain - Import and Breakline		2		16						18	\$ 2,500					\$ 2,500			
b. Boundary Conditions		1		4						5	\$ 722					\$ 722			
c. Roughness for Land Uses		3		4						7	\$ 1,110					\$ 1,110			
d. Fixing Model Instability Issues		4		12						16	\$ 2,360					\$ 2,360			
e. QA/QC Model Development			2							2	\$ 436					\$ 436			
4.2 Calibration											\$ -					\$ -			
a. Identify Points to Use for Calibration		2		3						5	\$ 784					\$ 784			
b. Approach for "Goodness of Fit"		4								4	\$ 776					\$ 776			
c. Calibration		4		16						20	\$ 2,888					\$ 2,888			
d. QA/QC Model Calibration		4								4	\$ 776					\$ 776			
4.3 Validation											\$ -					\$ -			
a. Validate Model based on peak level during 2019 Spring Snowmelt				8						8	\$ 1,056					\$ 1,056			
4.4 Flood Inundation Maps									8		\$ -					\$ -			
a. Flood Inundation / Depth Maps		1		4						13	\$ 1,730					\$ 1,730			
b. Summarizing Results		4		8						12	\$ 1,832					\$ 1,832			
4.5 Drought Conditions											\$ -					\$ -			
a. Drought Depth Maps		1		3					6	10	\$ 1,346					\$ 1,346			
b. Summarizing Results		3		6	3					12	\$ 2,028					\$ 2,028	\$ 26,271		
Task 5 - Long Term Changes / Sensitivity Analysis																			
5.1 Update Intake Geomorphology work	1	2								3	\$ 566		\$ 5,184	\$ 7,664		\$ 13,414			
5.2 State-Wide Initiatives	1	2								3	\$ 566					\$ 566			
5.3 Sensitivity Analysis	1	4		24						29	\$ 4,122					\$ 4,122	\$ 18,102		
Task 6 - Ice Jam Analysis																			
6.1 Update Existing 1D model											\$ -		\$ 8,160			\$ 8,160			
a. Truncate 2004 Model on u/s and d/s ends		1		8						9	\$ 1,250					\$ 1,250			
b. Add New XS as needed		2		8						10	\$ 1,444					\$ 1,444			
c. Update Existing XS with new data		2		8						10	\$ 1,444					\$ 1,444			
d. Screening Level QC remaining XS		2		8						10	\$ 1,444					\$ 1,444			
6.2 Ice Jam Analysis										0	\$ -					\$ -			
a. Flood Hydrology Increment for Ice-Affected Flows		4								4	\$ 776					\$ 776			
b. Ice Jam Iterations based on bank connection, max velocity		12		40						52	\$ 7,608					\$ 7,608			
c. Validate model for reasonableness		2		8						10	\$ 1,444					\$ 1,444			
d. Compare Ice Jam levels to Open Water Runs		4		8						8	\$ 1,056					\$ 1,056			
e. QC Ice Jam Analysis		4								4	\$ 776					\$ 776			
6.3 Inundation Maps											\$ -					\$ -			
a. Ice Jam Inundation Maps		2		4					8	14	\$ 1,924					\$ 1,924			
b. Summarizing Results / Incremental Risk Assessment		2		8						18	\$ 2,964					\$ 2,964			
Task 7 - Risk Evaluation																			
7.1 Risk Assessment										0	\$ -		\$ 2,875	\$ 1,695		\$ 4,570	\$ 30,290		
a. Floods (Baseline)	3	6	2	16						27	\$ 4,248					\$ 4,248			
b. Droughts (Baseline)	3	6	2	12	2					25	\$ 4,154					\$ 4,154			
c. Long-Term Changes / Sensitivity Analysis Implications	3	6	2	8	2					21	\$ 3,626					\$ 3,626	\$ 15,996		
Task 8 - Conceptual Mitigation Alternatives																			
8.1 Mitigation Alternatives										0	\$ -					\$ -			
a. TBD										0	\$ -					\$ -			
TOTAL PHASE 020 COST																\$ 149,797			
Future Phases (Preliminary Design, Final Design, Construction Etc)																			
Task 1 - FUTURE TBD																			
a. SUBTASK - FUTURE TBD																		TBD	