Exhibit A

DESIGN SERVICES CONTRACT

CITY OF PORTLAND

CONTRACT NUMBER 30008199

Dam 1 Spillway Gates Replacement Project

As authorized by Ordinance _____ and Portland City Code 5.68.035, this Design Services Contract ("Contract") is entered into by and between the City of Portland ("City," or "Bureau") and **McMillen, LLC, an Idaho Company, dba McMillen Jacobs Associates**, ("Consultant").

Effective Date and Term
This Contract shall commence on the Effective Date, January xx, 2023, and shall continue in full force and effect until December 31, 2025, or such other date on the Contract is terminated or extended pursuant to the terms of this Contract ("Term").

Consideration

(a) City agrees to pay Consultant a sum not to exceed one million three hundred twenty-nine thousand three hundred twenty-five Dollars ($1,329,325.00) to complete the work in accordance with the Statement of Work (SOW), attached hereto as Exhibit A.

(b) Payments shall be made in accordance with the Compensation section, attached hereto as Exhibit B.

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CONSULTANT DATA AND CERTIFICATION

Name (print full legal name): **McMillen, LLC, an Idaho Company, dba McMillen Jacobs Associates**
Address: 1500 SW First Avenue, Portland, OR 97201

Business Designation (check one):	☐ Individual	☐ Sole Proprietorship	☐ Partnership	☐ Corporation
☒ Limited Liability Co (LLC)		☐ Public Service Corp.	☐ Government/Nonprofit	

Payment information will be reported to the IRS under the name provided above. Information must be provided prior to contract approval.

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TERMS AND CONDITIONS

1) Standard of Care
In providing services under this Contract, the Consultant shall exercise that degree of skill and care ordinarily used by other reputable members of Consultant's profession, practicing in the same or similar locality and under similar circumstances (the "Standard of Care").

2) Effect of Expiration
Expiration of the Term shall not extinguish, prejudice, or limit either party's right to enforce this Contract with respect to any default or uncorrected defect in performance.

3) Order of Precedence
This Contract consists of these Terms and Conditions, the SOW, all Exhibits, and the City's RFP and Consultant's Proposal. Any apparent or alleged conflict between these items will be resolved by using the following order of precedence:
(a) Amendments executed by the parties after Contract award;
(b) This form Contract as executed by the Parties, including all Exhibits;
(c) RFP Requirements as set forth in City's RFP, including without limitations all Exhibits and any Addenda; and
(d) Consultant's Proposal in response to the RFP, including without limitation, to all supplementary materials.

4) Early Termination of Contract
(a) The City may terminate this Contract for convenience at any time for any reason deemed appropriate in its sole discretion. Termination shall be effective immediately upon City's delivery of a written notice of termination to Consultant.

(b) Either party may terminate this Contract in the event of a material breach by the other party that is not timely cured. Before termination is permitted, the party seeking termination shall give the other party written notice of the nature of the alleged breach, its intent to terminate, and provide fifteen (15) calendar days within which to cure the breach. If the breach is not cured within 15 days, the party seeking termination may terminate immediately by giving written notice that the Contract is terminated.

5) Remedies and Payment on Early Termination

(a) If the City terminates pursuant to 4(a) above, the City shall pay the Consultant for work performed in accordance with the Contract prior to the date of the termination notice. No other costs or loss of anticipated profits shall be due or payable.

(b) If the City terminates pursuant to 4(b) above, the City is entitled all remedies available at law or equity. In addition, Consultant shall pay the City for the costs to defend any claim, and all damages, costs, and sums incurred by the City as a result of the breach.

(c) If the Consultant terminates the Contract pursuant to subsection 4(b), the Consultant's sole remedy shall be payment for work completed prior to date of City's receipt of the termination notice. No other costs, loss of anticipated profits or consequential damages shall be paid.

(d) If the City's termination under Section 4(b) was wrongful, the termination shall be automatically converted to one for convenience and the Consultant shall be paid as if the Contract was terminated under Section 4(a).

(e) In the event of early termination, the Consultant's work product completed prior to the date of termination shall be deemed the property of the City and copies and/or data shall be immediately released to the City.

6) Assignment

Consultant shall not subcontract, assign, or transfer any of the work scheduled under this agreement without the prior written consent of the City. Notwithstanding City consent, the Consultant shall remain responsible for full performance hereunder. The Consultant agrees that if subcontractor(s) are employed in the performance of the SOW under this Contract, both Consultant and any subcontractors remain subject to the requirements of ORS Chapter 656, Workers' Compensation.

7) Compliance with Applicable Laws; Funding Requirements

Consultant shall perform all services in accordance with all applicable federal, state, and local laws and regulations, including without limitations tax laws and terms and conditions incident to receipt of any grant funds. Consultant represents and warrants that it is and will remain in compliance with all laws and expressly represents that it is and shall remain in compliance with Title VI of the Civil Rights Act of 1964 and its corresponding regulations during the Term of this Contract.

8) Respectful Workplace Behavior

The City is committed to a respectful work environment, free of harassment, discrimination and retaliation and other inappropriate conduct. Every individual has a right to work in a professional atmosphere where all individuals are treated with respect and dignity. The City's HR Rule 2.02 covers all employees of the City as well as consultants, vendors or contractors who provide services to the City. Consultant warrants its compliance with the terms and conditions of HR 2.02 as further described at: https://www.portlandoregon.gov/citycode/27929.

9) Indemnification for Property Damage and Personal Injury

Consultant shall indemnify, defend, and hold harmless the City, its officers, agents, and employees, from all claims, losses, damages, and costs (including reasonable attorney fees) for personal injury and property damage arising out of the intentional or negligent acts or omissions of the Consultant, its Subconsultants, suppliers, employees or agents in the performance of its services. Nothing in this paragraph requires the Consultant or its insurer to indemnify the City for claims of personal injury or property damage caused by the sole negligence or misconduct of the City. This duty shall survive the expiration or termination of this Contract or final payment hereunder.

The indemnity obligations of Consultant under this Contract will not in any way be affected or limited by the absence of insurance coverage or by the failure or refusal of any insurance carrier to perform any obligation under insurance policies affecting this Contract.

Consultant's indemnity obligations are in addition to any other rights or remedies available under this Contract, or in law or in equity to the City. In the event of any claim or demand made against any party entitled to indemnification hereunder, the City may in its sole discretion reserve, retain or apply any monies due to the Consultant under the Contract to resolve such claims; provided, however, that the City may release such funds if the Consultant provides the City with adequate assurance of the protection of the City's interests. The City shall determine in its sole discretion of the adequacy of such assurances.

10) Insurance

Consultant shall obtain and maintain in full force at Consultant's sole cost and expense, throughout the Term and any warranty or extension periods, the required insurance identified below. The City reserves the right to require additional insurance coverage as required by statutory or legal changes to the maximum liability that may be imposed on Oregon cities during the term of the Contract.

(a) Workers' compensation insurance as required by ORS Chapter 656 and as it may be amended. Unless exempt under

ORS Chapter 656, the Consultant and all Subconsultants shall maintain applicable coverage for all subject workers.

(b) General commercial liability (CGL) insurance covering bodily injury, personal injury, property damage, including coverage for independent Consultant's protection (required if any work will be subcontracted), premises/operations, contractual liability, products and completed operations, in per occurrence limit of not less than $1,000,000, and aggregate limit of not less than $2,000,000.

(c) Automobile liability insurance with coverage of not less than $1,000,000 each accident, and an umbrella or excess liability coverage of $2,000,000. The insurance shall include coverage for any auto or all owned, scheduled, hired and non-owned auto. This coverage may be combined with the commercial general liability insurance policy.

(d) Professional Liability and/or Errors & Omissions insurance to cover damages caused by negligent acts, errors or omissions related to the professional services, and performance of duties and responsibilities of the Consultant under this Contract in an amount with a combined single limit of not less than $1,000,000 per occurrence and aggregate of $3,000,000 for all claims per occurrence. In lieu of an occurrence-based policy, Consultant may have claims-made policy in an amount not less than $1,000,000 per claim and $3,000,000 annual aggregate, if the Consultant obtains an extended reporting period or tail coverage for not less than three (3) years following the termination or expiration of the Contract.

Continuous Coverage; Notice of Cancellation: The Consultant agrees to maintain continuous, uninterrupted coverage for the duration of the Contract. There shall be no termination, cancellation, material change, potential exhaustion of aggregate limits or non-renewal of coverage without thirty (30) days written notice from Consultant to the City. If the insurance is canceled or terminated prior to completion of the Contract, Consultant shall immediately notify the City and provide a new policy with the same terms. Any failure to comply with this clause shall constitute a material breach of Contract and shall be grounds for immediate termination of this Contract.

Additional Insured: The liability insurance coverages, except Professional Liability, Errors and Omissions, or Workers' Compensation, shall be without prejudice to coverage otherwise existing, and shall name the City of Portland and its bureaus/divisions, officers, agents and employees as Additional Insureds, with respect to the Consultant's activities to be performed, or products or services to be provided. Coverage shall be primary and non-contributory with any other insurance and self-insurance. Notwithstanding the naming of additional insureds, the insurance shall protect each additional insured in the same manner as though a separate policy had been issued to each, but nothing herein shall operate to increase the insurer's liability as set forth elsewhere in the policy beyond the amount or amounts for which the insurer would have been liable if only one person or interest had been named as insured.

Certificate(s) of Insurance: Consultant shall provide proof of insurance through acceptable certificate(s) of insurance, including additional insured endorsement form(s) and all other relevant endorsements, to the City prior to the award of the Contract if required by the procurement documents (e.g., request for proposal), or at execution of Contract and prior to any commencement of work or delivery of goods or services under the Contract. The Certificate(s) will specify all of the parties who are endorsed on the policy as Additional Insureds (or Loss Payees). Insurance coverages required under this Contract shall be obtained from insurance companies acceptable to the City of Portland. The Consultant shall pay for all deductibles and premium. The City reserves the right to require, at any time, complete, certified copies of required insurance policies, including endorsements evidencing the coverage the required.

Subconsultant(s): Consultant shall contractually require its Subconsultants to acquire and maintain in effect until full performance of their Work under this Contract, insurance equal to the minimum coverage limits required above.

11) Ownership of Work Product

All work product produced by the Consultant under this Contract is the exclusive property of the City upon payment in full to Consultant as set forth in this Contract. "Work Product" includes, but is not limited to research, reports, computer programs, manuals, drawings, recordings, photographs, artwork and any data or information in any form. The Consultant and the City intend that such Work Product shall be deemed "work made for hire" of which the City shall be deemed the author. If for any reason a Work Product is deemed not to be a "work made for hire," the Consultant hereby irrevocably assigns and transfers to the City all right, title and interest in such work product, whether arising from copyright, patent, trademark, trade secret, or any other state or federal intellectual property law or doctrines. Consultant shall obtain such interests and execute all documents necessary to fully vest such rights in the City. Consultant waives all rights relating to work product, including any rights arising under 17 USC 106A, or any other rights of authorship, identification or approval, restriction or limitation on use or subsequent modifications. If the Consultant is an architect, the Work Product is the property of the Consultant-Architect, and by execution of

this Contract, the Consultant-Architect grants the City an exclusive and irrevocable license to use that Work Product. City's alteration of Consultant's Work Product or its use by City for any other purpose shall be at City's sole risk.

Notwithstanding the above, all pre-existing trademarks, services marks, patents, copyrights, trade secrets, and other proprietary rights of Consultant are and will remain the exclusive property of Consultant.

12) Business Tax Registration
The Consultant shall obtain a City of Portland business tax registration number as required by Portland City Code ("PCC") 7.02 prior to beginning work under this Contract.

13) Successors in Interest
The provisions of this Contract shall be binding upon and shall inure to the benefit of the parties hereto, and their respective successors and approved assigns.

14) Severability
The parties agree that if any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular term or provision held to be invalid.

15) Waiver
The failure of the City to enforce any provision of this Contract shall not constitute a waiver by the City of that or any other provision.

16) Errors
The Consultant shall, without cost to the City, promptly correct errors or omissions related to the services required by this Contract.

17) Governing Law/Venue
The provisions of this Contract shall be interpreted, construed and enforced in accordance with, and governed by, the laws of the State of Oregon without reference to its conflict of laws provisions that might otherwise require the application of the law of any other jurisdiction. Any action or suits involving any question arising under this Contract must be brought in the appropriate court in Multnomah County, Oregon.

18) Amendments; Minor Amendments
Any changes to the provisions of this Contract's dollar amount, must be made by written amendment and approved by the Chief Procurement Officer or City Council to be valid. Any other changes to the provisions of this Contract, including changes to the scope of work, key personnel, Subconsultants or other changes, must be made by written amendment and approved as pursuant to PCC 5.68 and the PTE Manual.

(a) Amendment of the Contract. Any material change(s) to the provisions of this Contract shall be in the form of an Amendment. A "material change" means a change that increases risk to the City, or that increases the cost of the Contract to exceed the Contract Price. Amendments must be in writing, must be approved as to form by the City Attorney, and must be executed in writing by authorized representatives of the Parties. Any proposed material amendment to this Contract that does not meet the requirements of this section will be deemed null, void, invalid, non-binding, and of no legal force or effect. "Material Amendment" does not mean a Minor Amendment as described in (b) below and does not mean an administrative change which the City may effect unilaterally. An administrative change means a written Contract change that does not affect the substantive rights of the Parties.
(b) Minor Amendments to Contract or Change Orders to a Statement of Work. The City and Consultant may make minor changes that do or do not impact the substantive rights or obligations of the Parties but that are not material amendments. Minor Amendments shall be made through the use of a Change Order that modifies a Statement of Work or Task Order. Following mutual approval of the Change Order, the parties will update the SOW to reflect changes to the description of services and any resulting changes to the timeframe of deliverables.

19) Prohibited Conduct
The Consultant shall not hire any City employee who evaluated the proposals or authorized the award of this Contract for two years after the date the Contract was authorized without the express written permission of the City and provided the hiring is permitted by state law.

20) Payment to Vendors and Subconsultants
The Consultant shall timely pay all Subconsultants and suppliers providing services or goods for this Contract. If the Consultant fails to make timely payments to its Subcontractors, Subconsultants, or suppliers, the City is entitled to take any action permitted by law, including, but not limited to, the following:
(a) Withhold all or part of any progress payment until Consultant makes payment;
(b) Find that the Consultant is not a qualified bidder for future projects per the City's consideration of the Consultant's record of past performance pursuant to ORS 279C.110(3);

(c) Directly make payment to the Subcontractor, Subconsultant, and supplier who has not received proper payment; and
(d) Terminate the Contract for and Event of Default as provided herein.

21) Access to Records and Audits

(a) The Consultant and its subconsultants and suppliers shall maintain all fiscal records relating to the Contract in accordance with generally accepted accounting principles. The Consultant and its subconsultants shall maintain all other records necessary to clearly document their performance of the work and any claims for additional compensation or requests for additional contract time arising from or relating to their performance under the Contract.
(b) The Consultant shall include in its subcontracts, purchase orders and all other written agreements a provision requiring all subconsultants, material suppliers, providers of rented operated equipment and persons submitting cost or pricing data according to the term of a contract, at all tiers, to comply with this section.
(c) The City and its authorized representatives shall have timely access to, and an opportunity to inspect, examine, copy and audit all books and records relating to the Contract, for any reason, upon reasonable notice.
    i) Such books and records shall be maintained by the Consultant and all subconsultants, suppliers and persons with cost or pricing data for a minimum period of six (6) years from the date of Final Payment under the Contract, or until the conclusion of any audit, controversy, litigation, dispute or claim arising out of, or related to, the Contract, whichever is longer.
    ii) The Consultant and all subconsultants, suppliers, and persons with cost or pricing data shall maintain all records in such a manner that providing a complete copy is neither unreasonably time consuming nor unreasonably burdensome for the Consultant or the City. Failure to maintain the records in this manner shall not be an excuse for not providing the records.
    iii) The Consultant and all subconsultants, suppliers, and persons with cost or pricing data shall produce all such books and records in Portland, Oregon, regardless of whether the records are produced pursuant to this provision of the Contract or as a result of a claim, litigation, arbitration or other proceeding. The Consultant or a subconsultant, supplier, or other person may produce the books and records elsewhere if it fully compensates the City for the reasonable costs of travel to and from the place where the records are produced and the reasonable cost of any employee's time in having to travel.
(d) If an audit discloses that payments to the Consultant were in excess of the amount to which the Consultant was entitled, the Consultant shall repay the amount of the excess to the City. Under no circumstances will the payment of previous invoices constitute an acceptance of the charges associated with those invoices.

22) Electronic Signatures

The City and Consultant may conduct this transaction, including any Contract amendments, by electronic means, including through the use of electronic signatures.

23) Merger Clause

This Contract, and the Contract Documents identified at Section 3 above shall be deemed to encompass the entire agreement of the parties and supersede all previous understandings and agreements between the parties, whether verbal or written.

24) Dispute Resolution/Work Regardless of Disputes

The parties shall participate in mediation to resolve disputes before conducting litigation. The mediation shall occur at a reasonable time after the conclusion of the Contract with a mediator jointly selected by the parties. For any claim or dispute that is subject to mediation under this section, the statute of limitations and statute of repose shall not begin to run until the time period set forth in Section 30 below or upon the conclusion of mediation, whichever is later. Notwithstanding any dispute under this Contract, the Consultant shall continue to perform its work pending resolution of a dispute, and the City shall make payments as required by the Contract for undisputed portions of the work. In the event of litigation, no attorney fees are recoverable. No different dispute resolution paragraph(s) in this Contract or any attachment hereto shall supersede or take precedence over this provision.

25) Progress Reports: /☒/ Applicable / ☐/ Not Applicable

If applicable, the Consultant shall provide monthly progress reports to the Project Manager as described in the Statement of the Work and Payment Schedule.

26) Consultant's Key Personnel: /☒/ Applicable / ☐/ Not Applicable

If applicable, the Consultant shall assign the Key Personnel listed in the Statement of the Work and Payment Schedule for the work required by the Contract and shall not change Key Personnel without the prior written consent of the City, which shall not be unreasonably withheld. Notwithstanding anything to the contrary herein, Consultant shall, within 30 (thirty) days of receipt a request from the City replace any Key Person who is not meeting City performance requirements.
The Consultant agrees that the primary personnel assigned to perform the services shall be listed in the Statement of Work and Consultant shall not change such personnel without the prior written consent of the authorized representative of the City as designated in the SOW. The City will enforce all social equity contracting for Disadvantaged, Minority, Women, Emerging Small Business and Service-Disabled Veteran Business Enterprise (D/M/W/ESB/SDVBE) Subconsultant commitments submitted by the Consultant in its proposals. Failure to use the identified D/M/W/ESB/SDVBE Subconsultants without prior written consent is a material breach of contract.

27) Third Party Beneficiaries
There are no third-party beneficiaries to this Contract. Enforcement of this Contract is reserved to the parties.

28) Conflict of Interest
Consultant hereby certifies that, if applicable, its Contract proposal was made in good faith without fraud, collusion or connection of any kind with any other proposer of the same request for proposals or other City procurement solicitation(s), and that the Consultant as a proposer competed solely on its own behalf and without connection or obligation to any undisclosed person or firm. Consultant certifies that it is not a City official/employee or a business with which a City official/employee is associated, and that to the best of its knowledge, Consultant, its employee(s), its officer(s) or its director(s) are not City officials/employees or a relative of any City official/employee who:

(a) has responsibility in making decisions or ability to influence decision-making on the Contract or project to which this Contract pertains;
(b) has or will participate in evaluation or management of the Contract; or
(c) has or will have financial benefits in the Contract.

Consultant understands that should it elect to employ any former City official/employee during the term of the Contract then that the former City official/Consultant employee must comply with applicable government ethics and conflicts of interest provisions in ORS Chapter 244, including but not limited to ORS 244.040(5) and ORS 244.047, and the City's Charter, Codes and administrative rules, including lobbying prohibitions under Portland City Code Section 2.12.080.

29) Contractual Statute of Limitations/Statute of Repose for Design Services Claims
The statute of limitations applicable to Design Services provided pursuant to this Contract shall be 2 years from the date of final completion of the project. The statute of repose applicable to Design Services provided pursuant to this Contract shall be 10 years from Final Completion of the project. The statute of limitations and statute of repose set forth herein shall not begin to run until the project reaches Final Completion, regardless of discovery of any condition, act, error, or omission. This provision shall be included in any Subconsultant agreement executed by the Consultant for the performance of services.

30) Notices and Communications
All notices and other communications concerning this Contract shall bear the Contract number assigned by the City. Notices and other communications may be delivered personally, by facsimile, email, by regular, certified or registered mail or other commercial delivery service. A notice to the City will be effective only if it is delivered to that person designated in writing in either:

(a) the Notice of Award of this Contract,
(b) the Notice to Proceed under this Contract, or
(c) to another individual specifically designated by this Contract.

A notice to the Consultant shall be effective if it is delivered to the individual who signed this Contract on behalf of Consultant at the address shown with that signature, to a corporate officer if Consultant is a corporation, to a general partner if Consultant is a partnership, or to another individual designated in writing by the Consultant in the Contract or in a written notice to the City.

31) Safety
Consultant shall ensure that all Work is performed in a safe manner protective of workers and the environment. Accordingly, Consultant shall maintain in place a safety plan that provides for compliance with all safety laws and regulations in effect during the Term. **Consultant shall bear the cost of compliance with its safety plan. The City agrees to increase Consultant's compensation only in the event of a change of law that directly and actually results in an increase in Consultant's costs of compliance with the new law. The City reserves the right but not the obligation to issue a "halt work" order in the event of a potential life safety risk as determined at the City's discretion.**

32) Access to Facilities
Consultant agrees that Consultant's physical or remote access to City facilities shall be subject to the security interests and health controls necessary to protect public property, City employees and the public. The City shall not be liable for any delays necessary in granting Consultant access to any portion of the facilities or systems.

33) Force Majeure

(a) If a Force Majeure Event occurs, the Party that is prevented by that Force Majeure Event from performing any one or more obligations under this Contract (the "Nonperforming Party") will be excused from performing those obligations, on condition that (1) the Nonperforming Party used reasonable efforts to perform those obligations, (2) the Nonperforming Party's inability to perform those obligations is not due to its failure to take reasonable measures to protect itself against the event or circumstance giving rise to the Force Majeure Event, and (3) the Nonperforming Party complies with its obligations under section 33(c).
(b) For purposes of this Contract, "Force Majeure Event" means, with respect to a Party, any event or circumstance, regardless of whether it was foreseeable, that was not caused by that party and that prevents a party from complying with any of its obligations under this Contract, except that a Force Majeure Event will not include a strike or other labor unrest that affects only one Party, an increase in prices, or a change in law.
(c) Upon occurrence of a Force Majeure Event, the Nonperforming Party shall promptly notify the other party of occurrence of that Force Majeure Event, its effect on performance, and how long that Party expects it to last. Thereafter the Nonperforming Party shall update that information as reasonably necessary. During a Force Majeure Event, the

Nonperforming Party shall use reasonable efforts to limit damages to the other party and to resume its performance under this Contract.

34) Attachments

The following attachments are incorporated into this Contract.

(a) Exhibit A – Statement of Work
(b) Exhibit B – Compensation
(c) Exhibit C – Consultant's Hourly Rates and Negotiated Budget
(d) Exhibit D – Seismic Stability Analysis
(e) Exhibit E – Consultant's Proposal
(f) Exhibit F – RFP 1831 Solicitation Document

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CONSULTANT SIGNATURE:

Consultant represents that Consultant has had the opportunity to consult with its own independently selected attorney in the review of this Contract. Neither Party has relied upon any representations or statements made by the other Party that are not specifically set forth in this Contract.

This Contract constitutes the entire agreement between the City and Consultant and supersedes all prior and contemporaneous proposals and oral and written agreements, between the Parties on this subject, and any different or additional terms on a City purchase order or Consultant quotation or invoice.

The Parties agree that they may execute this Contract and any Amendments to this Contract, by electronic means, including the use of electronic signatures.

This Contract may be signed in two (2) or more counterparts, each of which shall be deemed an original, and which, when taken together, shall constitute one and the same agreement.

IN WITNESS WHEREOF, the Parties hereby cause this Contract to be executed.

I, the undersigned, agree to perform work outlined in this Contract in accordance to the Terms and Conditions and the Statement of Work (Exhibit A); hereby certify under penalty of perjury that I/my business am not/is not in violation of any Oregon tax laws; hereby certify that my business is certified as an Equal Employment Opportunity Affirmative Action Employer and is in compliance with the Equal Benefits Program as prescribed by Chapters 5.33.076 and 5.33.077 of Code of the City of Portland; and hereby certify I am an independent consultant as defined in ORS 670.600

McMillen, LLC dba McMillen Jacobs Associates

BY: Marcus Emmons Date: 09/02/2022

Name: Marcus Emmons

Title: Director of Operations, VP

CONTRACT NUMBER: 30008199

CONTRACT TITLE: **DAM 1 SPILLWAY GATES REPLACEMENT**

CITY OF PORTLAND SIGNATURES:

By: _____ Date: _____
Bureau Director

By: _____ Date: _____
Chief Procurement Officer

By: _____ Date: _____
Elected Official

Approved:

By: _____ Date: _____
Office of City Auditor

Approved as to Form:

By: _____ Date: _____
Office of City Attorney

Consultant's and City's Project Manager for this Contract are:

For City of Portland/Water Bureau:	For Consultant:
Name: Kevin Larson	Name: James Boag
Title: Project Manager	Title: Senior Managing Engineer
e-mail: kevin.larson@portlandoregon.gov	e-mail: boag@mcmjac.com
Copy to: Jin Huang	Copy to:
Jin.huang@portlandoregon.gov	
Copy to: Andrew Urdahl	
Andrew.Urdhal@portlandoregon.gov	

1.0 Task 1.0 – Project Administration and Meetings

1.1 All project administration tasks from NTP through completion of the project. Specific activities include:

1.1.1 Develop and submit monthly summary billing progress reports (33 Months)
1.1.2 Develop and maintain subconsultant contracts
1.1.3 Develop and submit monthly subconsultant payment and utilization reports (33 reports)
1.1.4 Develop and submit a Project Management Plan (PMP)
1.1.5 Develop and submit a Project Communication Plan (PCP)
1.1.6 Develop and submit a Quality Assurance / Quality Control (QA/QC) Plan
1.1.7 Conduct virtual bi-weekly 1-hour coordination meetings to discuss project, upcoming workload, and schedule with Portland Water Bureau (PWB)
1.1.8 Includes a conducting a project kickoff meeting
1.1.9 Includes creating agendas and meeting minutes and distributing to the team
1.1.10 Includes creating agendas and meeting minutes and distributing to the team
1.1.11 Develop and submit the project schedule
1.1.12 Update the project schedule and the Basis of Design deliverable, 30% Plans and Specifications (P&S), 60% P&S, 90% P&S, and 100% P&S.

Table 1-1 Task 1.0 Deliverables

Task 1.0 – Project Administration and Meeting Deliverables	
Deliverable	**Format**
Monthly Billing / Progress Reports	PDF
Monthly subconsultant payment and utilization report	PDF
Project Management Plan	PDF
Project Communication Plan	PDF
QA/QC Plan	PDF
Bi-Weekly Meeting Agendas	MS Word
Bi-Weekly Meeting Minutes	PDF
Project Schedule	PDF

2.0 Task 2.0 – Conceptual Design Phase.

2.1 Tasks to develop the conceptual design including the alternative evaluation and Basis of Design

2.1.1 Review existing project information including studies, reports, record information
2.1.2 Perform a site specific seismic hazard analysis (SHA) to develop the seismic design criteria
2.1.3 Perform a linear dynamic finite-element analysis of the dam-foundation-reservoir system to estimate accelerations at the gate supports during the design seismic event
2.1.4 Conduct internal technical review (ITR) - All comments and suggestions will be addressed and documented in our standard ITR comment form.
2.1.5 Develop an alternative analysis matrix for evaluation of the different design or installation alternatives
2.1.6 Conduct an in person, alternative analysis workshop to review the alternatives, evaluation criteria, evaluation scoring, and develop a consensus for the alternative evaluation
2.1.7 Includes creating agendas and meeting minutes and distributing to the team
2.1.8 Develop and submit up to five technical memorandums (TM)
2.1.9 Topics for the TM's will be determined during the design by PWB
2.1.10 TM's are assumed to be no more than 5 pages in length
2.1.11 Conduct internal technical review (ITR) - All comments and suggestions will be addressed and documented in our standard ITR comment form

2.1.12 Develop sizing level design calculations (comparable to a 30% P&S level). These will be provided in the appendix of the Basis of Design report
2.1.13 Develop a 3D Computer-Aided Drafting and Design (CADD) model to support creation of conceptual plates
2.1.14 Develop 30% Plates (comparable to a conceptual 30% P&S level). These will be provided in the appendix of the Basis of Design Report
2.1.15 Develop a list of planned specification sections with a short description of the scope of each section. This will be provided in the appendices of the Basis of Design report
2.1.16 Develop a Class 5 construction cost estimate. This will be provided in the appendices of the Basis of Design Report
2.1.17 Develop a proposed helicopter flight path
2.1.18 Develop a draft Basis of Design report and submit for PWB and stakeholder review
2.1.19 This will be used to document and establish final consensus on the chosen design alternative
2.1.20 Will include an executive summary, design criteria, conclusions, recommendations, outstanding issues, costs, and reference material.
2.1.21 Conduct internal technical review (ITR) - All comments and suggestions will be addressed and documented in our standard ITR comment form.
2.1.22 Conduct a basis of design presentation meeting with PWB and stakeholders
2.1.23 Present selected design alternatives and hold discussions to establish consensus on the chosen alternatives.
2.1.24 Includes creating agendas and meeting minutes and distributing to the team
2.1.25 Includes a list of unresolved issues and next steps captured in the meeting minutes
2.1.26 Develop and submit the final Basis of Design Report
2.1.27 Incorporate PWB and stakeholder review comments
2.1.28 Conduct internal technical review (ITR) - All comments and suggestions will be addressed and documented in Consultants standard ITR comment form.

Table 2-1 Task 2.0 Deliverables

Task 2.0 – Conceptual Design Phase Deliverables	
Deliverable	**Format**
Alternative evaluation matrix	MS PPT
Meeting agenda and minutes for the alternative evaluation workshop	Agenda - MS Word, Minutes - PDF
Technical Memorandums	PDF
Draft Basis of Design Report	PDF
Helicopter Flight Path	PDF
Meeting agenda and minutes for the basis of design presentation meeting	Agenda - MS Word, Minutes - PDF

3.0 Task 3.0 – Seismic Analysis

Tasks to perform the seismic analysis. These tasks are divided into three phases as described in the subsections below.

3.1 Phase I – Spillway Gate Replacement Support

The Phase I seismic analysis will focus on developing a finite-element model of the dam-foundation-reservoir system and establishing seismic design criteria for the spillway gate replacement. This phase includes the following tasks:

3.1.1 Perform a site-specific seismic hazard analysis (SHA) to address Federal Energy Regulatory Commission FERC comments on previous studies and develop seismic design criteria for the Project
3.1.2 Gather and review Project background data including drawings, reports, surveys, monitoring, and calculations if available Perform one site visit
3.1.3 Develop a structural analysis plan (design basis memorandum)
3.1.4 Develop 3-dimensional geometric and finite-element models of the dam, foundation, and reservoir system
3.1.5 Perform linear finite-element analysis for static loads including gravity, hydrostatic, uplift, and soil/silt
3.1.6 Perform response spectrum analysis to establish peak crest- and gate-level seismic accelerations for spillway gate design

Table 3-1 Task 3.1 Deliverables

Task 3.0 – Seismic Analysis Deliverables	
Deliverable	**Format**
Site-Specific Seismic Hazard Analysis (SHA) Report	PDF
Site Visit Report	PDF
Design Basis Memorandum Draft	PDF
Design Basis Memorandum Final	PDF
Seismic Linear Response Analysis Evaluation Draft Report	PDF
Seismic Linear Response Analysis Evaluation Final Report	PDF
Phase I FERC Presentation	n/a

3.2 Phase II – Dam Stability Evaluation – Linear Analysis

The Phase II seismic analysis will focus on evaluating dam stability under unusual and extreme events. This phase will utilize linear analysis methods and the finite-element model developed during Phase I. Phase II tasks include the following:

3.2.1 Develop three sets of three-component acceleration time histories scaled to match the site-specific seismic hazard established in Phase I

3.2.2 Perform staged-construction analysis to establish gravity load effects and stress distribution

3.2.3 Conduct thermal analysis (temperature distribution) under summer and winter scenarios

3.2.4 Perform static analysis with thermal loading

3.2.5 Perform linear time history analysis (LTHA) using massed foundation with deconvolved seismic input and radiation damping. The LTHA will include analyses for 3 seismic records in combination with two reservoir elevations and two temperature conditions, for a total of twelve analyses

3.2.6 Perform post-earthquake analysis and compute stability factors of safety

3.2.7 Estimate seismic demand at the spillway crest and gate locations and compare with Phase I results

3.2.8 Present results to FERC and response to review comments.

Table 3-2 Task 3.2 Deliverables

Task 3.0 – Seismic Analysis Deliverables	
Deliverable	**Format**
Seismic Hazard Analysis report update w/ 3 scaled acceleration time histories	PDF / Excel
Phase II FERC Presentation	N/A
Global Dam Stability Evaluation – Linear Analysis Draft Report	PDF
Global Dam Stability Evaluation – Linear Analysis Final Report	PDF

3.3 Phase III – Dam Stability Evaluation – Nonlinear Analysis (Not Included)

Depending on the results of the Phase II analysis, an additional phase of analysis may be necessary to complete the evaluation of global dam stability. This phase would introduce non-linear mechanisms into the analysis model to evaluate the effects of cracking and sliding along joints in the concrete or along the concrete-foundation interface.

This additional non-linear analysis phase is described in Attachment 3 for information only and is not included in this scope of work.

4.0 Task 4.0 – 60% Plans and Specs

4.1 Tasks to develop the 60% Plans and Specs deliverable

4.1.1 Incorporate PWB and stakeholder 30% review comments

4.1.2 Develop 60% level design calculations to support the design

4.1.3 Refine the 3D CADD model to support creation of the plans

4.1.4 Develop 60% Plans

4.1.5 A drawings index shall be provided that will show all sheets for the project

4.1.6 Layout sheets and some detail sheets will be included in the 60% P&S deliverable.

4.1.7 Not all detail sheets will be completed at this milestone.

4.1.8 Develop 60% Specs

4.1.9 All spec sections shall be provided with general tailoring performed but not all spec language will be completed at the 60% P&S milestone.

4.1.10 Specifications will be created in SpecsIntact and will start with relevant Unified Facilities Guide Specifications (UFGS) guide specs.

4.1.11 Specifications will be submitted in PDF and MS Word formats. Native SpecsIntact files shall also be submitted upon written request by the PWB Project Manager (PM).

4.1.12 Edit Basis of Design report to capture design changes from the 30% milestone.

4.1.13 Develop an Association for the Advancement of Cost Engineering (AACE) Class 4 construction cost estimate.

4.1.14 Develop a schedule of values

4.1.15 Conduct (ITR) on all 60% P&S deliverables

4.1.16 All comments and suggestions will be addressed and documented in our standard ITR comment form.

4.1.17 Develop a comment log

4.1.18 Submit 60% P&S for PWB review.

4.1.19 Provide 5 hard copies with plans printed to 11x17 and Specs printed to 8.5x11

4.1.20 Conduct a 1-2 hour, 60% design review meeting with PWB and stakeholders

4.1.21 Create agendas and meeting minutes and distribute to the meeting attendees

4.1.22 Conduct a virtual, 1-2 hour, 60% design FERC review meeting

4.1.23 Includes creating agendas and meeting minutes and distributing to the team

4.1.24 Provide technical support for a Pre-Construction Potential Failure Mode Analysis (PFMA)

4.1.25 PFMA will be a 1-2 day in-person seminar

4.1.26 Attendees shall include McMillen core design team as well KMC Cost/Construction team members

4.1.27 Develop and submit a constructability technical memorandum

Table 4-1 Task 4.0 Deliverables

Task 4.0 – 60% P&S Deliverables	
Deliverable	**Format**
60% Design Calculations	PDF
60% Plans and Specifications	PDF & 5 hard copies
Basis of design report with 60% P&S updates	PDF
Class 4 construction cost estimate	PDF
Schedule of values	PDF
Comment log	PDF
Meeting agenda and minutes for the design review meeting	Agenda - MS Word Minutes - PDF
Meeting agenda and minutes for the FERC review meeting	Agenda - MS Word Minutes - PDF
Constructability Technical Memorandum	PDF

5.0 Task 5.0 – 90% Plans and Specs

5.1 Tasks to develop the 90% Plans and Specs deliverable

5.1.1 Incorporate PWB and stakeholder 60% review comments
5.1.2 Develop 90% level design calculations to support the design
5.1.3 Refine the 3D CADD model to support creation of the plans
5.1.4 Develop 90% Plans
5.1.5 A drawings index will be provided that will show all sheets for the project
5.1.6 All plan sheets will be provided at the 90% P&S.
5.1.7 All detail views will be provided but not all drawings details will be finalized
5.1.8 Develop 90% Specs
5.1.9 Draft language will be provided in all spec sections. Most but not all specification details will be finalized
5.1.10 Specifications will be created in SpecsIntact and will start with relevant UFGS guide specs.
5.1.11 Specifications will be submitted in PDF and MS Word formats. Native SpecsIntact files shall also be submitted upon written request by the PWB PM
5.1.12 Edit Basis of Design report to capture design changes from the 60% milestone
5.1.13 Develop an AACE Class 3 construction cost estimate.
5.1.14 Refine the schedule of values
5.1.15 Conduct ITR on all 90% P&S deliverables
5.1.16 All comments and suggestions will be addressed and documented in our standard ITR comment form
5.1.17 Update the milestone review comment log
5.1.18 Submit 90% P&S for PWB review
5.1.19 Provide 5 hard copies with plans printed to 11x17 and Specs printed to 8.5x11
5.1.20 Review Construction Manager / General Contractor (CM/GC) guaranteed max price
5.1.21 Conduct a virtual, 2 hour, 90% design review meeting with PWB and stakeholders
5.1.22 Attendees to include McMillen core design team as well KMC Cost/Construction team members
5.1.23 Includes creating agendas and meeting minutes and distributing to the team

Table 5-1 Task 5.0 Deliverables

Task 5.0 – 90% P&S Deliverables	
Deliverable	**Format**
90% Design Calculations	PDF
90% Plans and Specifications	PDF & 5 hard copies
Basis of design report with 90% P&S updates	PDF
Class 3 construction cost estimate	PDF
Schedule of values	PDF
Draft Operations & Maintenance (O&M) Manual	PDF
Comment log	PDF
Meeting agenda and minutes for the design review meeting	Agenda - MS Word Minutes - PDF

6.0 Task 6.0 – Final (100%) Plans and Specs

6.1 Tasks to develop the final (100%) Plans and Specs deliverable

6.1.1 Incorporate PWB and stakeholder 90% review comments
6.1.2 Develop final design calculations to support the design
6.1.3 Refine the 3D CADD model to support creation of the plans
6.1.4 Develop Final Plans
6.1.5 All plan sheets shall be provided and finalized
6.1.6 Develop 90% Specs

6.1.7 All specification language shall be complete
6.1.8 Specifications will be created in SpecsIntact and will start with relevant UFGS guide specs.
6.1.9 Specifications will be submitted in PDF and MS Word formats. Native SpecsIntact files can also be submitted upon request.
6.1.10 Edit Basis of Design report to capture design changes from the 90% milestone.
6.1.11 Develop an AACE Class 2 construction cost estimate.
6.1.12 Refine the schedule of values
6.1.13 Conduct (ITR on all 90% P&S deliverables
6.1.14 All comments and suggestions will be addressed and documented in our standard ITR comment form.
6.1.15 Update the milestone review comment log
6.1.16 Submit Final P&S for PWB review.
6.1.17 Provide 5 hard copies with plans printed to 11x17 and Specs printed to 8.5x11

Table 6-1 Task 6.0 Deliverables

Task 6.0 – Final P&S Deliverables	
Deliverable	**Format**
Final Design Calculations	PDF
Final Plans and Specifications	PDF & 5 hard copies
Final Basis of design report	PDF
Class 2 construction cost estimate	PDF
Schedule of values	PDF
Final comment log	PDF

7.0 Task 7 -Environmental and Permitting

7.1 Tasks to provide environmental and permitting support

7.1.1 Develop and submit a draft permitting strategy memorandum
7.1.2 Include identification of the federal, state, and local permits
7.1.3 Preparation of documents for State Historic Preservation Officer (SHPO) review
7.1.4 Coordinate with PWB & United States Forest Service (USFS) to determine if there's a need for a special use permit required for construction activities
7.1.5 Preparation of documents for a USFS special use permit
7.1.6 Coordination of FERC design reviews

Table 7-1 Task 7.0 Deliverables

Task 7.0 – Environmental and Permitting Deliverables	
Deliverable	**Format**
Permitting Strategy Memo	PDF
USFS Special Use Permit / Categorical Exclusion	PDF
Oregon SHPO National Historic Preservation Act Section 106 Clearance	PDF

8.0 Task 8 - CM/GC Bid Support Services

8.1 Tasks to provide support to PWB for procurement of CM/GC services

8.1.1 Attend CM/GC negotiation meetings, contract includes funding for attendance at three meeting
8.1.2 Create meeting minutes and distribute to the attendees
8.1.3 Perform a minimum of three site visits to Bull Run Dam 1 to advise PWB on engineering design topics
8.1.4 Includes inspecting and discussing constructability questions or concerns
8.1.5 Address CM/GC questions and inquiries and providing other onsite support to facilitate the CM/GC selection process.
8.1.6 Develop a site visit report documenting field notes
8.1.7 Address design inquires and questions
8.1.8 Advise on suitable material and equipment substitutions
8.1.9 Provide written responses or addenda to bid documents as required.
8.1.10 Participate in the evaluation of CM/GC proposals as technical advisors
8.1.11 Provide recommendation on how well proposals match the construction documents
8.1.12 Develop and submit memo that documents the evaluation of the CM/GC Guaranteed Maximum Price
8.1.13 Develop and submit memo that documents how well the CM/GC proposal meets the construction documents
8.1.14 Include considerations for market conditions, risk, completeness, comparison to construction cost estimate, and comparison of differences.

Table 8-1 Task 8.0 Deliverables

Task 8.0 – CM/GC Bid Support Deliverables	
Deliverable	**Format**

Minutes for negotiation meeting	PDF
Site visit report / filed notes	PDF
Design inquiry responses and design document addenda (to clarify inquires if required)	PDF
CM/GC proposal evaluation comments	PDF
CM/GC Proposal Evaluation memo	PDF

9.0 Task 9 - Construction Support Services

9.1 Tasks to provide support to PWB for administration of the construction contract

9.1.1 Attend pre-construction meeting
9.1.2 Create meeting minutes and distributing to the team
9.1.3 Perform technical review of submittals such as shop drawings, material certifications, welding procedures, work plans, and other pre-construction documents
9.1.4 Written submittal evaluation responses shall be provided to PWB
9.1.5 Shop inspections and site visits
9.1.6 Includes creation of inspection reports
9.1.7 Assume each shop inspection shall be a day trip involving only local travel
9.1.8 Up to 12 shop inspections / site visits are in the budget
9.1.9 Prepare up to five field orders and change orders
9.1.10 Review and provide responses to up to eight Requests for Information (RFI's)
9.1.11 Provide technical assistance with claims
9.1.12 Provide input to punch lists
9.1.13 Review final O&M manual and provide review comments
9.1.14 Provide written notice to PWB and PWB Contractor that the work is acceptable

Table 9-1 Task 9.0 Deliverables

Task 9.0 – Construction Support Services Deliverables	
Deliverable	**Format**
Minutes for pre-construction meeting	PDF
Submittal evaluation responses	Email / MS Word
RFI responses	Email / MS Word / Other formats as applicable
O&M Manual and closeout submittal review comments	Email / MS Word / Other formats as applicable
Written notice that construction work is acceptable	PDF

10.0 - Milestone Deliverable Dates and Project Schedule

Table 10-1 Milestone Deliverable Dates

Milestone / Deliverable	Submittal Date
NTP	November 2022
Estimated Alternative Evaluation Workshop (Specific Date TBD)	November 2022
Draft Basis of Design Report	December 2, 2022
Estimated Basis of Design Presentation Meeting (Specific Date TBD)	Mid December 2022
60% P&S Submittal	March 22, 2023
90% P&S Submittal	June 21, 2023
Final P&S Submittal	September 7, 2023

11.0 Key Personnel

Name	Title/Role	% of Time*	Company
James Boag	Project Manager	15%	McMillen, LLC
Mark Merklein	Principal Structural Engineer	1%	McMillen, LLC
Don Jarrett	Mechanical ITR	1%	McMillen, LLC
Bryan Duevel	Geotechnical ITR	1%	McMillen JA Engineering PLLC
John Bakken	Electrical ITR	1%	McMillen, LLC
Matt Hess	Mechanical Lead	4%	McMillen, LLC
Gavin Smith	Structural Lead	13%	McMillen, LLC
Matt Lawson	Electrical Lead	3%	McMillen, LLC
Taylor Bowen	Structural Support/FE Modeling	5%	McMillen, LLC
Marc Ryan	Geotechnical Lead	6%	Slate Geotechnical
Darlene Siegal	Permitting	4%	Wolf Water Resources

* Budget hour/(33months*160hrs/month)

12.0 Stability Analysis

Seismic stability analysis for the spillway gates to meet the FERC requirements. Exhibit D - Proposal by Subconsultant Klohn Crippen Berger

Exhibit B – Compensation

COMPENSATION

The maximum that the Consultant will be paid for the work on this Contract is **$1,329,325.00** (hereafter the "not to exceed" amount).

The "not to exceed" amount includes all payments to be made pursuant to this Contract, including reimbursable expenses, and Contract Mitigation if any. Contract Mitigation can be used only with prior written approval of the City prior to any effort being accomplished on added tasks. Nothing in this Contract requires the City to pay for work that does not meet the Standard of Care or other requirements of the Contract. The actual amount to be paid to the Consultant may be less than that amount.

The Consultant shall be paid based on its hourly rates, plus any authorized expenses, in accordance with the tasks listed below. If a task is completed and accepted by the City, and the amount billed by the Consultant is less than the estimated budget for the task, the remaining amount may be used on the other tasks as authorized in writing by the Project Manager. In no event shall the Consultant bill for an amount greater than what is shown for each task.

Task	Description	FY22/23	FY23/24	FY24/25	Total
1.0	Project Administration and Meetings	$52,210	$41,537	$38,093	$131,841
2.0	Conceptual Design Phase	$232,008			$232,008
3.0	Seismic Analysis	$168,096	$165,399		$333,495
4.0	60% Plans and Specs	$136,835	$34,209		$171,044
5.0	90% Plans and Specs		$131,565		$131,565
6.0	Final (100%) Plans and Specs		$78,545		$78,545
7.0	Environmental and Permitting		$61,140		$61,140
8.0	CM/GC Bid Support Services	$1,843	$18,163	$31,803	$51,809
9.0	Construction Support Services			$137,878	$137,878
Totals		$590,992	$530,558	$207,774	**$1,329,325**

The Consultant is entitled to receive progress payments for its work pursuant to the Contract as provided in more detail below. The City will pay Consultant based on invoices for acceptable work performed and approved until the "not to exceed" amount is reached. Thereafter, Consultant must complete work based on the Contract without additional compensation unless there is a change to the scope of work.

Any estimate of the hours necessary to perform the work is not binding on the City. The Consultant remains responsible if the estimate proves to be incorrect. Exceeding the number of estimated hours to complete the work does not impose any liability on the City for additional payment.

If the work is completed before the "not to exceed" amount is reached, the Consultant's compensation will be based on the Consultant's bills previously submitted for acceptable work performed and approved.

All travel and meals require Preapproval to expend prior to occurring. Preapproval shall be submitted by the Consultant through email request to the PWB Project Manager and cc'd to the PWB Contract Administration Branch Representative, Andrew Urdahl at Andrew.Urdahl@portlandoregon.gov

1. Payment Terms: Net 30 Days

The City shall pay the Consultant as follows upon the submission of invoices approved:

1.1. Invoices are to be submitted via email to: wbaps@portlandoregon.gov
1.2. Invoices must be in Consultant's full name: **McMillen, LLC DBA McMillen Jacobs Associates**
1.3. The Consultant shall make full payment to its subconsultants within **10 business days** following receipt of any payment made by the City to the Consultant.

2. Standard Reimbursable Costs

The following costs will be reimbursed without cost-increase:

2.1. **If Preapproved** by the PWB Project Manager, allowable costs of travel shall be determined in accordance with the General Services Administration (GSA) per diem rates in effect on the date of this Contract. Consultant's time spent traveling to the

Portland area, however, will not be reimbursed. All costs incurred for local travel within the Portland metropolitan area, and a 100-mile radius, including but not limited to, vehicle mileage and parking fees are considered as included in the overhead rate, and shall not be reimbursed separately.

2.2. Travel It is the policy of the City that all travel shall be allowed only when the travel is essential to the normal discharge of the Consultant's responsibilities under the Contract. All travel must be for official City business only. All travel and lodging shall be conducted in the **most efficient and cost-effective manner**. Reimbursable direct costs include preapproved travel beyond a 100-mile radius of Portland. Travel shall be reimbursed as follows:

2.2.1 Airfare: Itemized receipts are required, and reimbursement is based on actual expenses incurred. All Consultant representatives shall fly "coach class" unless Consultant personally pays the difference. One checked bag fee is permitted per flight.

2.2.2 Rail Travel: Itemized receipts are required, and reimbursement is based on actual expenses incurred. All Consultant representatives shall travel by "coach class" unless Consultant personally pays the difference. For overnight rail trips, reimbursement for sleeper accommodations is limited to one roomette per person. Bedrooms are allowed only when roomettes are not available, and Consultant must provide proof of no availability. Any upgraded travel requires Consultant to personally pay the difference.

2.2.3 Car rentals: Itemized receipts are required, and reimbursement is based on actual expenses incurred. All Consultant representatives shall be limited to economy or compact-sized rental vehicles, unless there are three or more persons on official City business, or there is a need for another type of vehicle such as a truck to meet business requirements. Prior to renting any other sized vehicle beyond an economy or compact-sized vehicle the Consultant shall receive pre-approval in writing by the Portland Water Bureau Project Manager. Consultant shall pay the difference otherwise.

2.2.4 Taxis/Ride-sharing Services/Mass Transit/Parking/Tolls/Gas: Receipts are required, and reimbursement is based on actual expenses incurred. Reimbursable tips are limited to 15%. Use of mass transit is strongly encouraged.

2.2.5 Private Vehicle Usage: Private Vehicle usage is not authorized under this Contract to conduct Program activities unless pre-approved in writing by the Portland Water Bureau Project Manager. Mileage for use of a personal vehicle and related parking expense to reach airports, train station, or other transit locations to Portland is reimbursable as long as usage of the Personal vehicle was pre-authorized. No gas expenses will be reimbursed for private vehicle usage under this Contract.

2.3 Meals: Receipts are not required (but must be made available upon request or for an audit) and reimbursement is based on the U.S. General Services Administration's (GSA) Meal and Incidental Expenses (M&IE) rate and guidelines per the travel year and destination – https://www.gsa.gov/travel/plan-book/per-diem-rates.

2.4 Lodging: Receipts are required, and reimbursement is based on GSA rates for the month and destination – https://www.gsa.gov/travel/plan-book/per-diem-rates. The GSA rates do not include lodging taxes, which may be reimbursed as a separate expense. Expenses beyond the allowable GSA rates will NOT be reimbursed.

2.5 It is the responsibility of the Consultant to request and maintain in their possession itemized receipts for air, lodging, ground transportation, and registration fee (if any) expenses. Under no circumstance will the City reimburse the aforementioned expenses without a receipt.

2.6 When submitting invoices, the Consultant shall include supporting documentation received from the PWB PM authorizing travel/meals along with all required travel receipts listed above. PWB will not pay Consultant or their subconsultants for overnight or extended parking costs not related to the scope of work under this Contract or if an alternate method is available at a lesser cost.

2.7 Preapproval of Travel/Meals

2.7.1 All travel shall be pre-approved in writing by the PWB PM with the Consultant providing an estimated total cost of the travel. Reimbursements for travel shall include itemized receipts AND a summary page with the following information: employee name, travel purpose, travel to/from locations, dates of travel, and list of expenditures for airfare, lodging, ground transportation, registration fee, and daily per diem requested. Daily per diem must be listed per day to reflect the amount charged per day minus any deductions for provided meals. The Consultant is required to notify the PWB PM regarding all travel they anticipate, including any travel beyond a 100-mile radius of Portland and indicate why this travel would be necessary.

2.7.2 When requesting authorization for travel and meals, the Consultant shall include the estimated date/times when Key Personnel, either employed with the Consultant or as a subconsultant on the Contract, will be required to travel and how this is associated with the Contract as well as indicate the location and estimated costs for that travel. The Consultant shall include the purpose and reason why a local member would not be available to perform the work and why an alternate communication method could not be used. The Consultant shall provide the preapproved email or letter that authorized travel when submitting their monthly invoice for review and approval.

2.8 Food and/or non-alcoholic beverages

Food and/or beverages may be provided to participants at training sessions, meetings or conferences that are allowable activities and have been preapproved by the PWB PM in writing. In addition, the agenda, list of participants and approval from the PWB PM must be

included as an attachment to the monthly invoice submitted for the scheduled event. Expenses incurred for food and/or beverages provided at training sessions, meetings, or conferences must satisfy the following three (3) tests:

2.8.1 Test 1: The cost of the food and/or beverages provided is considered to a reasonable in cost. *

2.8.2 Test 2: The food and/or beverages provided are incidental to a work-related event.

2.8.3 Test 3: The food and/or beverages provided are not related directly to amusement and/or social events.

2.8.4 **Any event where alcohol is being served is considered a social event and, therefore, costs associated with that event are not allowable.**

**Reasonable in cost shall be defined as a price that is consistent with what a reasonable person would pay in the same or similar circumstances for the same business or for the same or similar item.*

2.9 The Consultant and their subconsultants shall adhere to the following applicable definitions for food and beverages:

2.9.1 Food and/or beverages retain their common meanings.

2.9.2 Food and/or beverages are considered in the context of formal meals and in the context of refreshments served at short, intermittent breaks during an activity that supports the project under this Contract between the Consultant and the Portland Water Bureau.

2.9.3 **Beverages do not include alcoholic drinks.**

2.10 Gratuity

2.10.1 Gratuity for food, transportation, and other allowable expenses will be reimbursed at the maximum rate of 15%. Any additional tipping beyond 15% shall be paid by the Consultant.

2.10.2 Personal expenditures or expenditures not related to the Contract are not eligible for reimbursement.

3. Hourly Rates

3.1. The Consultant shall be compensated in accordance with the hourly rates set forth in attached Exhibit C, Consultant Hourly Rates and Negotiated Budget. In no way shall the cost of hours billed by the Consultant exceed the total Contract amount throughout the term of this Contract.

3.2. Hourly rates shall not be changed throughout the duration of the Contract.

4. Subconsultant Costs

Compensation for Subconsultants shall be subject to the same billing restrictions and requirements as those of the Consultant. Consultant may bill Subconsultant services at cost plus a 5% mark-up and shall not be subject to any cost increase. Other direct expenses, as stated under Standard Reimbursable Costs, shall be billed at cost without mark-up. Allowable Subconsultant services can only be marked-up once. For example, the Consultant is not allowed to mark-up on a second tier Subconsultant's services if it has already been marked-up by the Consultant's Subconsultant. Mark-up is not allowed when using intergovernmental resources to complete work and will not be accepted.

Sub-Consultants	**COBID Sub-Consultant**	**Scope/Type of Work**	**Subcontracting %**	**Total Dollars**
Kelly McNutt Consulting, LLC	D/WBE	Constructability, Construction Cost Estimating, CM/GC Support	9.5	$126,700
Wolf Water Resources, Inc.	D/W/ESB	Environmental Permitting	3.6	$46,800
S&F Land Services, LLC	ESB	Land Surveying	2.2	$29,280
Historical Research Associates, Inc.	WBE	Permitting	1.3	$17,280
Slate Geotechnical Consultants, Inc.	WBE	Dam Safety, Geotechnical Engineering, Seismic Hazard, and Earthquake induced Geologic Hazards Consulting	4.6	$45,600

Total subcontracting to COBID certified firms on this contract is estimated at **$265,660** or **20%** of the Contract Amount.

The City will enforce all social equity Contracting and subcontracting commitments of COBID certified firms indicated in the table above. Consultant shall not add, eliminate, or replace any Subconsultant assignments without the prior written consent of the Chief Procurement Officer. Failure to use the identified COBID certified Subconsultants without prior written consent is a material breach of contract. Any changes must be reported and submitted to the PTE Contract Compliance Specialist. All changes to this Contract, including changes to the Subconsultant participation, must be made by written amendment and approved by the Chief Procurement Officer to be valid.

For Contracts valued $50,000 or more, the Consultant shall submit Subconsultant payment and utilization information electronically in the Contract Compliance Reporting System, reporting ALL Subconsultants employed in the performance of this agreement. More information on this process may be viewed on the City Procurement website at: https://www.portlandoregon.gov/brfs/75932.

5. Progress Payments

5.1. Compensation to the Consultant shall be based on the following:

5.1.1. Invoices submitted to the City, including the appropriate required information as outlined below and all supporting documentation relating to charges expressed on the invoice.

5.1.2. **All invoices must be submitted using the Consultant's full name: McMillen LLC DBA McMillen Jacobs**

Associates.

5.1.3. Detailed monthly Project Progress Reports submitted to the City Project Manager by email.

5.1.4. Invoices are submitted via email to wbaps@portlandoregon.gov

5.2. The Consultant is required to follow Generally Accepted Accounting Principles (GAAP). Personal expenditures or expenditures not related to the Project or part of the Contract are not eligible for reimbursement. On or before the 15th of each month, the Consultant shall submit to the City Accounts Payable Department an invoice for work performed by the Consultant during the preceding month.

6. Invoices

6.1 On or before the 15th of each month, the Consultant shall submit to the Portland Water Bureau's Accounts Payable Department an invoice for work performed by the Consultant during the preceding month. The invoice shall contain the City's Contract Number and set out all items for payment including, but not limited to, the name of the individual, labor category, direct labor rate, hours worked during the period, and tasks performed. The Consultant shall also attach photocopies of claimed reimbursable expenses, if applicable. The Consultant shall stamp and approve all subconsultant invoices and note on the subconsultant invoice what they are approving as "billable" under the Contract. The billing from the prime should clearly roll up labor and reimbursable costs for the prime and subconsultants – matching the subconsultant invoices. **Ten days prior to initial billing, the Consultant shall develop a billing format for approval by the City. Provide this sample to the following contact: Andrew.Urdhal@portlandoregon.gov**

6.2 The City shall pay all amounts to which no dispute exists within 30 calendar days of receipt of the invoice. Payment of any bill, however, does not preclude the City from later determining that an error in payment was made and from withholding the disputed sum from the next progress payment until the dispute is resolved.

6.3 The Consultant shall make full payment to its subconsultants within 10 business days following receipt of any payment made by the City to Consultant.

6.4 Compensation to the Consultant shall be based on the following:

6.4.1 Invoices submitted to the PWB Finance Department via email and includes the appropriate required information as outlined in the Contract and includes all supporting documentation relating to charges expressed on the invoice.

6.4.2 The invoice shall be emailed to wbaps@portlandoregon.gov.

6.4.3 Detailed monthly Project Progress Reports submitted to the PWB PM as required.

6.4.4 The monthly Project Progress Report shall be emailed to the PWB PM.

6.4.5 Monthly Utilization Reports (MUR). For Contracts valued $50,000 or more, the Consultant shall submit subconsultant payment and utilization information electronically, reporting ALL subconsultants employed in the performance of this agreement. More information on this process may be viewed on the City Procurement website at: https://www.portlandoregon.gov/brfs/75932.
Contact the City's Procurement Office's PTE Contract Compliance Specialist for submission guidelines.

6.4.6 The MUR shall be emailed to the PWB PM and the City Procurement Compliance Manager, Paula.Wendorf@portlandoregon.gov.

6.4.7 The Consultant is required to follow Generally Accepted Accounting Principles (GAAP). Personal expenditures or expenditures not related to the Project or part of the Contract are not eligible for reimbursement. On or before the 15th of each month, the Consultant shall submit to the PWB Accounts Payable Department an invoice for work performed by the Consultant during the preceding month.

6.4.8 The Consultant shall enter all pertinent information below on their invoice in order for the City to review and authorize processing of invoices for payment. Invoices shall be emailed to: wbaps@portlandoregon.gov.

6.4.9 Contract Number and Portland Water Bureau's Project Title.

6.4.10 Invoice date.

6.4.11 Date range during which the services are being invoiced for work provided.

6.4.12 Invoice number that ends in a "##", which represents the correct invoice sequence of issue. The last invoice submitted on the Project must be clearly labeled "Final Invoice."

6.4.13 PWB PM's name.

6.4.14 Original Contract total, not to exceed amount broken out by: Task and Subtask (as applicable).

6.4.15 Reflect additional funds associated with a Contract amendment(s) and show the revised/current Contract amount.

6.4.16 Paid-to-date amount showing the amount submitted prior to the current invoice (regardless of payment status).

6.4.17 Amount being invoiced for the current invoice.

6.4.18 Balance remaining on the Contract after receipt of payment for the current invoice.

6.4.19 Consultant shall describe all services performed with particularity and by whom it was performed (Consultant's individuals or subconsultant, labor category, direct labor rate, hours worked during the period) and shall itemize and explain all expenses for which reimbursement is claimed. If reimbursable expenses are authorized, identify by line item categories: 1) Travel Expenses, and 2) General Reimbursable Expenses. Note: Invoices for Basic Services under a specific Task shall be for completed Basic Services only and shall indicate the percentage of the total Basic Services for that Task that the amount invoiced represents.

6.4.20 The Consultant shall attach photocopies of claimed reimbursable expenses, as applicable and preapproved authorization document from the PWB PM.

6.4.21 The Consultant shall stamp and approve all subconsultant invoices and note on subconsultant invoice what they are approving as "billable" under the Contract.

6.4.22 The billing from the Consultant must clearly roll up labor and reimbursable costs for the prime and subconsultants – matching the subconsultant invoices.

6.5 ***Prior to initial billing, the Consultant shall develop a billing format for approval by the City. Submission of the draft billing document shall be emailed to the PWB PM and the PWB CAB for final review and approval.***

Email addresses:
Kevin.Larson@portlandoregon.gov
Annette.Dabashinsky@portlandoregon.gov
Andrew.Urdahl@portlandoregon.gov

7. ACH Payments

It is the City's policy to pay its Consultant invoices via electronic funds transfers through the automated clearing house (ACH) network. To initiate payment of invoices, Consultants shall execute the City's standard ACH Vendor Payment Authorization Agreement and provide required documentation. Upon verification of the data provided, the Payment Authorization Agreement will authorize the City to deposit payments directly into Consultant's accounts with financial institutions. All payments shall be in United States currency.

8. Authorization to Proceed

Irrespective of the effective date of the Contract, the Consultant shall not proceed with any work required under this Contract without a written authorization to proceed from the City. Any work performed or expenses incurred by the Consultant prior to the Consultant's receipt of authorization to proceed shall be entirely at the Consultant's risk.

EXHIBIT C: Consultant's Hourly Rates and Negotiated Budget

Portland Water Bureau - Bull Run Dam 1
Spillway Gate Replacement
Rev 1 - 7/8/2022

Line item	Staff Role / Rates	Reference	Mara McMillion Principle $ 280	ITR Reviewers ITR Reviewers $ 245	James Boag Sr. Project Manager $ 260	Matt Hess Mechanical Lead $ 220	Jay Dallas Mechanical Engineer $ 190	Taylor Bowen Sr. Structural $ 195	Gavin Smith Sr. Structural $ 200	Chris Curtis Sr. Electrical $ 235	Staff Civil Sr. Hydraulic Engineer $ 205	Jason Chase CADD Designer $ 140	Eli Rhodes Jr CADD $ 95	Sarah Harris Tech Editor $ 130	Admin Accounting Admin $ 100	Robb Swenson KMC - SME $ 325	Drew Clark KMC - Sr. Estimator $ 239	Darlene Siegel Wolf Water Resources $ 185	Natalie Perrin Historical Research Associates $ 160	S&F Land Survey Land Survey $ 120	State Seismic Hazard Analysis $ 200	Klohn Crippen Berger Dam Stability $ 225	Hours	Total Labor	Airfare	Hotel / Car	Meals	Matl's	Total Expenses	TOTAL	FY (July 1 - June 30) 22/23	23/24	24/25
	Task 1.0 - Project Administration and Meetings		4	-	247	16	48	-	40	16	40	4	30	-	-	84	17	31	16	8	4	16	-	621	$ 129,841	$ 1,000	$ 500	$ 500		$ 2,000	$ 131,841	$ 788,402	$ 331,710	$ 208,714
	%FTE																																
1	Project Set-up	MCM			12										8	2	4							26	$ 5,524					$ -	$ 5,524	$ 5,524		
2	Monthly Summary Reports (33 Mo)	PI, SB, 4. (Pg. 9)			24																			24	$ 6,240					$ -	$ 6,240	$ 1,702	$ 2,269	$ 2,269
3	Subconsultant Contracts	PI, SB, 4. (Pg. 9)			30										10	4								44	$ 10,099					$ -	$ 10,099	$ 10,099		
4	Develop Project Management Plan (PMP)	PI, SB, 4. (Pg. 9)			6		4									1	1							12	$ 2,883					$ -	$ 2,883	$ 2,883		
5	Develop Project Communication Plan (PCP)	PI, SB, 4. (Pg. 9)			6		4									1	1							12	$ 2,883					$ -	$ 2,883	$ 2,883		
6	Develop QA/QC Plan	PI, SB, 4. (Pg. 9)			4											1	1							6	$ 1,603					$ -	$ 1,603	$ 1,603		
7	Meetings, agendas, minutes (Bi weekly - 66 meetings)	PI, SB, 4. (Pg. 9)	4		100	16	40		40	16	40	4	30			8	24	16	8	4	16			366	$ 77,108	1000	500	500		$ 2,000	$ 79,108	$ 21,575	$ 28,766	$ 28,766
8	Develop Project Schedule (Update @ BDR, 30% , 60% , 90% , 100%)	PI, SB, 4. (Pg. 9)			8																			8	$ 2,080					$ -	$ 2,080	$ 1,664	$ 208	$ 208
9	Monthly subconsultant payment and utilization reports (33 Mo)	PI, SB, 4. (Pg. 9)			24										33									57	$ 9,540					$ -	$ 9,540	$ 2,602	$ 3,469	$ 3,469
10	Develop monthly billing progress reports (33 Mo)	MCM			33										33									66	$ 11,880					$ -	$ 11,880	$ 3,240	$ 4,320	$ 4,320
																								-	$ -					$ -	$ -			
	Task 2.0 - Conceptual Design Phase		5	44	113	44	178	26	158	38	110	24	140	-	12	8	22	92	-	-	240	-	-	1,254	$ 231,508	$ -	$ -	$ -	$ 500	$ 500	$ 232,008			
	% FTE		1%	7%	18%	7%	28%	4%	25%	6%	17%	4%	22%	0%	2%	1%	3%	14%	0%	0%	38%	0%	0%										
11	Review existing information (studies / reports / record info)	PI, SB, 1. (Pg. 4)		2	8	8	8	8	8	8	8		8											66	$ 13,178					$ -	$ 13,178	$ 13,178		
12	~~Design criteria memo (Assume 30 Pg)~~																							-	$ -					$ -	$ -	$ -		
13	~~Seismic Hazard Analysis~~																							-	$ -					$ -	$ -	$ -		
14	~~Seismic Finite Element Analysis~~																							-	$ -					$ -	$ -	$ -		
15	Alternative Analysis Matrix	PI, SB, 1. (Pg. 4)			16	8	24		24	8	16	4	32				4	16						152	$ 29,915					$ -	$ 29,915	$ 29,915		
16	Alternative Analysis Workshop with PWB Stakeholders (In Person)	PI, SB, 1. (Pg. 4)			6		6		6		4													22	$ 4,484					$ -	$ 4,484	$ 4,484		
17	Technical Memorandums (TM) (Assume 5 TM @ 5 pages)	PI, SB, 1. (Pg. 4)	2	10	15		8	8	8								2	8						61	$ 14,149					$ -	$ 14,149	$ 14,149		
18	30% Calculations / Design Notebooks	PI, SB, 1. B. (Pg. 7)		3	2	8	24		20	8	20													85	$ 16,375					$ -	$ 16,375	$ 16,375		
19	BOD Concept Design Plates (5G / 5D 3C/ 20S / 22M / 15E = 70 sheets)	PI, SB, 1. B. (Pg. 7)	1	12	20	8	80		60	8	40	16	100								240			585	$ 91,180					$ -	$ 91,180	$ 91,180		
20	30% Specs (tech sections, no Div0, some Div1)	PI, SB, 1. B. (Pg. 7)	1	1	4	4			4	4														18	$ 4,185					$ -	$ 4,185	$ 4,185		
21	Class 5 Cost Estimate	PI, SB, 1. B. (Pg. 7)		6	4												8	60						78	$ 19,433					$ -	$ 19,433	$ 19,433		
22	Develop proposed helicopter flight path	PI, SB, 1. B. (Pg. 7)			2												8	8						18	$ 5,028					$ -	$ 5,028	$ 5,028		
23	Create Basis of Design Report (BDR) (80 pg)	PI, SB, 1. (Pg. 4)	1	10	20	4	24	8	24		20	4			12									127	$ 25,030				500	$ 500	$ 25,030	$ 25,030		
24	Package/Submit Draft BOD (5x 8.5x11 w/ 11x17 plates + Electronic)	PI, SB, 4. B. (Pg. 10)			10										8									18	$ 3,400					$ -	$ 3,400	$ 3,400		
25	Basis of Design Presentation Meeting				6	4	4	2	4	2	2													24	$ 5,152					$ -	$ 5,152	$ 5,152		
																								-	$ -					$ -	$ -			
	Task 3.0 - Seismic Analysis		-	16	28	-	-	224	-	-	-	-	16	-	-	-	-	-	-	-	-	280	895	1,459	$ 314,495	$ -	$ -	$ -	$ 19,000	$ 19,000	$ 333,495			
	% FTE		0%	1%	1%	0%	0%	12%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	15%	47%										
26	Seismic Hazard Analysis				4																	160		164	$ 33,040					$ -	$ 33,040	$ 33,040		
27	Phase I - Seismic Finite Element Analysis for Gate Design			8				200					16									40	555	819	$ 176,075				4000	$ 4,000	$ 180,075	$ 135,056	$ 45,019	
28	Phase II - Linear Global Dam Stability	M001, M002		8	24			24														80	340	476	$ 105,380				15000	$ 15,000	$ 120,380	$ -	$ 120,380	
																								-	$ -					$ -	$ -	$ -		
	Task 4.0 - 60% Plans and Specs		2	33	72	40	156	4	136	46	106	38	100	-	-	8	24	72	-	-	-	12	-	849	$ 170,044	$ -	$ -	$ -	$ 1,000	$ 1,000	$ 171,044			
	% FTE		1%	10%	23%	13%	49%	1%	43%	14%	33%	12%	31%	0%	0%	3%	8%	23%	0%	0%	0%	4%	0%										
29	60% Calculations / Design Notebooks			3	2	8	40		20	8	20	10												111	$ 21,465					$ -	$ 21,465	$ 21,465		
30	60% Plans (5G / 5D 3C/ 20S / 22M / 15E = 70 sheets)	PI, SB, 1. B. (Pg. 7)		12	20	16	80		80	16	60	16	100											400	$ 72,660					$ -	$ 72,660	$ 72,660		
31	60% Specs	PI, SB, 1. B. (Pg. 7)		8	8	4	16		16	4	16	8												80	$ 16,076					$ -	$ 16,076	$ 16,076		
32	Class 4 Cost Estimate	PI, SB, 1. B. (Pg. 7)	1	6	4												8	40						59	$ 14,938					$ -	$ 14,938	$ 14,938		
33	Schedule of Values	PI, SB, 1. B. (Pg. 7)	1	4													8	16						29	$ 7,678					$ -	$ 7,678	$ 7,678		
34	Package/Submit Deliverable (hard copies: 5x 11"x17" Plans, 8.5x11 Specs)	PI, SB, 4. B. (Pg. 10)			16	4	4		4	2	2				8									40	$ 8,162				1000	$ 1,000	$ 9,162	$ 9,162		
35	Perform 60% design stakeholder & FERC review meeting	PI, SB, 1. B. (Pg. 7)			8	8	8		8	8	8													48	$ 10,008					$ -	$ 10,008	$ 10,008		
36	Pre-Construction PFMA	PI, SB, 1. B. (Pg. 7)			12		8	4	8	8		4										12		56	$ 12,120					$ -	$ 12,120	$ 12,120		
37	Constructability Technical Memorandum	Pg 7			2												8	16						26	$ 6,938					$ -	$ 6,938	$ 6,938		
																								-	$ -					$ -	$ -			
	Task 5.0 - 90% Plans and Specs		2	35	55	36	96	2	120	34	90	22	100	-	-	8	10	54	-	-	-	-	-	664	$ 130,565	$ -	$ -	$ -	$ 1,000	$ 1,000	$ 131,565			
	% FTE		0%	7%	11%	8%	20%	0%	25%	7%	19%	5%	21%	0%	0%	2%	2%	11%	0%	0%	0%	0%	0%										
38	90% Calculations / Design Notebooks			10	12	8	16		40	8	20	10												124	$ 25,220					$ -	$ 25,220	$ 25,220		
39	90% Plans (5G / 5D / 20S / 22M / 15E = 67 sheets)	PI, SB, 1. B. (Pg. 7)	1	12	20	16	60		60	16	60	4	100											349	$ 62,680					$ -	$ 62,680	$ 62,680		
40	90% Specs	PI, SB, 1. B. (Pg. 7)	1	8	6	8	16	2	16	8	8	8												81	$ 16,878					$ -	$ 16,878	$ 16,878		
41	Class 3 Cost Estimate	PI, SB, 1. B. (Pg. 7)		1	1												4	40						46	$ 11,354					$ -	$ 11,354	$ 11,354		
42	Schedule of Values	PI, SB, 1. B. (Pg. 7)		4													2	6						12	$ 3,062					$ -	$ 3,062	$ 3,062		
43	Package/Submit Deliverable (hard copies: 5x 11"x17" Plans, 8.5x11 Specs)	PI, SB, 4. B. (Pg. 10)			8	4	4		4	2	2				8								1000	32	$ 6,082					$ 1,000	$ 7,082	$ 7,082		
44	CM/GC Guaranteed Max Price Review	PI, SB, 1. B. (Pg. 7)			8												4	8						20	$ 5,289					$ -	$ 5,289	$ 5,289		
																								-	$ -					$ -	$ -			
	Task 6.0 - Final (100%) Plans and Specs		2	10	62	22	40	-	50	22	34	18	36	-	-	8	12	52	-	-	-	-	-	368	$ 77,545	$ -	$ -	$ -	$ 1,000	$ 1,000	$ 78,545			
	% FTE		1%	3%	19%	7%	13%	0%	16%	7%	11%	6%	11%	0%	0%	3%	4%	16%	0%	0%	0%	0%	0%										
45	100% Calculations / Design Notebooks			4	6		8		8	8	8	10												52	$ 10,758					$ -	$ 10,758		$ 10,758	
46	100% Plans - Unsigned (5G / 5D 3C/ 20S / 22M / 15E = 70 sheets)	PI, SB, 1. B. (Pg. 7)		4	20	16	16		16	8	16	4	32											132	$ 25,456					$ -	$ 25,456		$ 25,456	
47	100% Specs - Unsigned (XX Sections)	PI, SB, 1. B. (Pg. 7)			8	4	8		8	4	8	4												44	$ 9,008					$ -	$ 9,008		$ 9,008	
48	Class 2 Cost Estimate		1	1													8	32						42	$ 10,763					$ -	$ 10,763		$ 10,763	
49	Schedule of Values??		1	1													4	8						14	$ 3,734					$ -	$ 3,734		$ 3,734	
50	Package/Submit Deliverable (CoP) (hard copies: 5x 11"x17" Plans, 8.5x11 Specs)	PI, SB, 4. B. (Pg. 10)			8	2	2		2	2	2		4		8								1000	30	$ 5,422					$ 1,000	$ 6,422		$ 6,422	
51	Package and Submit Deliverable (FERC submittal) -QCIP, Dam Safety, EAP				20		6		16									12						54	$ 12,405					$ -	$ 12,405		$ 12,405	
																								-	$ -					$ -	$ -			
	Task 7.0 - Environmental and Permitting		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	244	100	-	-	-	344	$ 61,140	$ -	$ -	$ -	$ -	$ -	$ 61,140			
	% FTE		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	5%	0%	0%	0%										
52	Local and State Permitting (OR, Mult Co, COP)																		100					100	$ 18,500					$ -	$ 18,500	$ 9,250	$ 9,250	
53	SHPO Permitting																			100				100	$ 16,000					$ -	$ 16,000	$ 8,000	$ 8,000	
54	Fed Permitting (USACE, NMFS, USFS)																		144					144	$ 26,640					$ -	$ 26,640	$ 13,320	$ 13,320	
																								-	$ -					$ -	$ -			
	Task 8.0 - CM/GC Bid Support Services		-	-	66	15	26	-	34	2	28	-	-	-	-	-	14	44	-	-	-	-	-	229	$ 51,809	$ -	$ -	$ -	$ -	$ -	$ 51,809			
	% FTE		0%	0%	6%	1%	2%	0%	3%	0%	3%	0%	0%	0%	0%	0%	1%	4%	0%	0%	0%	0%	0%										
55	Negotiation Meetings (Agendas / Minutes)				4		4											4						12	$ 2,755					$ -	$ 2,755	$ 276	$ 1,929	$ 551
56	Site Visits (Assume 3)				24	3	18		18		12													75	$ 15,672					$ -	$ 15,672	$ 1,567	$ 10,970	$ 3,134
57	Design Inquiries, Issue addenda to bid documents				8		4		4		4													20	$ 4,224					$ -	$ 4,224		$ 4,224	
58	Coordination for CM/GC selection process				8																			8	$ 2,080					$ -	$ 2,080		$ 1,040	$ 1,040
59	Evaluate CM/GC proposals				18	8			8	1	8						6	24						73	$ 17,121					$ -	$ 17,121			$ 17,121
60	Memo for how well CM/GC proposal match RFP				2	4			4	1	4						4	8						27	$ 6,228					$ -	$ 6,228			$ 6,228
61	Memo evaluating CM/GC GMP				2												4	8						14	$ 3,729					$ -	$ 3,729			$ 3,729
																								-	$ -					$ -	$ -			
	Task 9.0 - Construction Support Services		-	-	146	24	120	-	140	8	122	12	-	-	-	-	14	32	-	-	-	-	-	618	$ 128,378	$ 3,500	$ 4,500	$ 1,500	$ -	$ 9,500	$ 137,878			
	% FTE		0%	0%	11%	2%	9%	0%	11%	1%	10%	1%	0%	0%	0%	0%	1%	3%	0%	0%	0%	0%	0%										
62	Pre-con meeting and develop written responses to questions	Pg 8			8		8		8		8						2	8						42	$ 8,927					$ -	$ 8,927			$ 8,927
63	Tech assistance - clarifying design intent to PWB				16		4		4		2													26	$ 6,012					$ -	$ 6,012			$ 6,012
64	Shop Inspections & Site Visits with Written Reports (local day trip x 12)				8		16		16		12													52	$ 10,072	2000	3000	1000		$ 6,000	$ 16,072			$ 16,072
65	Prepare field orders and change orders (assume 3)				18	8			8		8							8						50	$ 11,118					$ -	$ 11,118			$ 11,118
66	Shop drawing and Submittal review				24	16	60		80	8	60	12												260	$ 50,260					$ -	$ 50,260			$ 50,260
67	Review O&M, schedules, warranties, bonds, Etc.				8													4						12	$ 3,035					$ -	$ 3,035			$ 3,035
68	General coordination (Resolving issues)				24												8	8						40	$ 10,748					$ -	$ 10,748			$ 10,748
69	Assist with claims				16		8										4	4						32	$ 7,934					$ -	$ 7,934			$ 7,934
70	Commissioning and testing (1 day per gate)				24		24		24		32													104	$ 20,272	1500	1500	500		$ 3,500	$ 23,772			$ 23,772
																								-	$ -					$ -	$ -			$ -
	Total Hours		15	138	789	197	664	256	678	166	530	118	422	-	12	116	113	377	260	108	244	308	895	6,406										$ -
	% FTE for Full Project		0%	3%	15%	4%	13%	5%	13%	3%	10%	2%	8%	0%	0%	2%	2.8%	6.9%	3.7%	1.3%	2.3%	5.8%	17%										
	Total Budget		$ 4,200	$ 33,810	$ 205,140	$ 43,340	$ 126,160	$ 49,920	$ 135,600	$ 39,010	$ 77,380	$ 24,190	$ 59,080	$ -	$ 1,560	$ 11,600	$ 36,691	$ 90,009	$ 48,100	$ 17,280	$ 29,280	$ 61,600	201,375		$ 1,295,324.85					$ 34,000	$ 1,329,325			

RED REPRESENTS CHANGES FROM ORIGINAL RFP PROPOSAL

Klohn Crippen Berger

McMillen Jacobs Associates

Bull Run Dam 1

Proposal for Stability Analysis

CANADA'S BEST MANAGED COMPANIES Platinum member

ISO 9001
ISO 14001
OHSAS 18001

McMillen Jacobs Associates

Bull Run Dam 1

Proposal for Stability Analysis

Klohn Crippen Berger

July 7, 2022

McMillen Jacobs Associates
1471 Shoreline Drive, Suite 100
Boise ID 83702

Taylor Bowen
Structural Engineer

Dear Mr. Bowen:

Re: Proposal for Stability Analysis of Bull Run Dam 1.

Klohn Crippen Berger Ltd. (KCB) is pleased to submit this proposal in response to the request from McMillen Jacobs Associates for engineering services for Bull Run Dam 1 Stability Analysis. Terms and Conditions are per the Subconsulting Services Agreement between McMillen Jacobs Associates and Klohn Crippen Berger Ltd. dated March 1, 2021.

KCB proposes an experienced team of engineers for Bull Run Dam 1 Stability Analysis. We confirm that the lead Qualified Professional Engineer was not involved in the detailed design and construction of Bull Run Dam 1 Stability Analysis. Furthermore, he has not been involved in monitoring of instrumentation at this dam.

Selecting KCB will provide McMillen Jacobs Associates with a fresh perspective on their facility. We also believe that our involvement will provide McMillen Jacobs Associates with the benefit of evaluating KCB to become a dependable, long-term engineering services provider of multidiscipline engineering services.

This proposal is submitted in confidence and its contents may not be divulged to third parties without the express written permission of Klohn Crippen Berger Ltd.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Ryan Douglas, P. Eng., P.E.
President

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1 BACKGROUND

This proposal is submitted for Stability Analysis of the Bull Run Dam 1 to McMillen Jacobs Associates.

Bull Run Dam 1 is a concrete arch-gravity dam approximately 200 feet (61m) high, located about 26 miles east of Portland, OR. Construction of Bull Run Dam 1 was completed in 1929. The dam has a spillway in the middle with three spillway gates on top. The gates are 40-ft wide by 8-ft high steel vertical lift roller gates that span horizontally between reinforced concrete piers. The gates are fitted with 18-inch-high splash boards.

Figure 1.1 Downstream View of Bull Run Dam 1

2 OBJECTIVE

The purpose of the project is to evaluate the structural strength and stability of the dam in response to unusual and extreme events such as flood and earthquake, develop floor response spectrum at the points of interest, and check the structural demand at the spillway piers.

High-level structural mitigations will be recommended if required to remediate the dam to meet code requirements.

3 PHASE I – SPILLWAY GATE REPLACEMENT SUPPORT

3.1 Project Management for Phase I

KCB will complete the stability analysis in three phases and has assigned a timeline of about four months to each phase. The project management tasks and hours are proposed based on this assumption.

3.1.1 Project Kick-off meeting

A project kick-off meeting with all key personnel will be arranged at the beginning of this task after receiving the background data and drawings from McMillen Jacobs Associates (McMillen). The agenda for this meeting will include reviewing the list of the received information and requesting the remaining data and drawings that KCB deems necessary for this project. Also, the functional requirements and the anticipated failure modes to be investigated in this study will be previewed and the site visit plan will be discussed.

The identified requirements and anticipated modes of failure will be reviewed in the site visit and described in the Design Basis Memorandum.

3.1.2 Status Update

The project management will include tracking costs and progress on a weekly basis, work performed, estimate of expenditures versus budget, and schedule to be shared with McMillen and Portland Water Bureau (PWB).

3.1.3 Phase I presentation to FERC

One web-meeting with Federal Energy Regulatory Commission representatives is considered throughout Phase I of the project to present and discuss the findings of Phase I of Stability Analysis.

3.2 Data Review and Project Familiarization

3.2.1 Background Data and Drawing Review

The analysis will require detailed as-built drawings (record drawings) of the dam and the spillway, the radial gates, rock abutments and foundation. The location and details of the vertical shear keys between dam blocks and at the base of the dam will be determined from the drawings. KCB will also review the OMS manual for the dam.

The latest reports on concrete/foundation coring will be reviewed and concrete material properties, geotechnical properties and the properties of the construction and contraction joints in the dam and the properties of the dam-to-foundation interface will be determined. The parameters for the material will be established through a background review of existing documents, including inspections and assessments. No site investigations have been budgeted, but may be recommended if some parameters are not well defined and may be crucial to the results of the structural

assessment. KCB assumes that all this background information will be readily provided, and no site investigation will be required.

We assume the Technical Memorandum related to the geotechnical analysis will be provided to us. The information we extract will be used as the basis for selecting design parameters for the model, including major discontinuities of the rock mass. The relevant information extracted will be included in the Design Basis Memorandum.

The normal maximum reservoir elevation, the probable maximum flood (PMF) (), and the low reservoir elevation will be obtained from the background data.

Current dam classification as determined by the regulatory authority and the latest site-specific seismic hazard analysis and time-histories report (Cornfoth Consultants, 2020) will be reviewed and the MDE (Maximum Design Earthquake) design spectrum from this report will be used for the Phase I seismic analysis. Appropriate sets of seismic records – two horizontal components and one vertical component per each set of records – will be provided by McMillen to KCB.

The air temperature and wind speed (to determine thermal convection coefficient) from the nearby weather stations will also be obtained and the reservoir temperature levels will be estimated (based on empirical data or experience) for thermal stress evaluation in Phase II.

Previous analyses of the dam will be reviewed and used in establishing a baseline comparison to validate the current study.

3.2.2 Site Visit

The KCB team will visit Bull Run Dam 1 to gain better understanding of the current conditions and parameters of structural, geotechnical and foundation properties, review the functional requirements, and identify the potential failure modes.

The project manager plus one additional structural engineer and one geotechnical engineer will attend the one-day site visit.

3.2.3 Site Visit Report

Site visit notes, general observations and pictures will be compiled into a site visit report.

3.3 Develop a Structural Analysis Plan and DBM

3.3.1 Functional Requirements and Failure Modes

Functional requirements and failure modes to be studied in this project will be confirmed by KCB and the McMillen project team.

3.3.2 Draft and Final Design Basis Memorandum

The Design Basis Memorandum (DBM) will be written in a prescriptive format and will be used as a guideline for the work.

The DBM will include all the material properties and important data for the project, as well as a detailed description of the analysis methodology, load cases and assumptions.

The DBM will include the following sections:

1. Introduction.
2. Objective and Scope.
3. Functional Requirements and Potential Failure Modes.
4. Material Properties.
5. Seismic Design Parameters and Time Histories.
6. Load Cases/Combinations.
7. Concepts and Methodologies for Seismic Structural Assessment (for each of the three phases).
8. Performance Requirements and Evaluation Criteria.
9. Deliverables.
10. References.

The DBM will remain a live document after completion and will be updated throughout the three phases of the project. Hence, the DBM will be submitted for review and acceptance at the start of each phase and will be used as the basis for the assessment. Major changes in the middle of a phase may result in rework and have not been accounted for in the scope.

3.3.3 Technical Meeting to discuss DBM

We anticipate that before submittal of the draft DBM, there will be one review meeting with McMillen to discuss the technical content. The lead structural engineer will represent KCB at this meeting.

3.4 Development and Verification of the 3D Finite Element Model (FEM)

3.4.1 Preliminary 2D FEM

A 2D finite element model of the tallest block of the dam on foundation will be developed to be used in the upcoming validation and sensitivity studies in different phases of the project.

3.4.2 3D Geometric Model

The geometric model will be prepared by a CAD technician or engineer using software such as SolidWorks, Civil 3D (or similar 3D CAD software). The model will include dam blocks, rock abutments, and foundations and will be exported in STEP or IGS (or similar) format.

3.4.3 3D Mesh and Interface Contacts

The STEP output file will be input into a mesh generator program such as HyperMesh (or similar) software. An initial keyword input file for LS-Dyna solver is exported that will be edited to include contact definitions at the concrete-rock interface (CRI) and vertical joints. Linear material properties will be assigned to concrete and rock. All the contacts remain tied in this phase for the system to remain linear. The contacts will be updated to frictional contacts in the nonlinear phase of the project.

Lumped mass will be added to the model to represent appurtenant structures such as gates, the hoist house, bridge, and other small structures on the dam and spillway not included in the geometric model.

3.4.4 Hydrostatic Load, Uplift, Hydrodynamic Mass; Silt Load and its Equivalent Mass

Hydrostatic load will be applied as pressure load to the upstream face of the dam and uplift will be applied at the CRI.

The node coordinates on the upstream face of the dam and the vectors normal to the faces will be input to an Excel spreadsheet (or similar) to define the generalized Westergaard nodal masses. These masses will be applied to the model using a keyword input file.

Static silt load (if required) will be estimated at the upstream face and equivalent mass will be implemented to account for the dynamic response of the silt for seismic analysis.

3.5 Static Analysis for Normal, Flood, and Low Reservoir Levels

3.5.1 Construction Stage Analysis

A construction analysis will be performed to determine the stress distribution and deformations in the gravity load case. Analysis of the gravity load case without considering the construction sequence will result in arching action for gravity loads and wrong load path to foundation in this case. Therefore, this case is analyzed with an assumed construction sequence.

3.5.2 Static Analysis: Normal, Flood, and Low Reservoir Level

A static analysis will be performed with the following load combinations:

1. Gravity from construction analysis.
2. Hydrostatic pressure caused by normal, flood, and low reservoir elevation.
3. The corresponding uplift.

3.5.3 Global Stability Factors of Safety

Global stability factors of safety will be assessed using the method described in the Engineering Guidelines for the Evaluation of Hydropower Projects (Federal Energy Regulatory Commission) Chapter 3.

3.6 Response Spectrum Analysis

3.6.1 Modal Analysis

Initially a modal analysis will be performed to assess the dynamic properties of the system and report the first few primary periods and mode shapes of the system. These values are used in further evaluating the accuracy of the model by comparing them with the values from the literature, experience, and hand calculations.

3.6.2 Response Spectrum Analysis

Response spectrum analysis (RSA) will be performed on the dam model developed in the previous tasks, using the spectral accelerations from the seismic hazard report (Cornforth Consultants, 2020)

3.6.3 Validation and Sensitivity Studies

Static analysis, Modal analysis, and RSA will be performed on the simplified 2D model to gain confidence with 3D results. Sensitivity of the analysis results to foundation elastic modulus will be checked using the 2D model.

3.7 Spillway Structural Demands

3.7.1 Seismic Demand at the Gate Locations

Maximum accelerations at the crest-level and top-of-pier level will be obtained for the preliminary assessment of the new gates.

3.7.2 Pier Section Forces for Strength/Stability Checks

Maximum section forces (moment, axial force and shear) will be obtained for each of the two piers at a section at the base of that pier for structural strength and stability checks of the piers.

Maximum deflection of the piers will be obtained and compared with the gaps between the rollers and the embedded guides of the gate system. This comparison is made to avoid damage to the gates during earthquake resulted from excessive pier deflections.

3.8 Phase I Report

3.8.1 Draft and Final Report

KCB will prepare a report that summarizes background and objective of work, the data, and drawings we obtained, material properties, seismic hazard and our modeling assumptions and methodology. Diagrams of the simulation results (stress and deformation) will be provided. Conclusions will be made based on these results and the possible structural or stability deficiencies will be explained. Finally, recommended mitigations to possible deficiencies (such as anchoring) will be explained.

The report will include the following sections:

1. Introduction.
2. Purpose of study.
3. Analysis methodology and modeling techniques utilized.
4. Analysis parameters and material properties.
5. Analysis results and findings.
6. Conclusions.
7. Recommendations.

The report will be finalized after incorporating the comments from McMillen on the draft report.

3.8.2 Submittal Review Meeting

We have budgeted that before submittal of the draft report, there will be one review meeting with McMillen to discuss the technical content. The lead structural engineer on the project will represent KCB at this meeting.

4 PHASE II – DAM STABILITY EVALUATION – LINEAR TIME-HISTORY ANALYSIS

4.1 Project Management for Phase II

4.1.1 Status Update

The project management will include tracking costs and progress on a weekly basis, work performed, estimate of expenditures versus budget, and schedule to be shared with McMillen and Portland Water Bureau (PWB).

4.1.2 Phase II Presentation to FERC

One web-meeting with FERC representatives is considered throughout Phase II of the project to present and discuss the findings of Phase II of Stability Analysis.

4.2 Thermal Structural Analysis

Thermal stress evaluation will be performed on the dam so that the effects of thermal stress can be added to the load cases studied in this project.

4.2.1 Thermal Analysis (Temperature Distribution)

The dam temperature and its corresponding thermal stress will be estimated in the following conditions:

1. Summer (flood season).
2. Winter (coldest month).

The distribution of temperature in the reservoir will be determined based on the measured data from the dam reservoir or similar locations. The ambient temperature will be determined from the nearby weather stations.

4.2.2 Static Analysis with Thermal Loads

A static analysis will be performed with the following load combination:

1. Gravity loads from construction analysis.
2. Hydrostatic pressure and uplift from normal maximum reservoir elevation.
3. Thermal loads obtained in the previous task.

4.3 Seismic Linear Time History Analysis (LTHA)

4.3.1 Calibration of the Model using Dam Monitoring Data

Dam monitoring data obtained from McMillen will be used in calibrating the model using static analysis results. Modifications will be made to the foundation elastic modulus so that the FEA model replicates the deflections observed in the dam monitoring data.

4.3.2 Seismic Input, Radiation Damping

Seismic excitation will be applied as tractions to the base of the foundation. These tractions will be calculated as the product of free-field velocities corresponding to each record, deconvolution scale factor (see below) and the Lysmer dampers calculated in three directions for the foundation material. Application of the seismic excitation as traction prohibits seismic wave reflection from the model boundaries in a model with mass-ed foundation.

Radiation damping is accounted for by using the non-reflecting boundary condition that is available in LS-Dyna software.

4.3.3 Deconvolution Study

To account for the loss of energy due to foundation damping a deconvolution study will be performed using a shoebox model of the foundation. A shoebox model of the foundation has the same overall dimensions of the actual foundation; however, it has a shoebox shape and excludes the topographic features of the real foundation.

For each record, the free-field motion will be implemented at the base of the foundation and the response at the top will be recorded. The ratio of spectral acceleration of the recorded motion to the free-field motion, at the primary period of the structure will be used as amplification factor to be applied to the seismic record.

4.3.4 Linear Time History Analysis

Twelve linear time-history analyses will be performed on the FEA model. This is to account for three records, two water elevations (high and low) and two thermal conditions (summer and winter). All

the loads from the normal static analysis will be used in the time history analyses in addition to the seismic excitations applied in the manner explained above.

The maximum deflection at the crest of the dam will be calculated and the record/load condition that causes the largest deflections will be selected.

The post-processing will be performed on the selected record analysis results and will include:

1. Envelope of normal stress.
2. Envelope of maximum tensile stress.
3. Envelope of maximum compressive stress.
4. Envelope of downstream deflection of the dam.
5. Maximum base reaction (pressure distribution).
6. Maximum arch and cantilever stresses in the dam.

Cloud computing will be used for speed of analysis depending on number of elements, nodes, and degrees of freedom in the model.

4.3.5 Post-Earthquake Stability Factors of Safety

The same load combination that was used for static analysis with normal reservoir elevation will be implemented. However, cracking under the dam blocks will be estimated using the time history analysis results and the uplift pressure will be set to full pressure throughout the crack length.

4.3.6 Validation and Sensitivity Studies

Linear time history analysis will be performed on the simplified 2D model using one selective record and load condition to gain confidence with 3D results. Sensitivity of the analysis results to foundation elastic modulus will be checked using the 2D model.

4.4 Spillway Structural Demands

4.4.1 Seismic Demand at the Gate Locations – Floor Response Spectrum

The acceleration response will be logged for all three records in three directions at the points of interest (POIs). The points of interest are seven points which are at crest level (at the ogee below the gates) and top of piers.

The software Prism (or similar) will be used in preparing the corresponding response spectra with 5% damping for each direction. The envelope of the three response spectra for each direction will be the floor response spectrum for that direction.

Additional POIs could be considered for design checks of other appurtenant structures; however, additional POIs are not considered in this proposal. Besides, 2% and 1% damping curves can be developed if requested by the client but have not been accounted for in the proposal.

4.4.2 Pier Section Forces for Strength/Stability Checks

Maximum section forces (Moment, Axial Force and Shear) will be obtained for each of the two piers at a section at the base of that pier. Maximum forces will be obtained for each seismic record and the maximum between the values obtained from the three records will be recommended for structural strength and stability checks of the piers.

Maximum deflection of the piers will be obtained as maximum of the deflection from the three analysis and will be compared with the gaps within the rollers and the embedded guides of the gate system. This comparison is made to avoid damage to the gates during earthquake resulted from excessive pier deflections.

4.5 Phase II Report

4.5.1 Draft and Final Report

KCB will prepare a report that summarizes background and objective of work, the data, and drawings we obtained, material properties, seismic hazard and our modeling assumptions and methodology. Diagrams of the simulation results (stress and deformation) will be provided. Conclusions will be made based on these results and the possible structural or stability deficiencies will be explained. Finally recommended mitigations to possible deficiencies (such as anchoring) will be explained.

The report will include the following sections:

1. Introduction.
2. Purpose of study.
3. Analysis methodology and modeling techniques utilized.
4. Analysis parameters and material properties.
5. Analysis results and finding.
6. Conclusions.
7. Recommendations.

The report will be finalized after incorporating the comments from McMillen on the draft report.

4.5.2 Submittal Review Meeting

We anticipate that before submittal of the draft report, there will be one review meeting with McMillen to discuss the technical content. The lead structural engineer on the project will represent KCB at this meeting.

5 PHASE III – DAM STABILITY EVALUATION – NONLINEAR TIME-HISTORY ANALYSIS

5.1 Project Management for Phase III

5.1.1 Status Update

The project management will include tracking costs and progress on a weekly basis, work performed, estimate of expenditures versus budget, and schedule to be shared with McMillen and Portland Water Bureau (PWB).

5.1.2 Phase III Presentation to FERC

One web-meeting with FERC representatives is considered throughout Phase III of the project to present and discuss the findings of Phase III of Stability Analysis (nonlinear time-history analysis)

5.2 Seismic Nonlinear Time History Analysis (NTHA)

5.2.1 Updating Contact Surfaces at Potential Failure-Planes

The contact surfaces defined at the concrete-rock interface and the contacts between the dam blocks will change from tied contact to frictional contact with appropriate frictional angle for nonlinear analysis.

5.2.2 Nonlinear Time History Analysis

Seven nonlinear time-history analysis runs will be performed on the nonlinear FEA model with the provided seismic records. The assumption is that the worst between summer and winter load case and the worst between normal and low water elevations is established in the linear time-history analysis.

All the loads from the normal static analysis will be used in the time history analysis. Seismic excitations will be applied in the manner explained in Phase II.

The maximum deflection at the crest of the dam will be calculated and the three record/ load condition that caused the largest deflections will be selected.

The post-processing will be performed on the selected three records analysis results and will include:

1. Envelope of normal stress.
2. Envelope of maximum tensile stress.
3. Envelope of maximum compressive stress.
4. Envelope of downstream deflection of the dam.
5. Maximum base reaction (pressure distribution).
6. Maximum arch and cantilever stresses in the dam.

Cloud computing will be used for speed of analysis depending on number of elements, nodes, and degrees of freedom in the model.

5.2.3 Post-Earthquake Stability Factors of Safety

The same load combination that was used for static analysis with normal reservoir elevation will be implemented. However, cracking under the dam blocks will be estimated using the time history analysis results and the uplift pressure will be set to full upstream pressure through the length of the crack and varying from full pressure at the end of the crack to 0 at the downstream edge of the dam.

5.2.4 Validation and Sensitivity Studies

Non-linear time history analysis will be performed on the simplified 2D model using one selective record to gain confidence with 3D results. Concrete-rock interface will be set to frictional contact and sensitivity of the analysis results to foundation elastic modulus will be checked using the 2D model.

5.3 Spillway Structural Demands

5.3.1 Seismic Demand at the Gate Locations – Floor Response Spectrum

The acceleration response will be logged for all seven records in three directions at the points of interest. The points of interest are seven points which are at crest level (at the ogee below the gate) and top of piers.

The software Prism (or similar) will be used in preparing the corresponding response spectra with 5% damping for each direction. The average of the seven response spectra for each direction will be the floor response spectrum for that direction.

Additional POIs could be considered for design checks of other appurtenant structures; however, additional POIs are not considered in this proposal. Besides, 2% and 1% damping curves can be developed if requested by the client but have not been accounted for in the proposal.

5.3.2 Pier Section Forces for Strength/Stability Checks

Maximum section forces (Moment, Axial Force and Shear) will be obtained for each of the two piers at a section at the base of that pier. Maximum forces will be obtained for each seismic record and the average force between seven records will be recommended for structural strength and stability checks of the piers.

Maximum deflection of the piers will be obtained as average of the deflection from the seven analysis and will be compared with the gaps within the rollers and the embedded guides of the gate system. This comparison is made to avoid damage to the gates during earthquake resulted from excessive pier deflections.

5.4 Phase III Report

5.4.1 Draft and Final Report

KCB will prepare a report that summarizes the background and objective of work, the data, and drawings we obtained, material properties, seismic hazard and our modeling assumptions and methodology. Diagrams of the simulations results (stress and deformation) will be provided. Conclusions will be made based on these results and the possible structural or stability deficiencies will be explained. Finally, recommended mitigations to possible deficiencies (such as anchoring) will be explained.

The report will include the following sections:

1. Introduction.
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4. Analysis parameters and material properties.
5. Analysis results and findings.
6. Conclusions.
7. Recommendations.

The report will be finalized after incorporating the comments from McMillen on the draft report.

5.4.2 Submittal Review Meeting

We anticipate that before submittal of the draft report, there will be one review meeting with McMillen to discuss the technical content. The lead structural engineer on the project will represent KCB at this meeting.

6 LIMITS OF THIS STUDY

In the above three phases, no stability checks will be performed within the bedding planes below the dam and at the abutments of the dam and the stability study is limited to the dam concrete structure.

7 PROJECT DELIVERABLES AND SCHEDULE

Project deliverables are listed below:

1. Site Visit Report.
2. Design Basis Memorandum.
3. Weekly summary of work performed, estimate of expenditures versus budget, and schedule.
4. Phase I Report.

5. Phase II Report.
6. Phase III Report.

Schedule of key milestones is as follows, assuming 2 weeks review of reports.

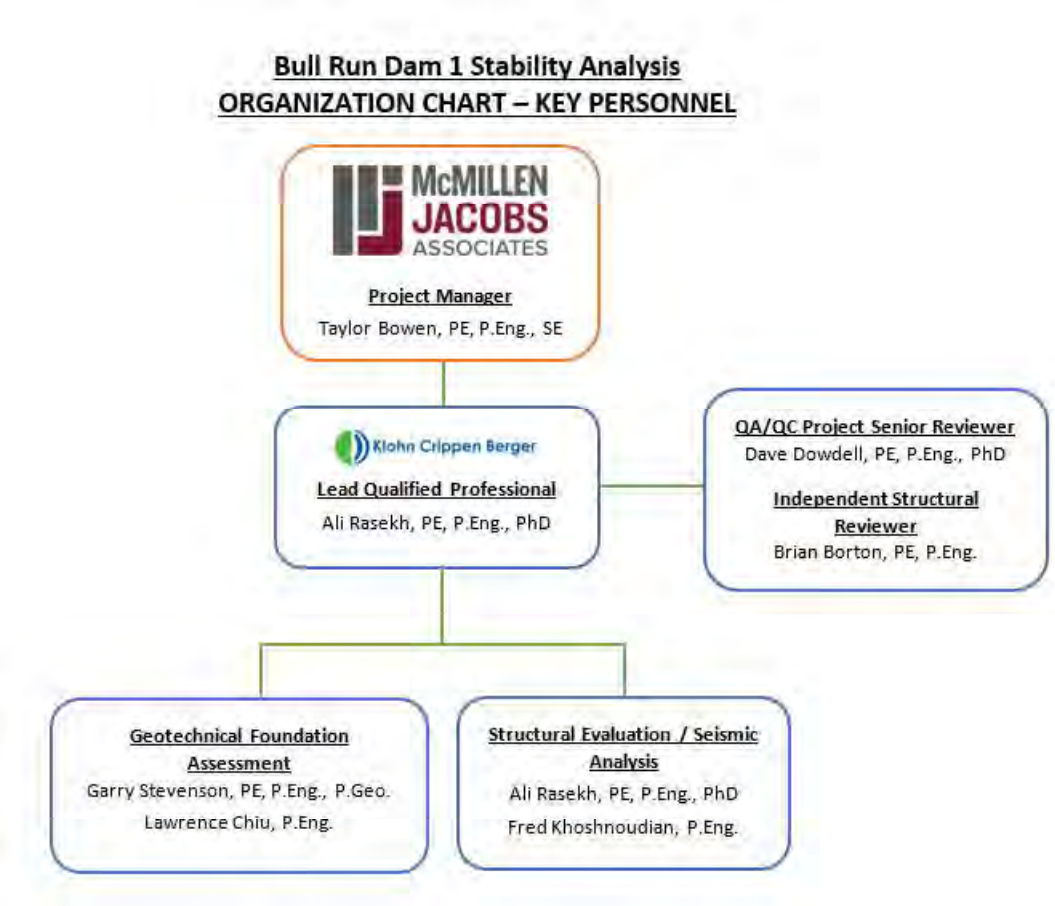
Table 7.1 Schedule of Key Milestones

Key Milestones	Suggested Dates
Contract Award	Jul 29, 2022
Kickoff meeting	Aug 2, 2022
Site Visit	Aug 9, 2022
DBM Draft	Aug 19, 2022
DBM Final	Sep 9, 2022
Phase I Report Draft	Nov 4, 2022
Phase I Report Final	Nov 25, 2022
Phase II Report Draft	Mar 3, 2023
Phase II Report Final	Mar 24, 2023
Phase III Report Draft	Jun 2, 2023
Phase III Report Final	Jun 23, 2023

8 KEY TEAM MEMBERS AND ROLES

Klohn Crippen Berger (KCB) proposes an experienced project team to undertake the Stability Analysis of Bull Run Dam 1. The project team will be led by Ali Rasekh, PE, P.Eng., PhD, who will coordinate other engineering personnel from the various disciplines required for this assessment.
Garry Stevenson, P.Eng., P.Geo. will provide necessary QA/QC and will act as overall project reviewer under our Integrated Management System (IMS). Ali Rasekh will also be the project technical lead for finite element analysis and structural evaluation.

The Organization Chart and the descriptions below present the team and their role in the project. The CVs of the team members are presented in Appendix I.



Ali Rasekh, PE, P.Eng., PhD, Project Manager and Lead Structural Engineer

Ali is a senior structural engineer with 25 years of experience in performing numerical analysis and computational mechanics simulations. He has a strong technical background and experience in seismic analysis of structure, rockfill, reservoir and foundation, and different applications of Fluid-Soil-Structure-Interaction (FSSI) analysis.

Ali has led complex modeling projects such as the new Panama Canal expansion, Susitna-Watana Arch Dam feasibility study, Cerro Corona TSF Dam expansion project and the new San Francisco-Oakland Suspension Bridge. He has performed diligent R&D studies for each project and has provided conceptual and hands-on solutions on time and budget.

Dave Dowdell, PE, P.Eng., PhD, QA/QC Project Senior Reviewer

With over 33 years in engineering, David has a broad experience in the analysis and design of bridges, dams, and water control structures such as intake towers, spillways and penstocks. David has been involved in the rehabilitation of several dam structures including the Snoqualmie Falls generating Station Redevelopment, the Glenmore Dam and Morrison Dam. David has also been involved in the retrofit of significant bridges including the Lions Gate Bridge, the Angus MacDonald Bridge and the erection engineering for the new San Francisco/Oakland Bay Bridge SAS.

David has applied advanced finite element modelling to evaluate seismic performance of hydraulic structures such as dams and intake tower structures, with particular experience gained in the evaluation, design and retrofit of dam, bridge and building structures for earthquake loading using systems for improved seismic performance, such as the design of tubular eccentrically braced frames for the temporary structures used for the erection of the San Francisco/ Oakland Bay Bridge SAS; seismic retrofit of the Lions Gate Bridge North Approach Viaduct using a unique rocking system and energy dissipation elements. Evaluation and design of these structures required the use of nonlinear Finite element analysis tools to accurately model the structural performance.

Brian Borton, P.E., P.Eng., Independent Structural Reviewer

Brian has over 20 years of structural engineering experience specializing in the design and redevelopment of hydroelectric facilities, complex seismic analysis, condition assessments and evaluation of existing structures. Brian has successfully managed over 30 hydro-related projects encompassing refurbishment, remediation, and safety-by-design. He has extensive knowledge in computer modeling and the resolution of complex structural and dynamic analysis. He is proficient with several structural design software programs including ADINA, S-Frame, S-Steel, SAP 2000, Midas Civil, Mathcad, LS-DYNA, Microsoft Office and AutoCAD.

He is the lead structural engineer for the seismic upgrades of the John Hart Concrete Main Dam and the construction of the new Site C Powerhouse and Operations Building superstructure. Brian was the lead structural engineer for the redevelopment of the Snoqualmie Hydroelectric facilities, and the redevelopment of the Elko Generating Station.

Garry Stevenson, P.E., P.Eng., P.Geo., Geotechnical Reviewer

Garry has over 40 years' experience in a variety of soil and rock projects. His experience includes conducting site investigations, designs, construction supervision and project management for hydroelectric development, bridges, highways, and rapid transit projects. Garry is experienced in design and construction of embankment and roller compacted concrete dams, tunnels and shafts in hard and soft ground and safety evaluations of operating dams. Garry has authored several papers on dam and underground excavation design and construction.

Garry was the project manager and lead civil/geotechnical engineer for due diligence review, condition assessment and review of operating and planning budgets for 79 m high Waneta Dam and 480 MW hydroelectric station prior to client purchase.

Fred Khoshnoudian, P.Eng., Structural Engineer

Fred is a structural engineer with over twenty years of experience working in performing finite element modeling and analysis. He has a strong technical background and experience in seismic analysis of hydroelectric projects of high complexity, including concrete dams, powerhouses, spillways, intake structures, and other hydraulic structures. Fred has been involved in condition assessments and the repair of buildings, powerhouses, and other hydraulic structures in high seismic zones. In addition, he is proficient with several structural design software programs, including SAP, Midas-Civil, and Midas FEA NX. He has performed complex modeling projects such as Bukhtarma Dam seismic assessment, Bennett Dam seismic assessment, seismic analysis of Ladore and Strathcona

gates as well as low-level outlet GMS Finite element modeling. He has implemented CDA and US Army corps engineering guidelines in analysis and design besides structural engineering codes and regulations.

Lawrence Chiu, P.Eng., Geotechnical Engineer

Lawrence is a Geotechnical Engineer who has over five years' experience working on geotechnical engineering projects, including highways, bridges, hydropower dams, industrial facilities, marine facilities, and railways. His experience includes foundation design, geotechnical analysis, planning and undertaking geotechnical exploration drilling, and field construction monitoring.

9 FINANCIAL AND OTHER COMMERCIAL CONSIDERATIONS

9.1 Financial Proposal

The work breakdown structure and the budget are presented in Appendix II. The budget was estimated based on Time & Materials to an upset limit. The following is a summary of the budget (in USD).

Table 9.1 Summary of Budget

Phase	Cost
Phase I – Spillway Gate Replacement Support	$128,898
Phase II – Dam Stability Evaluation – Linear Analysis	$91,400
Phase III – Dam Stability Evaluation – Nonlinear Analysis	$80,084
Total for the 3 Phases	$300,382

KCB costs are based on a proper system of quality management and the project will be performed with appropriate levels of supervision, quality control and independent review as could be seen in the detailed financial estimates on Appendix II.

KCB costs do not include applicable taxes.

The charge out rates are based on schedule of rates per the Subconsulting Services Agreement between McMillen Jacobs Associates and Klohn Crippen Berger Ltd. dated 1 March 2021. The rates were raised by 3.5% to account for annual inflation, as follows:

Table 9.2 Charge-Out rates (USD)

Classification	2021 rates	2022/23 rates
E7	$270	$279
E6	$235	$243
E5	$200	$207
E3	$150	$155
T4	$135	$140
C2	$85	$88

Expenses were considered for site visit – disbursement for flights, accommodations, transportation for three engineers for a single site visit. Cost of cloud computing (software and hardware) was considered in the expenses.

9.2 Terms and Conditions

Terms and Conditions are per the Subconsulting Services Agreement between McMillen Jacobs Associates and Klohn Crippen Berger Ltd. Dated 1 March 2021 (Appendix III).

The above-mentioned agreement was used for Searsville assignments and is applicable to Bull Run Dam 1 project in addition to the following adjustments:

- Auto Insurance: Canadian auto-insurance providers cannot add third parties as additional insureds to its policies (that's a Canadian industry standard), so, that term will need to be revised accordingly if it shows up again; and
- Limitation of Liability: Section 17: The Client agrees that the liability of and the Client's recourse against KCB with respect to the Project and Services, whether such liability arises in contract, tort or otherwise and whether arising directly, indirectly, in whole or in part because of an error or omission by KCB, shall be absolutely limited as follows:
- The quantum or amount of the claim or claims:
    a. in the event the Client's claim or claims are covered by KCB's insurance, such liability and recourse shall be absolutely limited to the lesser of fees paid to KCB or $250,000.00.
    b. in the event the Client's claim or claims are not covered by KCB's insurance, for whatever reasons, such liability and recourse shall be absolutely limited to the lesser of $50,000.00 or 10% of the fees paid to KCB for the Services that gave rise to the claim or claims.
    c. in the case of the Client's indirect or consequential loss, including without limitation, loss of earnings, profits, business opportunity or otherwise, KCB shall have no liability whatsoever.

10 DISCLAIMER

This proposal is submitted in confidence and its contents may not be divulged to third parties without the express written permission of Klohn Crippen Berger Ltd.

This proposal is valid until August 19, 2022.

KLOHN CRIPPEN BERGER LTD.

Ryan Douglas, P.Eng., P.E.
President

APPENDIX I

Key Personnel CVs

Ali Rasekh, PE, P.Eng., PhD

Dave Dowdell, PE, P.Eng., PhD

Brian Borton, PE, P.Eng.

Garry Stevenson, PE, P.Eng.

Fred Khoshnoudian, P.Eng.

Lawrence Chiu, P.Eng.

ALI RASEKH, P.ENG., P.E., PH.D.

Senior Structural Engineer and Project Manager

ARasekh@klohn.com

EDUCATION

PhD, Structural Engineering
University of British Columbia, 2007

MS/MSc, Structural Engineering
Sharif University of Technology, 1999
Tehran, Iran

BS/BSc, Civil Engineering,
Sharif University of Technology, 1997
Tehran, Iran

PROFESSIONAL REGISTRATIONS

Professional Engineer, Engineers and Geoscientists British Columbia

Professional Engineer, State of Washington

Project Management Professional, Project management Institute

PROFESSIONAL HISTORY

Klohn Crippen Berger Ltd.
Sr. Structural Engineer, 2018-present

MWH/Stantec
Sr. Structural Engineer/Associate, 2013-2018

Tetra Tech
Sr. Structural Engineer, 2009-2013

Klohn Crippen Berger Ltd.
Structural Engineer, 2007-2009

Shell Exploration and Production-Funded
Postdoctoral Research Fellow, 2006-2007

The University of British Columbia
Research and Teaching Assistant, 2000-2006

Tamin Maskan Group of Companies
Project Engineer, 1997-2000

Sharif University of Technology
Teaching Assistant, 1994-1997

Dr. Rasekh is a senior structural engineer with 25 years of experience in performing numerical analysis and computational mechanics simulations. He has a strong technical background and experience in seismic analysis of structure, rockfill, reservoir and foundation, and different applications of Fluid-Soil-Structure-Interaction (FSSI) analysis.

Dr. Rasekh has led complex modeling projects such as the new Panama Canal expansion, Susitna-Watana arch dam feasibility study, Cerro Corona TSF dam expansion project and the new San Francisco-Oakland suspension bridge. He has performed diligent R&D studies for each project and has provided conceptual and hands-on solutions on time and budget. He has supervised and trained engineers on simulation concepts and use of FEA software.

He has implemented CDA and FERC engineering guidelines in analysis and design besides structural engineering codes and regulations.

HIGHLIGHTS OF EXPERIENCE

- Structural design, check or review for hydroelectric facilities including dams, spillways, powerhouses, gates, and piers.
- Project manager and technical lead on dam retrofit projects.
- Design lead for preparation of engineering drawings and specifications packages.
- Complex seismic analysis of gravity and arch concrete dams and their aperture using non-linear time history analysis with contacts, foundation with/without mass and radiation damping and both explicit and implicit solvers. Performing progressive analysis and evaluation of the results. Performing sensitivity and parametric studies.
- Evaluation of the seismic performance of a major navigation structure in 2 levels of seismic hazard. Performing simple, response spectrum, linear and nonlinear analyses as a progressive way of evaluating the results. Performing verification studies to maintain confidence in the solution.
- Evaluation of the seismic performance of a tall tailings dam design in highly seismic area using nonlinear time history with nonlinear material characterization, massed foundation, checking the seepage and liquefaction potential.

ALI RASEKH, P.ENG., P.E., PH.D.

Senior Structural Engineer and Project Manager

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- Thermal analysis for a concrete navigation and dam structures to determine construction joints and thermal stress.
- Construction engineering and erection analysis of a major new bridge.

KEY PROJECT EXPERIENCE

Bukhtarma Dam Safety Investigation, seismic assessment of concrete gravity dam, Glencore International AG
Kazakhstan
Independent Structural Reviewer, Dam Safety Investigation including seismic assessment of the concrete gravity dam using Finite element modeling. Developing a structural 2D model of the Dam to assess stability.

Searsville Watershed Restoration Project – Stanford University
California, USA
Project Manager and Technical Lead, managing the subcontract from McMillan Jacobs Associates and lead their technical team on FEA modeling of Searsville Dam.

Nicola Lake Dam Structural Review – BC Ministry of Forests, Land, Natural Resources Operations
Merritt, British Columbia
Senior Reviewer, Review of static and response spectrum analysis of the spillway gate structure in LS-Dyna and hand calculations for retaining walls and the fishway and control gate structure.

Mica Discharge Facilities Seismic and Reliability Upgrade Project – BC Hydro
Revelstoke, British Columbia
Lead Seismic Structural Analyst, Site visit, determination of structural deficiencies. Working design basis for seismic analysis and leading the seismic structural analysis of the spillway, chute, flip bucket, outlet works and their structural appurtenant.

Ladore Spillway Seismic Upgrade Project – BC Hydro
Campbell River, British Columbia
Structural Engineer and Analyst, Check and review of spillway model created in LS-Dyna for developing Floor Design Spectra at points of interest.

Strathcona Dam Discharge Upgrade Project – BC Hydro
Campbell River, British Columbia
Structural Engineer, Review of intake structure model created in Midas Civil for response spectrum and response history analyses. Providing guidance on creating Floor Design Spectra at the point of interest.

Wilsey Cylindrical Arch Dam Structural Evaluation – BC Hydro
Vernon, British Colombia
Project Manager and Technical Lead, Review of existing data, preparation of the working design basis. Check and review of the arch dam mesh and LS-Dyna input files. Extensive validation of the input and results of the finite element analysis. Performing a set of linear and nonlinear static analysis under different levels of hydrostatic and seasonal temperature loads. Performing response spectrum analysis. Proposing seismic mitigation for the plug dam. Collaborating with the geotechnical team on abutment stability check for the arch dam.

Ituango Design Reviews, Steel Liner – Empresas Públicas de Medellín (EPM)
Medellín, Colombia
Structural Engineer, General guidance on the closed form and FEA buckling analysis of a steel liner based on ASCE 79 Manual. Checked the LS-Dyna model prepared for this purpose and reviewed the final report.

Lois Lake Arch Dam Structural Evaluation – Evolugen (Brookfield)
Powell River, British Colombia
Project Technical Lead and Coordinator, Review of existing data, preparation of the working design basis. Check and review of the arch dam mesh and LS-Dyna input files. Extensive validation of the input and results of the finite element analysis. Performing a set of nonlinear response history analysis and computing the floor response spectra at the hoist structure above the arch dam. Designing and proposing seismic mitigation for the spillway piers and bridge based on the seismic analysis results. Collaborating with the geotechnical team on abutment stability check for the arch dam.

Glide Due Diligence – Confidential Client
British Columbia
Structural Engineer, document and drawings review, CAPEX and OPEX review.

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WAC Bennet Dam Spillway Seismic Assessment – BC Hydro
Bella Coola, British Colombia
Project Technical Lead and Coordinator, Review of existing data, preparation of the working design basis, check and review of the stability assessment for the headworks structure and the spillway chute structure. Check of time-history selection and scaling. The work will continue with response spectrum analysis of the headworks and time history analysis of the spillway chute and flip bucket structure.

Site C Clean Energy Project – Powerhouse Superstructure– BC Hydro
Ft St John, British Colombia
Structural Engineer, checking the Post IFC steel superstructure and operation building. The seismic structural analysis and design of these buildings was checked.

Site C Clean Energy Project – Hydro Mechanical – BC Hydro
Ft St John, British Colombia
Structural Engineer, checking interface loads – seismic loads from the spillway gate on the trunnions.

John Hart Dam Preliminary Design – BC Hydro
Campbell River, British Columbia
Structural Engineer/ FEA Analyst. Review of the FEA models of the concrete dam and its spillway in LS-Dyna software. Reviewed complete nonlinear model of the concrete main dam and provided a verification report for the model. Reviewed a model of the gate spillway which was created for producing floor design spectra an provided a verification report for the model.

Clowhom Rec Foundation – BC Hydro
Sechelt, British Columbia
Engineer of Record, structural design of the foundation slab and helical-pile cap. Review of different pile alternatives (mat foundation, micro-pile, and helical-pile). Check, review and seal of IFC drawings.

Cardinal Due Diligence – Confidential Client
British Columbia
Structural Engineer, document and drawings review, site inspection of the hydroelectric facilities, CAPEX and OPEX review.

John Hart Dam Feasibility Design – BC Hydro
Campbell River, British Columbia
Structural Engineer/ FEA Analyst. Review of the feasibility design reports and submitting them to BC Hydro. Review of the verification studies and the working design basis for numerical modeling.

Brilliant Dam Diesel Generator Replacement – Fortis BC
Castlegar, British Columbia
Structural Engineer, reviewed and revised the structural specifications and seismic criteria, checked and reviewed the new foundation design for the diesel generator.

Noxon Rapids Dam Spillway Gates – Avista Utilities
Montana, U.S.A.
Structural Engineer, seismic and structural analysis of the gates, check and review of the steel design of the gate members.

Crowe Bay Spillway Design – Public Works and Government Services Canada
Ontario, Canada
Structural Engineer, check and review of the stability calculations and concrete reinforcing analysis and design. The calculations performed both for the existing abutment wall and the newly designed spillway.

Oroville Emergency Recovery-Spillways – Department of Water Resources, Division of Safety of Dams
California, U.S.A.
Structural Engineer, structural and stability design of spillway air ramps to avoid any potential cavitation issues during high velocity flows.

Waipapa Dam Gate Assessment and Refurbishment – Mercury
New Zealand
Structural Engineer, performed seismic analysis on the dam and gates. The analysis included both detailed response spectra analysis and time-history analysis and the design values were verified by parametric study and progressive analysis.

The steel design of the gate was checked based on the local code: NZ3404.

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Grand Coulee Dam Third Power-plant, FEA and Fatigue Analysis of Unit 19-21 Generator – US Bureau of Reclamation
Washington State, U.S.A
Structural Engineer and FEA analyst, performed stress-analysis on the rotor part of a generator. The analysis included the effects of shrink-fit, centrifugal and magnetic pull, and thermal. Collaborated with the hydro-mechanical engineers in determining the loading, boundaries, analysis steps and the necessity of stress linearization and applying the stress concentration factors. This project resulted in determining the operating conditions, material fatigue properties and eventually estimating the fatigue life for the critical parts of the rotor.

Evaluating the Seismic Performance of the TSF Dam at Cerro Corona – Gold Fields La Cima
Perú
Geotechnical Engineer, FLAC Analysis and Project Control Specialist, The Tailing Storage Facility studied by our team is a centerline rockfill dam with proposed maximum height of 200 m and crosses 4 valleys with a total crest length of approximately 2600 m. The dam has a low permeability core with transitional filters on its downstream side and supporting rockfill on both sides of these zones. It is located at a subduction seismic zone and the design earthquake has a peak ground acceleration of 0.57 g.

Revisions to the dam design were recently proposed and FLAC V7.0 was used to evaluate its performance in response to the design earthquake. 2D sections of the dam were analyzed and each section included a massed foundation with quiet boundary at its bottom and free field boundaries at the vertical sides.

A comparison of the results with Mohr-Coulomb and UBCHYST models for the rockfill was performed. Quad4mu software was used to calibrate the shear modulus reduction and the damping values for sections with Mohr-Coulomb material model for the rockfill.

Following the completion of the seismic deformation analyses, the estimated residual horizontal displacements in the core and filter zones and the shear strains and effective normal stresses in the core were reviewed to evaluate that these zones remain functional in the post-earthquake condition.

Eventually a report and a paper was prepared that presents the methodology used to evaluate the seismic performance of the dam, the analysis results and a discussion of the influence of the constitutive model on them, and the optimized dam design following the application of mitigation measures.

Deformation Analysis of the TSF dam at Cerro Corona Mine – Gold Fields La Cima
Perú
Geotechnical Engineer, Simulated the deformations incurred at the tailing storage facility dam through raise of the dam using FLAC software. The analysis results were compared with instrumentation and inclinometer readings. As a next step, the Duncan parameters for the rockfill are to be modified to calibrate the model.

Lake Eleanor Multiple Arch Dam Needs Assessment – San Francisco Public Utilities Commission
California, U.S.A.
QA/QC; Reviewed Ansys model prepared for seismic time history analysis and thermal analysis of the dam. Reviewed the technical report.

Ruskin Powerhouse Intake Structure Evaluation – BC Hydro
Fraser Valley, British Columbia
Structural Engineer; performed simplified seismic analysis on the intake structure to assess its stability using SAP2000 and continued with a set of progressive analyses. Prepared reports and recommendations for mitigation.

Nipawin Stability Analysis – Saskatchewan Power Corporation
Saskatchewan, Canada
Structural Engineer; contributed to the development of design criteria. Reviewed the documents and drawings.

Wanapum Dam Anchoring Project – Grant County Public Utility District
WA, U.S.A.
QA/QC; Reviewed project documents and drawings. Reviewed Ansys model prepared for seismic analysis of the dam.

White River Rockfill Dams – Regional Power Inc.
Ontario, Canada
Technical Lead; Investigated the deformation and stresses in of FRP sheetpiles in taller rockfill dam (26 m) at White River using two analytical models. The finite element model was developed in Ansys software and the finite difference model was developed in FLAC and the results obtained from the twosoftware agreed with each other. The deformation and stress capacities were obtained from full –scale tests performed by the vendor.

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Powell River Dam – Brookfield Power
British Columbia, Canada
Project Technical Lead and Coordinator; reviewed structural design of the gates, trunnions, and piers for seismic performance and capacity and proposed additional posttensioning in piers; prepared Quality Management Plan and also Sampling and Testing Plan for the project; witnessed coring and sampling of the dam; Prepared the Design Basis Memorandum. Performed Dam Safety review based on latest edition of CDA guidelines and prepared extensive seismic analysis report for dam piers stability. Supervised the CAD team on civil drawings. Prepared civil specifications. Coordinated the project progress among multiple teams and offices of Stantec including the gate design team and electrical/mechanical/hydro teams, subcontractors, partners and client representatives. Represented Stantec in the pre-bid meeting with owner and bidding gate suppliers.

Susitna-Watana Arch Dam Feasibility – Alaska Energy Authority
Alaska, U.S.A.
Structural Engineer, performed nonlinear seismic simulations of the dam-reservoir-foundation in Ansys-Mechanical and LS-Dyna; Developed solution strategy for massed foundation concept, performed nonlinear seismic simulations and prepared report; extensive interaction with LS-Dyna technical support and also discussions with the industry experts; performed deconvolution and nonlinear simulation of the dam-reservoir-foundation; used cloud computing for large scale simulations; prepared the report for feasibility phase.

Ruskin Dam Crest Block Anchoring and Design – BC Hydro
Fraser Valley, British Columbia
Project Technical lead, prepared the response spectra for the seismic records; performed nonlinear seismic simulation of dam-reservoir-foundation using Ansys-Mechanical; Prepared Excel sheet for "sliding block analysis" with cavitation as progression analysis; solution verified with Westergaard solution; participated in client meetings on development of the concepts; supervised Ansys study on of CFD model of reservoir in FSI simulation; designed structural remediation; QA/QC as in APEGBC standards of practice; Lead author of the final report which is a white paper on the analysis procedure.

White River Project – Regional Power Inc.
Ontario, Canada
Structural Engineer; Performed analysis and design of the concrete powerhouse and the steel superstructure. Designed the mezzanine composite deck and the anchoring for the log boom. Designed the penstock for hydrostatic and water hammer loads; supervised preparation of CAD drawings. Investigated the use of FRP sheet-piles in the rockfill dam using FEA structural model and also reviewed full –scale test results and finally verified the use and made recommendations.

Wanapum Dam – Grant County Public Utility District
Washington State
Technical Lead – Performed nonlinear static pushover-analysis in SAP2000; calculated the performance point for seismic spectra between 500-year and 1,000,000-year return period; determined the ultimate displacement ductility and the corresponding mean-return period; lead author of the technical report.

Soda Spring Dam Seismic Updates – PacificCorp Energy
Oregon, U.S.A.
Structural Engineer; Reviewed the site-specific seismic hazard report for the project and made comments on the ground motion time histories; reviewed the model and the reports prepared by Stantec and drawings provided by the client and acceptance criteria for the dam performance; chapters 3 and 11 of the FERC.

Panama Canal Design-Build – Panama Canal Authority
Panamá
Lead Design Engineer and Seismic Analyst for the Pacific Outlet Approach Structure: piles and bridge superstructure; wing walls, valve towers and trifurcations; designed reinforced concrete based on ACI, ASCE and Employer's Requirements; Lead author/ reviewer/checker of several reports and DBM's; Reviewed the tender design drawings and prepared design drawings; mentored engineers for Abaqus software; performed time history, stability and fluid-soil-structure interaction simulations in Abaqus; Scaled the input seismic records; performed nonlinear FEA thermal stress and crack analysis of mass concrete.

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Senior Structural Engineer and Project Manager

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Hyundai Valve Design for the Third Set of Locks – Panama Canal Authority
Panamá
Seismic FEA Analyst in charge of estimating the seismic hydrodynamic forces; Lead author of the reports and a technical paper; Performed extensive fluid-structure interaction analysis in Abaqus/Explicit; Performed progression analysis to verify the computer simulation; Worked closely with the mechanical engineers and experts; performed study, research and development and reviewed alternative mitigation.

Sound Transit East Corridor HCT Light Rail – Sound Transit
Seattle, Washington, U.S.A.
Bridge Engineer responsible for the geometric modeling, displacement analysis and structural modeling of the track transition structure Reviewed the vertical load design for the East Channel Bridge and the D2 Bridge; Obtained the foundation mass and spring properties from the geotechnical firm Reviewed FEA software options for nonlinear seismic retrofit analysis and design and acquired expertise with Adina and SEQMC; Nonlinear time history and pushover analysis to obtain the plastic hinge rotations.

Inner Harbour Navigation Canal Hurricane Risk Reduction – USACE
New Orleans, U.S.A.
Structural Engineer in charge of FEA analysis and steel pipe design check for the GIWW sector gate; Prepared extensive calculation report with narratives; Performed buckling and frequency analysis in Sap2000; Determined slamming and downfall loads based on the design basis and USACE publications; Reviewed the layout and structural design of new bridge on top of the sector gate.

Deltaport Birth 3 Marine Works – Port Metro
Vancouver, British Columbia
Site Inspector; witnessing the vibroflotation process to avoid liquefaction under caisson walls; Performed site estimation and inspection for environmental safety.

Suncor STP Pumphouse and Flare Stack – Suncor Energy
Alberta, Canada
Structural Engineer; analyzing floor slab as shell model on pile springs; concrete design of self-supporting 200-foot flare stack; Loading and design based on NBCC2005, CSA A23.3-04 and Suncor standards.

San Francisco Oakland Bay Bridge Temporary Structures – American Bridge and Flour JV
California, U.S.A.
Bridge Construction Engineer; responsible for erection analysis and steel design of temporary support structure using Lusas software; Involved in preparation of technical reports and responses to client requests; Erection analysis and camber analysis of temporary structure and bridge deck; Wind, seismic (response spectrum) and thermal analysis for construction stages; pushover analysis of temporary towers to obtain ductility; Use of design codes such as AISC, ASCE and IBC; Reviewed the shop drawings.

Tamin Maskan Group of Companies
Tehran
Construction management for design-bid-build residential construction projects in different municipalities; Reviewing of drawings, bids and reports by consultants, constructors and inspectors.

AWARDS AND RECOGNITION

- KCB Performance Bonus Awards
- MWH Canada Spot Bonus Award
- TetraTech Pinnacle Award and Achiever Award in two successive years
- Shell Exploration and Production Grant for Post-Doctoral Fellowship
- Holder of full UBC University Graduate Fellowship for four successive years and holder of UBC Josephine T Berthier Fellowship for two years
- Graduated from Sharif University summa cum laude

RESEARCH

Monticello Dam Blind Prediction Analysis Workshop – US Bureau of Reclamation
California, U.S.A.
Technical Lead, prepared LS-Dyna model with massed foundation and Westergaard mass representation of the hydrodynamic effects and executed an explicit analysis. Performed scaling of the seismic input. Used Perfectly Matched Layer as quiet boundary condition and Effective Seismic Input Method as an alternative to deconvolution.

Performed QA/QC on the Ansys model with massless foundation and Westergaard masses.

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Unconventional Oil and Gas Exploration
Client: Shell Exploration and Production
Postdoctoral Fellow; reviewed the effectiveness of grouting of oil wells with numerical modeling of grout in fractured rocks using Comsol Multiphysics; prepared interim and final reports and client presentations.

Earthquake Performance Based Design and Pushover Analysis
Client: Sharif University of Technology
Researcher on pushover analysis of high-rise steel structures; Validating different load and displacement patterns to be used in pushover analysis; Performed analysis on piezoelectric actuators and sensors.

Process Modelling of FRP Structural Composites
Client: UBC Composites Group
Researcher on the FRP composites parts being used as primary structures in aerospace industry; Preparation of several technical reports, presentations, conference and journal papers; Innovated an efficient spatial and time integration and an adaptive solution for the FEA method; Innovated progression analysis techniques for engineers and instructors; Performed Extensive FEA thermal and stress analysis using Abaqus.

SELECTED PUBLICATIONS AND CONFERENCE PRESENTATIONS

Ali Rasekh. Estimating Floor Design Spectra at the Top of a Dam Using Dam Response Spectrum Analysis Results. ICOLD 2022 Annual Conference.

Ali Rasekh. Validating Nonlinear Seismic Analysis of Dam-Foundation-Reservoir System with Foundation Cyclic Symmetry. USSD 2020 Annual Conference.

Ali Rasekh, Petros Giannaros, Bruno Bagneres. Evaluating the Seismic Performance of An Old Concrete Arch Dam. CDA 2019 Annual Conference. Calgary, Alberta, Canada.

Ali Rasekh. Evaluating the Seismic Performance of Dams and Navigation Structures: Experiences, Challenges and Lessons Learnt. Presentation at Vancouver Chapter of the CDA. February 20, 2018

Efrain Rondinel Oviedo, Henry Tovar Barrientos, Ali Rasekh, Patrick Corser. Evaluating the Seismic Performance of a TSF Rockfill Dam. CDA 2017 Annual Conference. Kelowna, BC, Canada.

Iso-Ahola, V., Tarbox, G.S., Mostafa, M., Ellenson, S., Bector, M., Rasekh, A. Understanding the Performance of Aging Infrastructure: A 99-Year-Old Multiple Arch Dam. USSD Annual Meeting and Conference. April 3-7, 2017. Anaheim, California.

Abbaszadeh S., Rasekh, A. Use of Instrumentation Data for Deformation Model Calibration and Prediction of Rockfill Dam Performance. Poster Presentation. ASDSO Dam Safety 2016. September 11-15, 2016. Pennsylvania Convention Center, Philadelphia, PA.

Monticello Dam Blind Prediction Analysis Workshop. April 14, 2016, USSD Committee on Earthquakes, 2016 USSD annual conference. Denver, CO.

Rasekh, Ali. “Hydrodynamic Pressure on Culvert Gates during an Earthquake”. 2012 SIMULIA Community Conference (Speaker). 2012.

Rasekh, Ali, Mofid, Massood, Khezrzadeh, Hamed. “On the effect of large deflection on nonlinear behavior of an eccentric bracing system”. Structural Design of Tall and Special Buildings. 2007.

Rofooei, F. R., Attari, N. K., Rasekh, Ali, and Shodja, A. H.," Adaptive Pushover Analysis ". Asian Journal of Civil Engineering. Vol. 8, No. 4. 2007.

Rofooei, F. R., Attari, N. K., Rasekh, Ali, and Shodja, A. H. "Comparison of Static and Dynamic Pushover Analysis in the Assessment of the Target Displacement". International Journal of Civil Engineering. Vol. 4, No. 3. 2006.

Nima Zobeiry, Ali Rasekh, Reza Vaziri*, Anoush Poursartip. “Efficient Modelling Techniques for Predicting Processing Residual Stress and Deformation in Composite Parts”. ICCM 14. San Diego, USA. 2003.

A. Rasekh, R. Vaziri, A. Poursartip. Simple Techniques for Thermal Analysis of the Processing of Composite Structures. 36th Int’l SAMPE Tech. Conf., November 15-18, San Diego, USA. 2004.

Ali Rasekh, Reza Vaziri. “Efficient Numerical Modeling Techniques for the Thermochemical Analysis of Composite Materials during the Manufacturing Process”. 7th World Congress on Computational Mechanics. Los Angeles, California (Speaker). 2006.

DAVID DOWDELL, PH.D., P.ENG.

Senior Structural Engineer

ddowdell@klohn.com

EDUCATION

Ph.D., University of British Columbia, 2005. Developing design methods for structures with passive and semi-active friction dampers.

M.A.Sc., Civil Engineering, University of Waterloo, 1987. Investigated the fatigue life prediction of material subjected to multi-level, random load histories.

B.A.Sc., Civil Engineering (Co-op), University of Waterloo, 1985.

PROFESSIONAL REGISTRATIONS

British Columbia APEGBC (P.Eng.)
Saskatchewan APEGS (P.Eng.)
Nova Scotia APENS (P.Eng.)
Ontario PEO (P.Eng.)
Washington State (P.E. 46284)
State of California (P.E. C 71826)

Member, Canadian Society for Earthquake Engineering (CSEE)
Member, Canadian Dam Association (CDA)

PROFESSIONAL HISTORY

Klohn Crippen Berger Ltd.
Senior Structural Engineer, 2006-present

BC Hydro
Senior Structural Engineer, 2000-2006

Klohn-Crippen Consultants Limited
Structural Engineer. 1999-2000

SNC-Lavalin Inc.
Structural Engineer, 1996-1999

Buckland and Taylor Ltd.
Structural Engineer, 1994-1996

Kayaba Industries Ltd.
Research Engineer, 1987-1989

With over 33 years in engineering, David has a broad experience in the analysis and design of bridges, dams and water control structures such as intake towers, spillways and penstocks. Over the course of his career, David has participated many dam and hydroelectric projects including dam safety reviews, deficiency investigations, conceptual retrofit designs and design reviews, many involving seismic assessment. David has led the evaluation and retrofit design of several bridge structures, including the Lions Gate Bridge, the Angus MacDonald Bridge and the erection engineering for the San Francisco/Oakland Bay Bridge.

David has gained experience in the evaluation, design and retrofit of bridge and building structures for earthquake loading with systems for improved seismic performance. Projects include the development of state-of-the-art active-mass-damping systems for the control of seismic deformations of high-rise buildings in Japan; the design of tubular eccentrically braced frames for the temporary structures used for the erection of the San Francisco/ Oakland Bay Bridge SAS; seismic retrofit of the Lions Gate Bridge North Approach Viaduct using a unique rocking system and energy dissipation elements. Evaluation and design of these structures required the use of nonlinear Finite element analysis tools to accurately model the contact surfaces, impact loads and energy dissipation through yielding affecting the structural behaviour.

David has also used advanced finite element modelling to evaluate seismic performance of hydraulic structures such as dams and intake tower structures.

KEY PROJECT EXPERIENCE

DAMS

Ituango Dam Power tunnel steel liner assessment
Antioquia, Colombia
Advisor for the finite element buckling assessment of steel liners to be used to form the vertical shafts of the power tunnels ay the Ituango hydroelectric project.

Coquitlam Dam Transition Block Assessment
Coquitlam, BC
Assessed the stability of the transition block under seismic loads. The transition block is anchored on a steeply sloping foundation surface and interacts with the reservoir and the embankment dam during an earthquake. The impending slide direction does not

DAVID DOWDELL, PH.D., P.ENG.
Senior Structural Engineer
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align with the axis of the dam or its perpendicular. A 3-D limit equilibrium computation was developed for this assessment independent of the dam's coordinate system.

Wilsey Dam
Lumby, BC
Initial condition assessment and Senior advisor for the subsequent detailed finite element seismic assessment of this cylindrical arch dam.

Lajoie Penstock Assessment
Bridge River system, BC
Senior advisor for the detailed seismic assessment of the response of steel conduits beneath the dam combining fluid and non-linear structural elements and contact support conditions to determine the withstand of the structures taking into account internal static an dynamic pressures.

Bridge River Penstocks
Bridge River BC
Evaluated the stresses in the penstocks at penstock supports using a finite element model as part of an overall investigation of the penstocks. Looked at the stress distribution around saddle supports under static and dynamic loading conditions.

Snoqualmie Falls Redevelopment Project
Snoqualmie Falls, Washington
As part of a large multidisciplinary team, engineer of record for the Powerhouse 1 and 2 penstock bifurcations, pier and anchor block designs.

Strathcona Dam
Vancouver Island, BC
Participated in a PFMA study of the Strathcona dam facilities to evaluate vulnerabilities of the structure to environmental loads, structural, mechanical and geotechnical conditions. The study included the time to failure and the severity of potential defects. Commented on the effectiveness of recent repairs on the intake structure that were designed for operational loads under extreme loading conditions.

Seymour Falls Dam
North Vancouver, BC
The Seymour Falls Dam is a complex buttress dam structure. Evaluated of the floor spectra in the upper levels of the dam structure utilising a floor-spectra-from-response-spectra technique. Results of the seismic analysis were used in preliminary seismic assessments of equipment and other appurtenances to the dam structures.

Glenmore Dam - Spillway Operating Gate Replacement
Calgary, AB
Glenmore dam is a major dam operated by the City of Calgary. Reviewed and advised on the structural modifications to the spillway structures including the spillway piers, spillway deck and spillway gate hoist structures.

Concrete Assessment, Island Falls Island Falls Generating Station and Whitesand Dam
Sandy Bay , Saskatchewan
Led the evaluation of the concrete condition to develop a long-term plan for the management of the Powerhouse, Main Dam Spillway and the A-Dam concrete structures. The investigation comprised core sampling and laboratory testing, plus in-situ non-destructive measurement techniques.

Morrison Dam Rehabilitation Project
Coronach, SK
Morrison Dam includes the main dam, service spillway, auxiliary spillway, and riparian low-level outlet. The dam has experienced significant deterioration of the concrete spillway. Reviewed modifications to the gates, piers, trunnions and spillway structures as part of the overall structural rehabilitation.

Island Falls Hydroelectric Station A-Dam Deck and Abutment Repairs
Sandy Bay, Saskatchewan
Led the load rating study of the deteriorating deck structure. Designed upgrades to the deck and abutments of to enable the deck to safely carry permit and non-permit vehicles and provided support services through construction of deck and abutment upgrades.

Cobre Panama
First Quantum Minerals
Senior Reviewer for the seismic design of an intake tower. The tower was designed to resist the tailings loads imparted in a large seismic event.

Concrete Deck Assessment, Timiskaming Dam
Temiscaming, Quebec
For PWGSC, led the inspection and the conceptual retrofit of the bridge deck over the Quebec side of the

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Timiskaming Dam. A snooper-truck was used to access the underside of the deck to inspect and map out the concrete condition. Recommended installing a set of deck-seat extension brackets to extend the useful life of the deck in the short-term pending the long-term redevelopment of the dam.

SaskPower Hydroelectric Stations Inspection
Various Locations, Saskatchewan
Led the annual dam safety inspections of facilities in Saskatchewan including the Athabasca system, Nipawin, EB Campbell and Coteau Creek Hydroelectric Stations.

Terzaghi Dam Seismic Assessment
Lillooet, BC
As part of a multi-disciplinary investigation team, led the seismic assessment of the concrete portions of the Terzaghi Dam outlet works – the spillway gate structure, the overflow spillway and the spillway chute walls. Undertook a detailed investigation of the interaction between the spillway chute wall and the embankment dam. Investigated and recommended retrofit options to ensure the integrity of the water barrier following a large earthquake.

Pingston Creek Hydroelectric Facility – Independent Review
Upper Arrow Lake, BC
The 45 MW Pingston Creek Hydroelectric Facility, is located 65 km south of Revelstoke in British Columbia, Canada. It is a high-head generating facility comprising two Pelton wheel powered generators. Lead civil/structural engineer for the independent review of the dam, intake and powerhouse structures.

Dam Safety Review: Watson Island Dams
Prince Rupert, BC
Led the Dam Safety Review of Kloiya, Rainbow and Diana Dams, concrete and earthfill dams which in earlier years provided the water supply for industry in Watson Island near Prince Rupert, BC.

Dam Safety Review: Woodworth Dam
Prince Rupert, BC
Led the Dam safety review of a small cement and rubble dam owned by the city of Prince Rupert forming part of the municipal water supply. Updated OMS and Emergency Planning documents. Also designed repair works for the spillway of Woodworth Dam and conceptual replacement options.

Dam Safety Review: Whatshan and Clowhom Dams,
Needles, BC and Sechelt, BC
Carried out Dam Safety Reviews of Whatshan and Clowhom Dams for BC Hydro in 2012.

Dam Safety Review: Jordan Dam
Jordan River, BC
Carried out the Dam Safety Review of Jordan Dam in 2010. The Jordan dam is a buttress dam structure in an area of high seismicity on the west coast of Vancouver Island.

Boundary Dam
Estevan, Saskatchewan
Senior review and engineer of record for structural modifications to enable the radial gates to withstand high flows.

John Hart Dam
Campbell River, BC
Feasibility engineering of a new intake structure and power tunnel and a free-crest overflow spillway.

RTA, Skins Lake Dam
Burns Lake, BC
Investigated the stability of the spillway structure under imbalanced flow conditions.

Brazeau Dam Spillway
Drayton Valley, Alberta
Investigated the seismic withstand of the spillway and gate hoist structures.

Strathcona Intake Tower
Campbell River, British Columbia
Undertook investigations as part of the seismic evaluation and conceptual retrofit. The computer program ADINA was used to investigate the non-linear rocking response of the tower and subsequently compare the performance of several different proposed retrofit options.

BRIDGES

San Francisco Oakland Bay Bridge SAS
San Francisco, California
The San Francisco Oakland Bay Bridge SAS is the self-anchored suspension span (SAS) is the signature span of the crossing between Yerba Buena Island and the City of Oakland. A steel span carrying 10 lanes of traffic and a 5m wide pedestrian/cycle path of the Project Engineer and engineer of record for the design of the San Francisco/Oakland Bay Bridge temporary

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support structures. The temporary works include foundations, steel towers and trusses necessary to support the placement, positioning and connection of the permanent orthotropic box girder deck sections of the self-anchored suspension span. Designed eccentrically braced tubular steel towers to improve the seismic performance of the structure. The design also included the cradles used to slide and manoeuvre the deck sections into place and temporary bearings to support the permanent structures during load transfer. Led the design of tie-back and tie-down systems to control deformations of the structures during construction.

Lions Gate Bridge Seismic Retrofit North Approach Viaduct
Vancouver, British Columbia
Analyst for the seismic retrofit design of the North Approach Viaduct for the landmark suspension bridge. The project included seismic modeling and analysis prior to a complete seismic retrofit design. The seismic retrofit used rocking at the foundation level to reduce the retrofit needed in the upper portions of the structure. The retrofit concept was proved with a suite of non-linear time-history analyses using ADINA. The seismic retrofit comprised vertical guides at the tower bases, hysteretic energy dissipation, tower strengthening, improved tower-deck connections, longitudinal restraints between adjacent deck segments and lead-core elastomeric bearings at the north abutment. Impact energy was tracked to ensure transient forces remain within tolerable limits.

Gordie Howe International Bridge
Windsor, On to Detroit MI
Technical advisor on the bridge design and construction as part of a design-build consortium. bidding the bidding to design, build operate and maintain the vital trade link between Canada and the USA. The Gordie Howe International Bridge will be the longest cable-stay bridge in North America when completed.

Vedder Bridge Replacement
Chilliwack, BC
Quality Manager for the design and construction of the Vedder Road crossing in the city of Chilliwack, BC. Review and audit of the quality procedures of the design and oversight of the construction quality procedures and reporting.

Angus MacDonald Bridge Deck Replacement
Halifax/Dartmouth, Nova Scotia
Provided design checking services to the contractor as part of the design-build refurbishment of the deck and cable support systems of the signature suspension bridge structure. As part of the effort designed a light steel support platform which could be moved up and down the main cables to provide access for workers perform upgrades to the main cables and suspenders.

Golden Hill to West Portal Design-Build
Golden, BC
Design Quality Manager for the design-build project comprising 4km of roadway and two overpass structures, one of which was a wildlife overpass.

PUBLICATIONS

CONFERENCE PUBLICATIONS

D.J. Dowdell, B. Borton, R. Alava, “Non-linear Seismic Assessment of an Aging Penstock Including Fluid-Structure Interaction”, Canadian Dam Association Annual Conference, Quebec, October 15-17, 2018

D.J. Dowdell and C.E. Ventura, “Design of Viscous and Friction Dampers for the Seismic Response Control of an Asymmetrical Structure”, 100 year anniversary of the 1906 Great San Francisco Earthquake Conference, April 18-23, 2006, San Francisco

D. J. Dowdell and B.H. Fan, “Practical Aspects of Engineering Seismic Dam Safety – Case Study of A Concrete Gravity Dam”, Paper No. 2629, 13th World Conference on Earthquake Engineering, 1-6 August, 2004, Vancouver, Canada

D.J. Dowdell and C.E Ventura, “Application of Control Theory for Optimal Design of Added Viscous and Friction Dampers”, Paper No. 2481, 13th World Conference on Earthquake Engineering, August 1-6, 2004, Vancouver, Canada

D.J. Dowdell and C.E. Ventura, “Determining Optimal Damper Sizes In A Steel Frame Structure Using Structural Control Concepts” in STESSA 2003, Behaviour of Steel Structures in Seismic Areas, F. Mazzolani (ed.), Swets & Zeitlinger, Lisse, 2003

D.J. Dowdell and B. Hamersley, “The Lions Gate Bridge: Seismic Retrofit of the North Approach Viaduct”, Presented at: STESSA 2000, Behaviour of Steel Structures in Seismic Areas, F. Mazzolani and R. Tremblay (eds.), AA Balkema, Rotterdam, 2000

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D.J. Dowdell and S. Cherry, "On Passive and Semi-Active Friction Dampers for Seismic Response Control of Structures", Eleventh World Conference on Earthquake Engineering, June 22-28, 1996, Acapulco, Mexico.

D.J. Dowdell and S. Cherry, "Optimal Seismic Response Control of Friction Damped Structures", Tenth European Conference on Earthquake Engineering, August 28-September 2, 1994, Vienna, Austria.

D.J. Dowdell and S. Cherry, "Structural Control Using Semi-Active Friction Dampers", First World Conference on Structural Control, August 3-5, 1994, Pasadena, California.

D.J. Dowdell and S. Cherry, "Semi-Active Friction Dampers for Seismic Response Control on Structures", Fifth U.S. National Conference on Earthquake Engineering, July 10-14, 1994, Chicago, Illinois.

JOURNAL PUBLICATIONS

Dowdell, D.J., Leipholz, H.H.E., Topper, T., "Experimental Verification of Fatigue Life Predictions for Discrete Strain Markov Processes", International Journal of Fatigue, Vol. 11, No 1., January 1989, pp. 19-28.

Dowdell, D.J. Leipholz, H.H.E., Topper, T., "Fatigue Life Prediction for Discrete Strain Markov Processes", International Journal of Fatigue, Vol. 10, No. 4, October 1988, pp. 227 236.

Dowdell, D.J., Leipholz, H.H.E., Topper, T., "The Modified Life Law Applied to SAE-1045 Steel", International Journal of Fracture, No. 31, 1986, pp. 29 36.

BRIAN BORTON, P.ENG., P.E.

Structural Engineer

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EDUCATION

B.A.Sc. in Civil Engineering
University of British Columbia, 2003

PROFESSIONAL REGISTRATIONS

Engineers and Geoscientists British Columbia

Professional Engineers Ontario

Association of Professional Engineers and Geoscientists of Alberta

Professional Engineer in Washington State

PROFESSIONAL HISTORY

Klohn Crippen Berger Ltd.
Structural Engineer, 2003-Present

HIGHLIGHTS OF EXPERIENCE

Brian is a professional engineer with over 18 years of structural engineering experience, and he is registered in the provinces of BC, Ontario, Alberta and the state of Washington. His area of expertise is hydroelectric facilities, dams, water conveyance and retaining structures, heavy industrial and bridge infrastructure. Brian been involved in condition assessment and repair of dams, powerhouses, bridges, and other facilities ranging from initial inspection and assessment to redevelopment. He was a lead structural engineer for the seismic upgrades of the John Hart Concrete Main Dam, the construction of the new Site C Powerhouse and Operations Building superstructure, the redevelopment of the Snoqualmie Hydroelectric facilities, and the redevelopment of the Elko Generating Station. He has extensive knowledge in computer modeling and the resolution of complex structural and dynamic analysis. He is proficient with several structural design software programs including ADINA, S-Frame, S-Steel, SAP 2000, Midas Civil, Mathcad, LS-DYNA, Microsoft Office and AutoCAD.

- Structural design and analysis for dams, spillways, water passageways, powerhouses and other hydro facility structures.
- Dam inspections and dam safety reviews.
- Project manager or structural lead on over thirty (30) BC Hydro projects.
- Bridge inspections and site experience
- Bridge evaluations including condition assessments, structure evaluation involving load ratings and renewal options analysis.
- Seismic analysis including non-linear time history, non-linear pushover and unstressed response spectrum.
- Construction engineering and erection analysis.
- Miscellaneous steel design including walkways, stairs, platforms, conduit, cable tray and pipe supports.

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KEY PROJECT EXPERIENCE

Wahleach Crane Installation and Powerhouse Upgrades, BC Hydro
Chilliwack, British Colombia
Structural engineer and project manager for the detailed design of upgrades to the existing powerhouse superstructure and crane runway system for the installation of a new 240 MT overhead crane. Previous phases included a seismic assessment of the substructure and superstructure and a live load evaluation of the main service bay floor to support the heavy generator equipment.

Site C Clean Energy Project – Powerhouse Superstructure, BC Hydro
Ft. St. John, British Colombia
Lead structural engineer for the design and preparation of the drawings and technical specifications for the Site C Clean Energy Project Powerhouse Superstructure and Operations building. The powerhouse is a 290 m long, 29 m wide steel framed building which supports two 320 ton cranes in tandem. The operations building is an integrated steel framed building comprising between 3 and 5 floor levels.

Bennett Dam Seismic Assessment of Headworks Structures, BC Hydro
Ft. St. John, British Colombia
Project manager for the seismic assessment of the Bennett Dam headworks structures. The assessment consists of stability analysis of the spillway, and chute walls, a response spectrum analysis of the spillway structure and spillway gates, time history analysis of the spillway chute walls and flip bucket structure.

John Hart Dam Seismic Upgrades, BC Hydro
Campbell River, British Columbia
Lead structural engineer for the seismic evaluation of the existing middle and north fill dams, concrete gravity dam and spillway. Complex time history analysis of the concrete dam and spillway structures using LS Dyna, complete with soil-structure interaction, Langragian fluid elements and perfectly matched boundary conditions.

Wilsey Cylindrical Arch Dam Structural Evaluation, BC Hydro
Lumby, British Colombia
Senior structural reviewer for the seismic assessment of Wilsey Dam. Analysis included a set of linear and nonlinear static analysis under different levels of hydrostatic and seasonal temperature loads and response spectrum analysis. Proposing update to the plug dam to meet stability requirements.

Clowhom PH Access Ladders and Platforms, BC Hydro
Sechelt, British Columbia
Project manager and structural engineer involved the design of access stairs, platforms, guardrails and davit arms attached to the existing facility required for access to the Powerhouse roof.

Site C Clean Energy Project – Hydromechanical Works, BC Hydro
Ft. St. John, British Colombia
Lead structural engineer for the design and preparation of the drawings and technical specifications for the Site C Clean Energy Project Spillway Gates, Intake Gates, Low Level Outlet Gates, Gate Hoists, Lifting Beams, Trashracks, Anti-Vortex Devices and embedded parts.

Bear Creek Tower Demolition, BC Hydro
Sooke, British Colombia
Project manager for the design and workplan associated with the demolition and decommissioning of the intake tower, and installation of a concrete plug around the underwater intake valves.

Ladore Generating Station Powerhouse Upgrades, BC Hydro
Campbell River, British Columbia
Project manager and design engineer for the detailed evaluation and retrofit design of existing powerhouse structure for a new 150-ton gantry crane. Retrofit design includes modifications to the powerhouse, new crane rail system and laydown area site improvements.

Duncan Dam Fish Weir Replacement, BC Hydro
45 km North of Kaslo, British Colombia
Project manager for the detailed design of a new 3-step fish weir upgrade to the existing damaged weir at the Lower Level Outlet 2 at Duncan Dam.

Clayton Falls Powerhouse Condition Assessment, BC Hydro
Ft. St. John, British Colombia
Project manager and structural engineer involved in the general condition assessment of the Clayton Falls powerhouse superstructure and associated HVAC, lighting, fire and life safety systems. Review of the crane runway structure in compliance with WorkSafeBC regulations and the British Columbia Building Code was of particular importance.

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La Joie Penstock Seismic Assessment, BC Hydro
La Joie, British Columbia
Structural engineer involved in the seismic assessment of the La Joie south conduit. Work included development of design plan, methodology and implementation of the work. The work included finite element modeling and seismic evaluation of the south conduit and water conveyance system. Analyses consisted of stressed vibration analysis, pseudo-static analysis, and linear pushover analysis, considering fluid-structure interactions to determine the seismic withstand of the south conduit.

Wahleach, Cheakamus and Bridge River 2 Penstock Assessments, BC Hydro
Hope, Squamish and Seton Portage, British Columbia
Structural lead engineer for assessment of the steel surface penstocks, and steel tunnel liners at the following BCH facilities: Wahleach, Cheakamus and Bridge River 2. Complete assessment included a screening level, finite element, settlement and fatigue assessment. Methodology, and results were summarized in a detailed design report. Secondary scope involved feasibility design of access-ways, anchor points and to assist in completing recoating of the interior of the penstocks.

TransAlta - Ghost Diversion Reconstruction
Ghost River (Canmore), Alberta, Canada.
Lead structural design Engineer for the design and tender of a reconstructed water diversion system that was destroyed in the 2013 flood. Presented numerous options for replacement before recommending a concrete intake with Coanda screen and 5-km long, 1.5-m dia buried pipeline option.

General Civil Maintenance Programs, BC Hydro
Various, British Columbia
Project manager for the civil maintenance program for all of BCH facilities. Project involves the development of maintenance instructions, maintenance standards, design basis memorandums, passport loading spreadsheets for all facilities for the following infrastructure: Roads, tunnels, debris booms, powerhouses and auxiliary buildings.

General Fall Arrest Systems, BC Hydro
Various Facilities, British Columbia
Project manager and structural engineer involved in fall arrest solutions at the following BC Hydro facilities: Cheakamus, Wahleach, Coquitlam and Lake Buntzen. Completed the detailed design and issued for construction drawings for guardrails, landlines and fixed anchors, davit arm bases and modifications to the existing structure to incorporate the new fall arrest elements.

Clowhom Access Platforms, BC Hydro
Sechelt, British Columbia
Project manager and structural engineer involved the design of access stairs, platforms, guardrails and davit arms required for inspection and maintenance of the Clowhom spillway operating gate trunnions.

Strathcona Tunnel Analysis, BC Hydro
Campbell River, British Columbia
Structural engineer as part of a multi-disciplinary team to provide recommendations regarding the feasibility of an intake gate closure test under full flow. Involved in the structural analysis of the concrete portion of a steel lined, buried penstock to determine if the penstock could withstand the increased internal pressure for a closure underflow event.

Wahleach Fire Protection Upgrades, BC Hydro
Hope BC, British Columbia
Lead structural engineer for a multidisciplinary project involving fire protection upgrades. Work included definition design for the replacement of powerhouse fire protection systems and a new gravity-fed fire water supply fed from large storage tank with long downhill pipeline. A significant phase of the work also involved a geotechnical drilling program and seismic analysis to evaluate liquefaction potential and seismic hazard for the buried pipeline.

Columbia Power – Elko Generating Station
Elko, British Columbia
Structural lead for the redevelopment of the existing generating station. Redevelopment includes a new dam, spillway, penstocks, powerhouse and generating equipment and refurbishment of the existing intake and tunnel water passageway. Structural assessment of the existing concrete culvert and tunnel. Deficiency mapping, core extractions and assessment.

Anahim Creek Dam Rehabilitation
Alexis Creek, British Columbia
Rehabilitation of existing gate structures enabling water storage in the upstream meadow. Design of the gate rehabilitation, new steel walkway and gate supporting structure

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Aeneas Lake Dam Rehabilitation, Penticton Indian Band
Penticton, British Columbia
The dam at Aeneas Lake with leakage issue for over 10 years. The project was to rebuild and redesign the new dam with the auxiliary facilities. Engineer responsible for the design of the Low Level Outlet, the spillway and the water pipe, preparation of specification and report writing.

Poplar Creek Spillway Restoration, Syncrude
Fort McMurray, Alberta
Repairs to the Poplar Creek Spillway, a ~300-m long reinforced concrete structure. Specifications and drawings for concrete repairs and performed quantity take-off for tendering purposes.

Cleveland Dam Tunnel Upgrades, Metrovan
North Vancouver, BC
Involved with the design of a new concrete extension to the existing concrete tunnel, replacement of the existing ventilation system, and upgrades to the lighting.

Woodworth Dam Rehabilitation, City of Prince Rupert
Prince Rupert, BC
The Woodworth Dam retains the reservoir for the domestic water supply for the City of Prince Rupert. Design of a concrete repair to the existing spillway. Developed an anchorage testing program prior to the permanent installation. Currently the project is in preliminary design.

Nipawin Hydroelectric Dam Safety Audit, SaskPower
Nipawin, Saskatchewan
Performed a Dam Safety Audit on the Francois-Finlay Dam and associated structures in accordance with the CDA guidelines. Performed a site visit and inspection of the existing infrastructure. Completed a review of the OMS and Emergency Response Plan and summarized deficiencies and non-conformances in a dam safety report.

Bridge River 2 Generator Upgrade Studies, BC Hydro
Bridge River, BC
Project manager for the rehabilitation study on the existing concrete foundation to support several generator replacement and upgrade options.

Kwakiutl Creek Dams
Bella Bella, British Columbia
Emergency repairs of concrete and bedrock foundation leaks in two concrete water supply storage dams. Follow-on scope includes overall DSR and evaluations, leading to assessment of options for repair or replacement of the dams.

Burrard Generating Station – Comprehensive Structural Inspection, BC Hydro
Port Moody, BC
Project manager and design engineer for the comprehensive structural inspection of the Burrard Generating Station. Involved in the field inspections, report writing and review and overall management of the project.

Snoqualmie Hydroelectric Redevelopment, Pudget Sound Energy
Washington, United States
Responsible for many aspects of the $150M project including: the design of powerhouse substructure and superstructure, retaining walls, transformer basins, oil water separators, crane girders and columns, walkways, stairs and platforms. Involved with the design of turbine support details, tailrace structure, conduit, HVAC and pipe supports. Continuous involvement with mechanical, electrical, and geotechnical engineering disciplines to coordinate design requirements. Responsible for all structural construction queries and submittal reviews.

Bridge River and Revelstoke Generating Station – Safety Upgrades, BC Hydro
Revelstoke, British Columbia
Design engineer for the structural review of the safety systems at Bridge River and Revelstoke Generating Station. Reviewed the existing safety standards for the handrails, guardrails, stairways and ladders to existing WorkSafeBC and building code standards. Designed modifications and/or additional safety upgrades where required.

Upper Lillooet Innergex Bid Design
Lillooet, British Columbia
Responsible for many aspects of the bid design including the penstock systems for the three hydroelectrical plant locations. Preliminary design of penstock including the structural supports, anchor blocks and tunnel to penstock transition.

Mica GS – Pipe Support System, BC Hydro
Revelstoke, British Columbia
Project manager and design engineer for the structural review of the piping supports and seismic bracing required for the new piping system and cable trays at Mica Generating Station Units 5 and 6 and the seismic retrofit of the piping supports for Units 1 to 4.

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Alouette Shaft Inspection, BC Hydro
Mission, British Columbia
Inspection of the concrete enclosure at the base of the surge tower, for the future installation of a new Adit gate. Designer of the concrete rehabilitation and monorail system for installation of a new gate and removal of the old gate.

Horsey 230 kV Building Foundation, BC Hydro
Victoria, British Columbia
Design engineer of the structural foundation supporting the 230 kV building columns and equipment, and the industrial building specifications. The foundation was designed to withstand the extensive seismic demands from the building including an intricate piping rack system.

Sooke Reservoir Valve Replacement Study
Sooke, British Columbia
Performed a close proximity investigation of the Sooke Reservoir Intake to determine the structural requirements for replacement of the existing intake valves. Developed a means and methods report for replacement of the valves including modifications to the existing structure.

Glenmore Dam Bridge Inspection, City of Calgary
Calgary, Alberta
Performed a close proximity inspection of the Glenmore Dam Bridge superstructure. Project engineer for the structural evaluation and rehabilitation design as well as the overall stability of the dam from an extreme flood or seismic event.

Strathcona Dam-Seismic and Seepage Upgrade, BC Hydro
British Columbia
BC Hydro replaced two existing vertical lift gates at their Strathcona Generating Station on Vancouver Island. Project engineer for the detailed design of the intake gate.

Cheakamus and La Joie Dam Intake Towers, BC Hydro
British Columbia
Responsible for the seismic analysis of these reinforced concrete intake towers, approximately 40 m and 69 m high. Investigated the tower with elastic and inelastic analysis utilizing S-Frame and ADINA. Performed non-linear time history analyses for both intake towers using recorded ground motions obtained from actual earthquake records and developed remedial designs for the deficiencies.

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Geotechnical Engineer

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EDUCATION

Soft Ground & Hard Rock Mechanical Tunneling Technology Seminar, Colorado School of Mines, 2003

M.Eng. in Civil Engineering, University of Alberta, 1984

B.A.Sc. in Geological Engineering, University of British Columbia, 1973

PROFESSIONAL REGISTRATIONS

Registered Professional Engineer and Professional Geoscientist in British Columbia (Registration No. 10171)

Registered Professional Engineer in Washington (Registration No. 37424)

PROFESSIONAL ASSOCIATION

Fellow, Engineering Institute of Canada
Fellow, Geoscientists Canada

Tunnelling Association of Canada
President, 2005 to 2008;
Vice President, 2000 to 2004;
Director of BC Chapter, 1992 to 2014

Canadian Dam Association

Canadian Geotechnical Society

International Society for Rock Mechanics

International Association for Engineering Geology and the Environment

PROFESSIONAL HISTORY

Under contract with Klohn Crippen Berger Ltd., 2017 to date
Klohn Crippen Berger Ltd. and predecessor companies, 1973 – 2017
Geotechnical Engineer, 1973 - 2017

Manager, Geo-Structures, 2007-2017

General Manager, Geoenvironment, 2004-2006

Garry has over 40 years' experience in a variety of soil and rock projects. His experience includes conducting site investigations, designs, construction supervision and project management for hydroelectric development, bridges, highways and rapid transit projects. Garry is experienced in design and construction of embankment and roller compacted concrete dams, tunnels and shafts in hard and soft ground and safety evaluations of operating dams. Garry has authored several papers on dam and underground excavation design and construction.

HIGHLIGHTS OF EXPERIENCE

- Dams, Tunnels, and Transportation Geo-technique and Project Management.

KEY PROJECT EXPERIENCE

Site C Dam, BC Hydro
Fort St. John, British Columbia
Lead geotechnical engineer for optimization, implementation (detailed design and tender documents) phases and construction of 60 m high earthfill dam, diversion tunnels, powerhouse and spillway on weak shale foundation for 1100-MW hydroelectric development.

Water Retention & Conveyance Structures Program, BC Hydro
Campbell River, British Columbia
Geotechnical reviewer for design of upgrades and improvements at various hydroelectric developments: John Hart Dam (feasibility, preliminary and detailed design of seismic upgrades to main and north earthfill dams); Strathcona Dam (conceptual, feasibility and preliminary design for addition of low level outlet channel and spillway upgrade); Wilsey Dam Safety Assessment; Alouette Lake tunnel intake stability; GM Shrum (Bennett Dam) low level outlet decommissioning and spillway stability assessment; Mica Dam (develop 3D surfaces for incorporation in dam safety model); Puntledge and Comox Dams (erosion control); Wahleach development (post-seismic fire water system, tailrace tunnel assessment); Duncan Dam addition of fish weir to low level outlet. Project manager for Duncan Dam core raise (sheet pile installation) design and construction monitoring.

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Bukhtarma Dam Safety Assessment, Glencore
Serebryansk Kazakhstan
Safety assessment of 90 m high concrete gravity dam at 675 MW hydroelectric station. Reviewer for seismic stability analysis of dam.

Pump-Storage Concept Deign, Confidential Client
Western USA
Geotechnical and dam design reviewer for development of concept design for 300 m head, 1800 MW pump storage scheme including 100 m high RCC dam.

Traphiche Mine Development, Apurimac State, Molle Verde SAC
Apurimac, Peru
Reviewer for prefeasibility investigations and design for two 50 m high RCC dams for fresh water and wastewater storage for proposed mine development.

Nam San Hydro Development Assessment, Confidential Client
Thatom, Laos
Condition assessment of three hydro developments (69 MW, 700 m head, 40 m high RCC dam; 45 MW, 300 m head, 48 m high RCC dam; 7.5 MW, 250 m head; 6 m diversion weir), future 40 m storage dam and future 40 m high dam and 700 m head power development for potential buyer.

Cleveland and Seymour Falls Dams Safety Monitoring, Metro Vancouver
North Vancouver, British Columbia
Senior reviewer for routine instrumentation monitoring for 92 m high concrete gravity and 30 m high earthfill dams for community water supply.

Waneta Expansion Project, Columbia Power Corporation
Trail, British Columbia
Geotechnical reviewer for the preliminary engineering design studies and industry competition of a design-build contract for 335-MW power plant expansion. Owner's Engineer (geotechnical) during construction.

Elko Hydroelectric Upgrade, Columbia Power Corporation
Elko, British Columbia
Geotechnical reviewer for redevelopment of existing 12 MW run-of-river hydroelectric development including tunnel.

Arrow Lakes Generating Station Safety Reviews, Columbia Power Corporation
Castlegar, British Columbia
Senior reviewer for twice-yearly (low and high reservoir) assessments of performance of approach channel, concrete face rockfill dam, rock slopes, and powerhouse. Senior reviewer for assessment of performance of the instrumentation system.

Falls River, Clowhom, Whatshan and Ruskin Dam Safety Reviews, BC Hydro
Prince George, Sechelt, Needles and Maple Ridge, British Columbia
Senior reviewer for periodic dam safety reviews; Ruskin DSR included assessment of safety during various stages of upgrade construction.

Balambano Dam Efflorescence and Safety Assessment, PT Vale
Sorowako, Sulawesi, Indonesia
Project manager and lead engineer for assessment of concrete efflorescence in galleries of 99 m high roller-compacted concrete dam, including review of instrumentation and potential effect of efflorescence on drainage and piezometric responses affecting dam safety.

Keeyask Dam Value Engineering, Dragados-Ledcor JV
Gillam, Manitoba
Senior reviewer for development of value engineering designs related to dam and dyke design, during contractor's proposal phase for early-contractor-involvement contract.

Keeyask Dam RCC Alternative, Manitoba Hydro
Gillam, Manitoba
Senior reviewer for alternative feasibility design of 25 m high roller compacted concrete dam.

Cleveland Dam Safety Review, Metro Vancouver
North Vancouver, British Columbia
Senior reviewer for safety review of 92 m high concrete gravity dam, including seepage through overburden in abutments.

Pervari Hydroelectric Development Independent Review, Louis Berger Group/NTF Insaat Ticaret Ltd.
Siirit Province, Turkey
Geotechnical reviewer for independent review of feasibility design including 165 m high RCC dam, diversion and power tunnels, 400-MW surface

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powerhouse, landslide stabilization works, stream diversion, and seismic risk.

Cleveland Dam Monitoring, Greater Vancouver Regional District
West and North Vancouver, British Columbia
Review engineer for monitoring movements of 92 m high concrete gravity dam before and during nearby tunnelling activities.

Waneta Generating Station Due Diligence, BC Hydro
Trail, British Columbia
Project manager and lead civil/geotechnical engineer for due diligence review, condition assessment and review of operating and planning budgets for 79 m high dam and 480-MW hydroelectric station prior to client purchase.

Nam Theun 2 Hydroelectric Project, Italian Thai Development Public Company Ltd & Nishimatsu Construction Company
Lao Peoples Democratic Republic
Project manager for tender and detail design of 48 m high RCC dam with spillway, diversion tunnel, 12 saddle dams on reservoir rim and 5.3 km headrace channel. Review engineer for low and high pressure tunnels, shafts and 1074-MW surface powerhouse under 350 m head. Site reviews and design modifications during construction.

Brilliant Expansion Project, Columbia Power Corporation
Castlegar, British Columbia
Owner's lead civil engineer for a design-build contract for a 120-MW hydroelectric project. Activities involved the preparation of contract documents, review of proposals and design submissions, and conducting technical reviews during construction.

McGregor and Herrick Hydro Developments, TransCanada Ltd.
Northeast British Columbia
Lead geotechnical engineer for feasibility investigation and design of 85 m high RCC dam and 50-MW powerhouse on McGregor River; and diversion weir, 1000 m long power tunnel and 35-MW powerhouse on Herrick River.

Falls River Dam Safety Assessment, BC Hydro
Prince Rupert, British Columbia
Review engineer responsible for the review of the adequacy of remedial works and stability assessment under various operating regimes for 12 m high concrete gravity dam.

FERC Hydroelectric Project Relicensing
California, Connecticut, Oregon and Washington, USA
Geotechnical engineer and geologist for environmental assessments required for hydroelectric project relicensing for the Federal Energy Regulatory Commission. Work included erosion, sedimentation and slope stability; Pelton-Round Butte (Oregon); Box Canyon (Washington); Crane Valley, Mokulmne, Hat Creek and El Dorado (California); and Housatonic (Connecticut). Mokulmne included dam breaching and removal components. El Dorado included a tunnel construction component.

Peace Cascade Project, BC Hydro
Fort St. John – Hudson's Hope, British Columbia
Project manager for the conceptual design of multiple, low-head, low-consequence power projects along 85 km of the Peace River.

Mattagami River Dam Safety Review, Ontario Power Generation
Timmins, Ontario
Geotechnical engineer responsible for foundation and embankment dam aspects of a concrete dam safety review at four projects in northern Ontario. Reviews were performed in accordance with Canadian Dam Association guidelines and OPG guidelines.

Porce III Hydroelectric Project, Empresas Publicas de Medellin ESP
Medellin, Columbia
Geotechnical and dam design reviewer for 143 m high roller compacted concrete (RCC) gravity dam, spillway, diversion works, 15 km power tunnel and 688 MW underground powerhouse.

Skins Lake Maintenance Project, Alcan Smelters and Chemicals Ltd
Skins Lake (Burns Lake), British Columbia
Senior geotechnical engineer responsible for geotechnical aspects of design. Project manager during construction of the spillway upgrade including diversion pipelines, RCC dykes and basin infill and spillway chute and stilling basin.

South Muskoka River Dam Safety Review, Ontario Power Generation
South Falls, Ontario
Conducted a safety assessment of Trethewey Falls, Hanna and South Falls concrete gravity dams (total

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6.9 MW) in accordance with the Canadian Dam Association Guidelines.

Kanan B1 Hydroelectric Project, Government of Luzon, Philippines
Luzon, Philippines
Geotechnical engineer for the feasibility design of a 85 m high RCC dam, 8 km power tunnel and 112 MW surface powerhouse under 165 m head in seismically active area.

Bulanog-Batang Hydroelectric BOT Project, Sythe Energy
Mindanao, Philippines
Geotechnical engineer responsible for foundation and tunnelling aspects of dam design for a 125 m high RCC dam and 3.8 km long, 5 m diameter power tunnel and penstocks, and tender design for a 150 MW project.

Seven Mile Deficiency Investigations, BC Hydro
Trail, British Columbia
Conducted investigations and an assessment of the stability of reservoir slopes, stability of in-filled channel in abutment and strength of the foundation of an 80 m high concrete gravity dam.

Nam Theun 2 Hydroelectric Project, Italian Thai Development Public Company Ltd
Lao Peoples Democratic Republic
Lead geotechnical engineer for basic design of surface workings including 50 m high RCC dam, saddle dams, headrace channel and 30 km of tailrace and downstream channels for a 680 MW project. Geotechnical reviewer for Value Engineering reviews with Owner.

Lower Larona River Hydroelectric Development – Balambano and Karebbe Dams, PT Inco International
South Sulawesi, Indonesia
Lead geotechnical and dam engineer for feasibility and detail design and specification preparation, including a 99 m high RCC dam and 137 MW surface powerhouse. Also for the Karebbe project featuring a 65m high RCC dam and 88 MW underground powerhouse. Conducted reviews during construction of Balambano Dam, diversion tunnel (250 m long, 6.4 m lined diameter) and associated works. The Balambano project featured rock excavations of up to 40 m high in highly sheared, ultrabasic granitic rock.

South Fork Dam Safety Inspection, Greater Nanaimo Water District
Nanaimo, British Columbia
Geotechnical engineer for a dam safety inspection of a 30 m high concrete arch dam and water supply tunnel in accordance with Canadian Dam Association Guidelines.

Keenleyside Powerplant Project, Columbia Power Corporation
Castlegar, British Columbia
Owner's geotechnical engineer for a design-build contract for a 185 MW hydroelectric project. Prepared contract documents, reviewed proposals, conducted reviews during construction, created an emergency preparedness plan and operation and maintenance for safety manual.

Keenleyside Dam Lock Remedial Works, BC Hydro
Castlegar, British Columbia
Prepared design, construction engineering and conducted an assessment of navigation lock foundation treatment to reduce seepage quantities and uplift pressures beneath lock walls under 20 m net head.

Revelstoke Dam Deficiency Investigation, BC Hydro and Power Authority
Revelstoke, British Columbia
Conducted an assessment of the source of material, rate of migration of material ("fines") through rock foundation and drains of 175 m high concrete gravity dam. Also designed and installed a trial fines collection system.

FRED KHOSHNOUDIAN

Structural Engineer

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EDUCATION

B.A.Sc. in Civil Engineering
Isfahan University of Technology, Isfahan, Iran

M.Sc. in Structural Engineering
University of Lille 1, Lille, France

PROFESSIONAL REGISTRATIONS

Professional Engineer, Engineers, and Geoscientists British Columbia

PROFESSIONAL HISTORY

Klohn Crippen Berger Ltd. Vancouver, Canada
Structural Engineer, 2019-Present

Lar Consulting Engineers, Iran
Senior Structural Engineer, 2017-2019

BBA Engineering Ltd., Vancouver, Canada
Structural Engineer, 2016-2017

Lar Consulting Engineers, Iran
Junior to Senior Structural Engineer, 2000-2016

Fred is a structural engineer with over twenty years of experience working in performing finite element modeling and analysis. He has a strong technical background and experience in seismic analysis of hydroelectric projects of high complexity, including concrete dams, powerhouses, spillways, intake structures, and other hydraulic structures. Fred has been involved in condition assessments and the repair of buildings, powerhouses, and other hydraulic structures in high seismic zones. In addition, he is proficient with several structural design software programs, including SAP, Midas-Civil, and Midas-FEA-NX.

He has performed complex modeling projects such as Bukhtarma Dam seismic assessment, Bennett Dam seismic assessment, seismic analysis of Ladore and Strathcona gates as well as low-level outlet GMS Finite element modeling. He has implemented CDA and US Army corps engineering guidelines in analysis and design besides structural engineering codes and regulations.

HIGHLIGHTS OF EXPERIENCE

- Structural analysis and design for concrete dams, including arch, gravity and RCC dams, from conceptual studies to detailed design.
- Design of spillways, powerhouses and other hydro facility structures.
- Conceptual and detailed design of hydropower concrete structures, such as intake tower, tunnels, culverts, walls and heavy foundations.
- Evaluation of existing structures, including residential buildings and hydraulic structures for seismic retrofit, rehabilitation and strengthening.
- Knowledge and application of structural design codes, standards, and applicable building codes.
- Structural lead on many of Hydro projects.
- Seismic evaluation of structures using time history, as well as response spectrum.
- Performance-based design using American standards (FEMA 273, FEMA 356 and FEMA 440)
- Solid experience in soil-structure interactions.

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- Extensive experience on modeling the complicated structures using appropriate software and elements while subjected to usual, unusual and extreme loadings.

KEY PROJECT EXPERIENCE

BUKHTARAMA Dam Safety Investigation, seismic assessment of concrete gravity dam, Glencore International AG
British Columbia
The BUKHTARAMA Dam Safety Investigation including seismic assessment of the concrete gravity dam using Finite element modeling. Developing a structural 2D model of the Dam and performing a linear and nonlinear time history analysis. The objective of the analysis is to evaluate the seismic demands on the existing concrete gravity dam and determine the length of the crack while the strong ground motions happens.

Strathcona dam projects-Hoist building structure
BC Hydro
British Columbia
Prepare the analysis, design, and drawings of hoist building structure. The design objectives are to:

- Ensure that the hoist house structures are designed to withstand all the required loads and load combinations including crane loads.
- Ensure that the hoist house structures comply with all the applicable requirements defined in DBM.
- Ensure the design complies with current codes, standards, and applicable guidelines.
- Ensure the drawings were prepared according to BC Hydro standards.

Strathcona dam projects-Intake structure
BC Hydro
British Columbia
Prepare the simplified modeling, design calculations and the drawings of intake structure. The design objectives are to:

- Ensure the stability of intake structures under usual, unusual, and extreme loadings.
- Ensure that the simplified modeling of intake structure comply with compressive modeling of the structure.
- Ensure the design complies with current codes, standards, and applicable guidelines.

Strathcona dam projects-Steel gate structure
BC Hydro
British Columbia
Prepare the modeling and seismic analysis of steel gate using Midas FEA-NX and Midas Civil. The seismic analysis objectives are to ensure the gate structure comply with all the applicable requirements defined in DBM. This includes verification of von mises with acceptable criteria and check the deflection of gate under usual and extreme loadings.

Ladore Spillway Seismic Upgrade, Initial Design,
BC Hydro
British Columbia
Ladore is located west of Campbell river and Dam is a concrete gravity dam with 38m height. I investigated seismic assessment of Gate using response Spectrum Analysis with applying Floor design spectrum, hydrostatic and hydrodynamic loads based on CDA employing Midas-Civil software.

WAC Bennett Dam Safety Investigation, seismic assessment of spillway with bridge and radial gates
BC Hydro
British Columbia
The WAC Bennett Dam Safety Investigation including seismic assessment of the Spillway Headworks Structure. Developing a structural model of the Spillway Headworks Structure with the spillway bridge and radial gates and performing a response spectrum analysis (RSA). The objective of the RSA is to evaluate the seismic demands on the existing radial gates and spillway bridge of the Spillway Headworks Structure and their response under these demands.

WAC Bennett Dam Safety Investigation, Flip bucket stability analysis
BC Hydro
British Columbia
The WAC Bennett Dam Safety Investigation includes a preliminary overall stability assessment of the seismic performance of the spillway flip bucket structure. The overall stability of the spillway flip bucket was analyzed initially using rigid body analysis following the Canadian Dam Association (CDA).

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Bighorn Spillway Stability Assessment, TransAlta Generation Partnership, AB
Alberta
Bighorn dam is in west-central Alberta and built in 1972 and managed by TransAlta. My role was to perform an initial screen check of stability analysis of spillway using a quasi-static seismic analysis as well as various drainage efficiency based on CDA and I Prepared the report.

Site C/Clean Energy project, Hoist Building, BC Hydro
British Columbia
Check the calculation package and drawings of the concrete hoist building at the site C project. It is the concrete structure using shear wall to resist against lateral loads. I checked to comply with the appropriate Canadian codes and working design basis.

Site C/Clean Energy project, BC Hydro
British Columbia
Review the shop drawings associated with intake and check the compatibility with the design drawings.

Nechako Reservoir Baseline Engineering Review
British Columbia
The objective is to review the reports prepared by SNC. The overall objective of this work is to:

- Verify that the original design and construction is without any fatal flaws considering the current state of engineering practice.
- Verify that the current existing condition of the structures meets design criteria that are based on current international best practices and satisfy D5 Standard and regulatory requirements; if not, present a mitigation plan.
- Develop OMM (Operation, Monitoring and Maintenance) manuals and ERPs (emergency response plans) for the structures.

Burrard Generating Station Project-Comprehensive structural inspection
BC Hydro
British Columbia
The objective of the comprehensive structural inspection is to document the condition of the structures at the Burrard Generating Station (BGS). By identifying repair and rehabilitation needs of the structures, items that require early attention, and setting a basis for future inspections, structural management is continued. The management of these structures aids in protecting and prolonging the service life of the plant.

PUN Recoating Project Penstock Modifications project- Ladder design
British Columbia
Designing of Aluminium Ladder and its support and preparing detailed drawing.

Bukhtarma Dam Safety Investigation Project-Seismic assessment of Dam
British Columbia
Preparing seismic stability assessment of main spillway dam body and seismic evaluation of the penstock as well as review the report associated with Navigation lock structure.

Clemina and Serpentine Hydroelectric Projects
SRE Hydro Canada
British Columbia
Designed powerhouse structures, including stability analysis against sliding and overturning, using Mathcad. Prepared preliminary design according to associated standards.

Narrows Inlet Hydroelectric Project
Jim Dent Construction
British Columbia
Design of concrete plug tunnel (shape, length and reinforcement), based on the appropriate practical standards. Optimized the plug shape and length to reduce concrete volume.

Trio Creek Hydroelectric Project
Bremner Trio Hydro Corp.
British Columbia
Performed preliminary and detailed design of sluiceway structure of Trio Dam using SAP2000 and CSA-A23. Issued drawings for construction.

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Winchie Creek Hydroelectric Project
Barkley Group Project
British Columbia
Performed calculation of switchyard and intake box structure according to the project requirements and using CSA-A23 and CSA-S16. Responded to RFI when required.

Narrows Inlet Hydroelectric Project
Jim Dent Construction
British Columbia
Designed Substation of Chickwat, Lower and Upper Ramona, as parts of Narrow Inlet Hydroelectric Project, including stability analysis using Mathcad and detailed design using SAP2000 and CSA-A23.

Parsian Dam Project
Iran Water & Power Resources Development Company
Fars Province, Shiraz, Iran
Successfully completed feasibility and detailed design of Parsian concrete dam with the 145 m high arch, gravity and RCC (Roller Compacted Concrete Dam) concrete dam alternatives. Performed the detailed design, including stability and stress analyses while dam subjected to seismic loads using time history analysis. Designed diversion tunnel, using US Army Corps document (EM 1110-2-2901). The project cost was about $330 M.

Mamloo Dam Project
Tehran Province Water and Wastewater Co.
Tehran Province, Tehran, Iran
Completed conceptual and detailed design of heavy infrastructures for Mamloo Embankment Dam Project, including 60 m high irrigation shaft, Culverts, retaining walls, etc. Reviewed calculation design of spillway (ogee, chute and flip bucket) and reduced 30% cost by optimizing design calculation. Prepared detailed design of irrigation tunnel, including required thickness and reinforcement. The cost of this project was about $180 M.

Seismic Assessment and Rehabilitation of Tehran Water Conveyance System Project
Tehran Province Water and Wastewater Co.
Tehran Province, Tehran, Iran
A vulnerability assessment and the preparation of a rehabilitation plan for the Tehran Water Conveyance System was completed using appropriate standards. The structures were constructed in 1960 with high seismic hazard. The project includes a large number of water treatment plants, reinforced concrete buried reservoirs, pump stations, telemetry and office buildings and pipelines.

Seismic Upgrade of Khuzestan School Buildings
Organization for Development, Renovation and Equipping of Schools of Iran
Khuzestan Province, Ahvaz, Iran
Prepared seismic upgrade for thirty school buildings, including reinforced concrete, steel and masonry buildings in Khuzestan Province. The project consists following steps:

- Preliminary screenings to ascertain their level of seismic risk (low, moderate, or high) and assess whether they should or should not be subjected to more detailed investigation.
- Performance evaluation to identify the vulnerability of the structural system and its components to seismic loads.
- Seismic upgrading to enhance the overall resistance of the building and individual components within the building to achieve the target objectives (IO, LS, CP)

Namrood Dam Project
Ministry of Energy
Firuzkuh Province, Firuzkuh, Iran
Completed conceptual studies and detailed design of spillway (weir, chute and stilling basin) and suggested the implementation of micro piles to reduce excessive uplift pressure under spillway. Designed intake structure using associated US Army Corps standard. The Namrood Dam Project cost was about $170 M.

Kamal Saleh Embankment Dam Project
Markazi Regional Water Authority
Markazi Province, Arak, Iran
Completed conceptual studies and detailed design of spillway, vertical shaft, inlet and outlet intake structures for Kamal Saleh Embankment Dam Project.The project cost was about $170 M.

Badovli Dam Project
West Azerbaijan Regional Water Authority
West Azerbaijan province, Urmia, Iran
Successfully completed seismic analysis of Badovli RCC Dam according to US Army corps documents. Time history analyses were performed to calculate the principal stress of the dam when subjected to earthquakes. The project cost was about $120 M.

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Tabriz Powerhouse Project
Ministry of Energy
East Azerbaijan province, Tabriz, Iran
Reviewed structural design reports to ensure adherence to accurate analysis procedures and guidelines of Tabriz Powerhouse (turbine foundation and substructure). The project was designed and constructed by the French company, "Alstom." This project was performed in order to identify the cause of unbalanced settlements after construction stage.

Namrood Residential Building Project
Ministry of Energy
Firuzkuh Province, Firuzkuh, Iran
Reviewed the calculation report of Namroud residential buildings, including reinforced concrete, steel and masonry buildings, with a total area of 16 000 sqm and buildings up to 3 stories. Suggested some modifications to provide cost effective solutions, based on appropriate standards and practical experience.

Kamal Saleh Residential Building Project
Markazi Regional Water Authority
Markazi Province, Arak, Iran
Detailed design of Kamal Saleh residential buildings using appropriate standards (ACI 318, AISC, ACI 530) and various seismic-force-resisting systems (ordinary moment frame, concentrically braced frames, conventional construction-shear walls) for reinforced concrete, steel and masonry buildings.

Mamloo Industrial Project
Tehran Province Water and Wastewater Co.
Tehran Province, Tehran, Iran
Prepared detailed design and calculation reports of industrial structures related to Mamloo Project, including control, valves and bottom outlet rooms, with variety of spans (8 – 12 m) and height (10 - 23 m).

LAWRENCE CHIU, P.ENG.

Geotechnical Engineer

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EDUCATION

B.A.Sc. Geological Engineering
University of British Columbia, 2016

PROFESSIONAL REGISTRATIONS

Professional Engineer (P.Eng)
Engineers and Geoscientist British Columbia

PROFESSIONAL HISTORY

Klohn Crippen Berger Ltd.
Geotechnical Engineer, 2017-Present

WSP Group Inc.
Junior Geotechnical Engineer, 2016

Robertson GeoConsultants
Co-op Student, Mining Hydrogeology & Geotechnical Engineering, 2015

Levelton Consultants
Co-op Student, Geotechnical Engineering, 2014

AMEC Environmental & Infrastructure
Co-op Student, Materials Technician, 2013

Lawrence is a Geotechnical Engineer with Klohn Crippen Berger's Power & Transportation Group. He has over fours years experience working on geotechnical engineering projects, including highways, bridges, industrial facilities, hydropower dams, marine facilities. and railways. His experience includes foundation design, geotechnical analysis, planning and undertaking geotechnical exploration drilling, and field construction monitoring.

HIGHLIGHTS OF EXPERIENCE

- Shallow and deep foundation design, including spread footings, driven piles, drilled shafts, and shear piles.
- Limit-equilibrium slope stability analysis, settlement analysis, and lateral pile analysis.
- Preparation of geotechnical borehole logs, AutoCAD, and Graphical Information Systems.
- Field construction monitoring, geotechnical exploration drilling, laboratory soils testing, and earthworks backfill compaction testing.
- Groundwater sampling, well-development and in-situ aquifer permeability testing.

KEY PROJECT EXPERIENCE

Highway 1 Illecillewaet Four-Laning Project
Revelstoke, British Columbia
Value engineering redesign of a 1 km section of Ministry of Transportation highway located in steep mountainous terrain between Revelstoke and Golden. Design engineer-of-record for geotechnical aspects including drilled shaft slope stabilization shear piles, rock socket design for cantilevered bridge foundations, and MSE lock-block retaining walls. Planned and undertook geotechnical exploration drilling to support VE design work.

Valley Line West LRT Project – Bid Engineering
Edmonton, Alberta
Bid Engineering preliminary design for proposed urban LRT project. Preliminary design of deep foundations included drilled shafts and driven steel piles for various LRT structures including bridges, elevated guideways, at-grade trackways, and operations facilities. Performed settlement analysis to predict performance of settlement-sensitive track structures. Planning of proposed geotechnical explorations required to support detailed design.

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Dry Creek Bridge – Highway 29
Fort St. John, B.C
Design of drilled shaft slope stabilization shear piles to improve stability of bridge abutments. Performed calculation checks for slope stability of bridge abutments and proposed stability berms.

John Hart Dam Seismic Upgrade – Preliminary and Detailed Design
Campbell River, British Columbia
Review of drill hole information for site characterization and development of geologic sections for FLAC seismic deformation analysis. Support preparation of tender documents and technical specifications for seismic upgrade work including marine dredging and filling, stabilization berm construction, dam instrumentation, excavations, and slope stabilization shear piles.

Vessel Moorage on Fraser River
Richmond, British Columbia
Geotechnical engineer for concept design of a moorage facility for two re-purposed BC Ferries. Working with marine structural engineers, performed lateral pile analysis to design driven steel mooring piles subject to vessel mooring and berthing loads. Cost estimation and planning for proposed detailed design analysis and geotechnical exploration drilling and CPT program.

E.B Campbell Dam – Safety Boom
Nipawin, Saskatchewan
Lateral pile analysis for design of a reservoir safety boom shore anchor. Worked with structural engineers to size pile and required pile penetration depths. Provided construction support during pile driving construction.

Centerm Expansion – Maplewood Marine Restoration Project
Vancouver, British Columbia
Field engineer and office support for land reclamation construction at the inter-tidal mudflat at Maplewood Flats in North Vancouver. Field monitoring and reporting on a marine based geotechnical exploration drilling and CPT program to support the design of the restoration works. This was a habitat remediation component of the major expansion of Centerm container terminal at the Inner Harbour, as Owner's Engineer for Port Metro Vancouver.

Skins Lake Dam – Plunge Pool Repairs
Nechako Reservoir, British Columbia
Field Engineer monitoring repairs for the Skins Lake Dam plunge pool. Field review of dry mix-shotcrete repairs of plunge pool walls, rock dowels installations and testing, and RCC slab repairs within dewatered spillway and plunge pool.

Bear Lake Dam #1 & #2 Rip Rap Resurfacing Project
Nechako Reservoir, British Columbia
Field monitoring and office support for rip rap construction for two saddle dams on the Nechako Reservoir. Provided construction support during rip rap production at site quarry and field monitoring during rip rap placement. Review of post-construction surveys, preparation of construction report and record drawings.

Annacis Wastewater Treatment Plant Stage V Expansion
Delta, British Columbia
Field construction monitoring for expansion of wastewater treatment facilities. Review of excavation subgrade, excavation shoring, contractor dewatering effort, CSM wall and jet grout column installations, review of survey and settlement monitoring for protection of existing structures, permanent ground anchor installation and proof testing.

Northwest Langley Wastewater Treatment Plant Stage 1 Expansion – Geotechnical Exploration
Langley, British Columbia
Field monitoring for landside and marine geotechnical exploration drilling for proposed expansion of wastewater treatment plant facilities, treated sewage outfall, and HDD sanitary force main river crossing alignments. Monitored sonic, auger, mud rotary drilling, CPT/SCPT, and Becker Penetration Testing. Conducted monitoring well and VWP installation, shelby tube sampling, in-situ vane testing, sampling for soil environmental and corrosivity testing. Planning, cost estimating, tender support, and data reporting.

Northwest Langley Wastewater Treatment Plant Phase 1 Ground Improvement and Preload
Langley, British Columbia
Field monitor for ground improvement stone column construction at wastewater treatment plant site. Field review and office assessment of post-densification cone penetration testing for compliance to performance specification requirements. Develop GIS database to track stone column construction progress and flag problematic areas. Field review and approval of excavation subgrade and fill placement.

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Northwest Langley Wastewater Treatment Plant Phase 2 Ground Improvement and Preload
Langley, British Columbia
Tender support & planning, review of geotechnical exploration data and preparation of contours defining limits of proposed ground improvement stone column construction.

Iona Island Wastewater Treatment Plant Biogas Line Replacement Project
Richmind, British Columbia
Review of historic settlement and geotechnical drill hole data. Estimate post-seismic footing bearing capacity for proposed biogas pipe support spread footings. Project estimated differential settlement along biogas line route based on historic settlement monitoring trends.

Alex Fraser Bridge Capacity Improvement Project
Lower Mainland, British Columbia
Design of driven pile and micropile foundations for proposed traffic signage across lower mainland highways. Conducted slope stability analysis on highway approach embankments. Monitored geotechnical exploration drilling (CPT, Augers and Mud Rotary) to support design. Project coordination and field review of foundation pile driving and micropile installations during construction.

Highway 17/91 Upgrades
Delta, British Columbia
Planning, site reconnaissance and field monitoring of geotechnical exploration for proposed highway upgrades along Highway 17/91 in Delta. Field monitoring includes mud rotary drilling, cone penetration testing, and coordination of subsurface utility locating.

CN Rail Watson Siding
Prince Rupert, British Columbia
Conduct slope stability assessment for proposed rail embankment siding bearing on soft estuary sediments.

CN Rail Kaien Siding
Prince Rupert, British Columbia
Conducted slope stability assessment and scoping level material volume estimates for proposed rail embankment siding alignment.

CN Rail Yale Subdivision Mile 118.7 Seismic Upgrade
Surrey, British Columbia
Field monitor for timber pile compaction piling for ground improvement work for rail bridge approach. Field monitoring to ensure piling work follows method specification contract requirements, review of settlement survey monitoring of bridge structure, and collect vibration monitoring data during production piling. Field review of post-densification verification CPT testing.

Agassiz-Rosedale Bridge – Pier 7 Seismic Upgrade
Surrey, British Columbia
Field monitoring for driven steel pipe pile foundation for bridge piers. Real-time monitoring of vibration monitoring, manual and automated surveys for protection of existing structures.

Deltaport Berths 1 Sinkhole Repairs
Delta, British Columbia
Field engineer for inspection and repairs for a deep sinkhole behind the wharf caissons at a keyway joint. Field monitoring and reporting of concrete placement, backfill compaction to reinstate grade and pavement structure at an active port facility.

Salmon River Diversion Dam Decommissioning
Campbell River, British Columbia
Field monitoring for dam decommissioning project. Review of excavation slope stability, dewatering measures, and project planning.

Highway 7 Widening Project
Mission, British Columbia
Coordinated traffic control, lane closure, and permitting for night time geotechnical drilling work along Highway 7. Field monitoring of in-situ Cone Penetration Testing and auger drilling.

Portside Road Widening Project
Richmond, British Columbia
Conducted slope stability, soil liquefaction, and seismic displacement analysis for proposed bridge crossing in Richmond.

Kemano T2 Hydropower Tunnel
Kitimat, British Columbia
Submittal reviews and distribution, assist in tunnel support design concept and report preparation.

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Stave Falls Diesel Generator Pad
Mission, British Columbia
Field construction monitoring and subgrade review for diesel generator pad.

YVR West Deicing Pad Expansion
Richmond, British Columbia
Planned and monitored geotechnical exploration program for proposed west deicing pad – Drilling, test pitting, monitoring well installation, field vane testing. Soil and groundwater environmental sampling.

YVR RESA 2017 Runway 26L & 13-31 Crosswinds
Richmond, British Columbia
Site construction monitoring - subgrade review and proof rolling of pavement structure granular fill for expansion of taxiways and runway extension safety areas.

Cleveland Dam East Abutment Inclinometer Monitoring
North Vancouver, British Columbia
Conduct periodic slope inclinometer readings at east abutment of Cleveland Dam as part of dam safety monitoring program. Plot and summarize inclinometer data in quarterly/annual inclinometer monitoring report.

TransMountain Expansion Project
Burnaby, British Columbia
Slope stability analysis of shoring design for slope cuts and road widening works at product receiving terminals. Review of seismic refraction geophysical survey and borehole data to develop design sections for secondary containment berms. Performed and coordinated laboratory testing, preparation of borehole logs, test hole location plans, and design concept drawings using AutoCAD.

Myra Falls Mine Closure Planning – Nyrstar
Strathcona Provincial Park, British Columbia
Sonic core Logging, soil sampling for geotechnical and geochemical testing, groundwater sampling, and water level measurements as part of hydrogeology drilling program. Site reconnaissance for potential borrow sources. Analysis of slug test data and preparation of soil logs and cross sections.

Historic Rum Jungle Rehabilitation Project – Northern Territory DoR
Batchelor, Northern Territory, Australia
Feasibility study and preliminary cost estimating for proposed closure scenario at legacy uranium mine site. Compiled and summarized groundwater level and water quality data for development and calibration of site wide groundwater model.

Tsawwassen Mills Mall Development – Ivanhoe Cambridge
Delta, British Columbia
Subgrade review and nuclear density compaction testing for perimeter roads. Inspection of preloads, footings and subbase material at mall site.

Lindbergh SAGD Expansion Project – Pengrowth Energy
Lindbergh, Alberta
Nuclear density compaction testing and field construction monitoring for site wide earthworks grading. Field plastic concrete testing and laboratory cylinder break tests.

APPENDIX II

Work Breakdown Structure (WBS) and Budget

Prepared By: Ali Rasekh
Checked By: Brian Borton

PR22P02-29

PROJECT BUDGET

WORK BREAKDOWN STRUCTURE (WBS)

				Project Manager - E5	Project (Senior) Reviewer - E6	Structural (Senior) Reviewer - E6	Structural Eng - E5	Structural Eng - E3	Geotechnical Reviewer -E7	Geotech Eng - E3	Drafting Technician - T4	Admin - C2	Total Hours	KCB Labour Fees	KCB Expenses	Expense Markup	KCB Disb Allowance	KCB Total	Sub Costs	Totals
				Ali Rasekh	Dave Dowdell	Brian Borton	Ali Rasekh	Fred Khoshnoudian	Garry Stevenson	Lawrence Chiu	Various	Various								
			Fee per hour:	$207	$243	$243	$207	$155	$279	$155	$140	$88				0%	0%			
				Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours	Hours								
Phase I - Spillway Gate Replacement Support	I-1	**Project Management for Phase I**	Subtotals:	18	1	1	8	9	1	3	0	1	42	$8,095.00	$0.00	$0.00	$0.00	$8,095.00	$0.00	$8,095.00
		Task 01	Project Kick-off meeting	2	1	1		1		1			6	$1,210.00	$0.00	$0.00	$0.00	$1,210.00	$0.00	$1,210.00
		Task 02	PWB Status Update (4 months x 4 hours per month)	16								1	17	$3,400.00	$0.00	$0.00	$0.00	$3,400.00	$0.00	$3,400.00
		Task 03	Phase I Presentation to FERC				8	8	1	2			19	$3,485.00	$0.00	$0.00	$0.00	$3,485.00	$0.00	$3,485.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-2	**Data Review and Project Familiarization**	Subtotals:	16	2	2	12	32	1	24	0	0	89	$15,727.00	$4,000.00	$0.00	$0.00	$19,727.00	$0.00	$19,727.00
		Task 01	Background Data and Drawing Review	0	2	2	8	16	1	4			33	$6,007.00	$0.00	$0.00	$0.00	$6,007.00	$0.00	$6,007.00
		Task 02	Site Visit	16				16		16			48	$8,272.00	$4,000.00	$0.00	$0.00	$12,272.00	$0.00	$12,272.00
		Task 03	Site Visit Report				4			4			8	$1,448.00	$0.00	$0.00	$0.00	$1,448.00	$0.00	$1,448.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-3	**Develop a Structural Analysis Plan and Design Basis Memorandum (DBM)**	Subtotals:	1	5	14	20	38	2	12	0	3	95	$17,536.00	$0.00	$0.00	$0.00	$17,536.00	$0.00	$17,536.00
		Task 01	Functional Requirements and Failure Modes		2	4	4	4	1	4			19	$3,805.00	$0.00	$0.00	$0.00	$3,805.00	$0.00	$3,805.00
		Task 02	Draft DBM		2	8	8	24	1	4		2	49	$8,881.00	$0.00	$0.00	$0.00	$8,881.00	$0.00	$8,881.00
		Task 03	Final DBM	1	1	2	4	8		2		1	19	$3,402.00	$0.00	$0.00	$0.00	$3,402.00	$0.00	$3,402.00
		Task 04	Technical Meeting to discuss DBM				4	2		2			8	$1,448.00	$0.00	$0.00	$0.00	$1,448.00	$0.00	$1,448.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-4	**Development and Verification of the 3D Finite Element Model (FEM)**	Subtotals:	0	0	0	22	96	0	0	96	0	214	$32,874.00	$0.00	$0.00	$0.00	$32,874.00	$0.00	$32,874.00
		Task 01	Preliminary 2D FEM				2	16			16		34	$5,134.00	$0.00	$0.00	$0.00	$5,134.00	$0.00	$5,134.00
		Task 02	3D Geometric Model				4	16			80		100	$14,508.00	$0.00	$0.00	$0.00	$14,508.00	$0.00	$14,508.00
		Task 03	3D Mesh and Interface Contacts				8	40					48	$7,856.00	$0.00	$0.00	$0.00	$7,856.00	$0.00	$7,856.00
		Task 04	Hydrostatic Load, Uplift, and Hydrodynamic Mass				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
		Task 05	Silt Load and its Equivalent Mass				4	8					12	$2,068.00	$0.00	$0.00	$0.00	$2,068.00	$0.00	$2,068.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-5	**Static Analysis for Normal, Flood, and Low Reservoir Levels**	Subtotals:	0	0	0	14	72	0	0	0	0	86	$14,058.00	$0.00	$0.00	$0.00	$14,058.00	$0.00	$14,058.00
		Task 01	Construction Stage Analysis				4	24					28	$4,548.00	$0.00	$0.00	$0.00	$4,548.00	$0.00	$4,548.00
		Task 02	Static Analysis: Normal Reservoir Level				2	8					10	$1,654.00	$0.00	$0.00	$0.00	$1,654.00	$0.00	$1,654.00
		Task 03	Static Analysis: Flood Reservoir Level				2	8					10	$1,654.00	$0.00	$0.00	$0.00	$1,654.00	$0.00	$1,654.00
		Task 04	Static Analysis: Low Reservoir Level				2	8					10	$1,654.00	$0.00	$0.00	$0.00	$1,654.00	$0.00	$1,654.00
		Task 05	Global Stability Factors of Safety				4	24					28	$4,548.00	$0.00	$0.00	$0.00	$4,548.00	$0.00	$4,548.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-6	**Response Spectrum Analysis**	Subtotals:	0	0	0	16	56	0	0	0	0	72	$11,992.00	$0.00	$0.00	$0.00	$11,992.00	$0.00	$11,992.00
		Task 01	Modal Analysis				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
		Task 02	Response Spectrum Analysis				8	24					32	$5,376.00	$0.00	$0.00	$0.00	$5,376.00	$0.00	$5,376.00
		Task 03	Validation and Sensitivity Studies				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-7	**Spillway Structural Demands**	Subtotals:	0	0	0	12	48	0	0	0	0	60	$9,924.00	$0.00	$0.00	$0.00	$9,924.00	$0.00	$9,924.00
		Task 01	Seismic Demand at the Gate Locations				8	32					40	$6,616.00	$0.00	$0.00	$0.00	$6,616.00	$0.00	$6,616.00
		Task 02	Pier Section Forces for Strength/Stability Checks				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	I-8	**Phase I Report**	Subtotals:	1	3	10	16	50	0	0	0	3	83	$14,692.00	$0.00	$0.00	$0.00	$14,692.00	$0.00	$14,692.00
		Task 01	Draft Report		2	8	8	40				2	60	$10,462.00	$0.00	$0.00	$0.00	$10,462.00	$0.00	$10,462.00
		Task 02	Final Report	1	1	2	4	8				1	17	$3,092.00	$0.00	$0.00	$0.00	$3,092.00	$0.00	$3,092.00
		Task 03	Submittal Review Meeting				4	2					6	$1,138.00	$0.00	$0.00	$0.00	$1,138.00	$0.00	$1,138.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Phase I Totals				36	11	27	120	401	4	39	96	7	741	$124,898.00	$4,000.00	$0.00	$0.00	$128,898.00	$0.00	$128,898
Phase II – Dam Stability Evaluation – Linear Analysis	II-1	**Project Management for Phase II**	Subtotals:	16	0	0	8	8	0	0	0	1	33	$6,296.00	$0.00	$0.00	$0.00	$6,296.00	$0.00	$6,296.00
		Task 01	PWB Status Update (4 months x 4 hours per month)	16								1	17	$3,400.00	$0.00	$0.00	$0.00	$3,400.00	$0.00	$3,400.00
		Task 02	Phase II Presentation to FERC				8	8					16	$2,896.00	$0.00	$0.00	$0.00	$2,896.00	$0.00	$2,896.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	II-2	**Thermal Structural Analysis**	Subtotals:	0	0	0	10	48	0	0	0	0	58	$9,510.00	$0.00	$0.00	$0.00	$9,510.00	$0.00	$9,510.00
		Task 01	Thermal Analysis (Temperature Distribution)				8	32					40	$6,616.00	$0.00	$0.00	$0.00	$6,616.00	$0.00	$6,616.00
		Task 02	Static Analysis with Thermal Loads				2	16					18	$2,894.00	$0.00	$0.00	$0.00	$2,894.00	$0.00	$2,894.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	II-3	**Seismic Linear Time History Analysis (LTHA)**	Subtotals:	0	0	0	42	136	0	0	0	0	178	$29,774.00	$15,000.00	$0.00	$0.00	$44,774.00	$0.00	$44,774.00
		Task 01	Calibration of the Model using Dam Monitoring Data				16	32					48	$8,272.00	$0.00	$0.00	$0.00	$8,272.00	$0.00	$8,272.00
		Task 02	Seismic Input, radiation Damping				2	8					10	$1,654.00	$0.00	$0.00	$0.00	$1,654.00	$0.00	$1,654.00
		Task 03	Deconvolution Study				4	8					12	$2,068.00	$0.00	$0.00	$0.00	$2,068.00	$0.00	$2,068.00
		Task 04	LTHA (12 analysis) 3 records -2 water Elevations - Summer/Winter				8	48					56	$9,096.00	$15,000.00	$0.00	$0.00	$24,096.00	$0.00	$24,096.00
		Task 05	Post-Earthquake Stability Factors of Safety				8	24					32	$5,376.00	$0.00	$0.00	$0.00	$5,376.00	$0.00	$5,376.00
		Task 06	Validation and Sensitivity Studies				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	II-4	**Spillway Structural Demands**	Subtotals:	0	0	0	24	72	0	0	0	0	96	$16,128.00	$0.00	$0.00	$0.00	$16,128.00	$0.00	$16,128.00
		Task 01	Seismic Demand at the Gate Locations - Floor Response Spectrum				16	48					64	$10,752.00	$0.00	$0.00	$0.00	$10,752.00	$0.00	$10,752.00
		Task 02	Pier Section Forces for Strength/Stability Checks				8	24					32	$5,376.00	$0.00	$0.00	$0.00	$5,376.00	$0.00	$5,376.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	II-5	**Phase II Report**	Subtotals:	1	3	10	16	50	0	0	0	3	83	$14,692.00	$0.00	$0.00	$0.00	$14,692.00	$0.00	$14,692.00
		Task 01	Draft Report		2	8	8	40				2	60	$10,462.00	$0.00	$0.00	$0.00	$10,462.00	$0.00	$10,462.00
		Task 02	Final Report	1	1	2	4	8				1	17	$3,092.00	$0.00	$0.00	$0.00	$3,092.00	$0.00	$3,092.00
		Task 03	Submittal Meeting				4	2					6	$1,138.00	$0.00	$0.00	$0.00	$1,138.00	$0.00	$1,138.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Phase II Totals				17	3	10	100	314	0	0	0	4	448	$76,400.00	$15,000.00	$0.00	$0.00	$91,400.00	$0.00	$91,400
Phase III – Dam Stability Evaluation – Nonlinear Analysis	III-1	**Project Management for Phase III**	Subtotals:	16	0	0	8	8	0	0	0	4	36	$6,560.00	$0.00	$0.00	$0.00	$6,560.00	$0.00	$6,560.00
		Task 01	PWB Status Update (4 months x 4 hours per month)	16								4	20	$3,664.00	$0.00	$0.00	$0.00	$3,664.00	$0.00	$3,664.00
		Task 02	Phase III Presentation to FERC				8	8					16	$2,896.00	$0.00	$0.00	$0.00	$2,896.00	$0.00	$2,896.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	III-2	**Seismic Nonlinear Time History Analysis (NTHA)**	Subtotals:	0	0	0	32	136	0	0	0	0	168	$27,704.00	$15,000.00	$0.00	$0.00	$42,704.00	$0.00	$42,704.00
		Task 01	Updating contact surfaces at Potential Failure-Planes				4	24					28	$4,548.00	$0.00	$0.00	$0.00	$4,548.00	$0.00	$4,548.00
		Task 02	NTHA (7 analyses) - 7 records				16	80					96	$15,712.00	$15,000.00	$0.00	$0.00	$30,712.00	$0.00	$30,712.00
		Task 03	Post-Earthquake Stability Factors of Safety				8	16					24	$4,136.00	$0.00	$0.00	$0.00	$4,136.00	$0.00	$4,136.00
		Task 04	Validation and Sensitivity Studies				4	16					20	$3,308.00	$0.00	$0.00	$0.00	$3,308.00	$0.00	$3,308.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	III-3	**Spillway Structural Demands**	Subtotals:	0	0	0	24	72	0	0	0	0	96	$16,128.00	$0.00	$0.00	$0.00	$16,128.00	$0.00	$16,128.00
		Task 01	Seismic Demand at the Gate Locations - Floor Response Spectrum				16	48					64	$10,752.00	$0.00	$0.00	$0.00	$10,752.00	$0.00	$10,752.00
		Task 02	Pier Section Forces for Strength/Stability Checks				8	24					32	$5,376.00	$0.00	$0.00	$0.00	$5,376.00	$0.00	$5,376.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	III-4	**Phase III Report**	Subtotals:	1	3	10	16	50	0	0	0	3	83	$14,692.00	$0.00	$0.00	$0.00	$14,692.00	$0.00	$14,692.00
		Task 01	Draft Report		2	8	8	40				2	60	$10,462.00	$0.00	$0.00	$0.00	$10,462.00	$0.00	$10,462.00
		Task 02	Final Report	1	1	2	4	8				1	17	$3,092.00	$0.00	$0.00	$0.00	$3,092.00	$0.00	$3,092.00
		Task 03	Submittal Meeting				4	2					6	$1,138.00	$0.00	$0.00	$0.00	$1,138.00	$0.00	$1,138.00
													0	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Phase III Totals				17	3	10	80	266	0	0	0	7	383	$65,084.00	$15,000.00	$0.00	$0.00	$80,084.00	$0.00	$80,084
Project Totals				70	17	47	300	981	4	39	96	18	1,572	$266,382.00	$34,000.00	$0.00	$0.00	$300,382.00	$0.00	$300,382

Klohn Crippen Berger

Printed: 2022-07-07

APPENDIX III

Subconsulting Services Agreement

March 1, 2021

Brian Borton, P.Eng, PE
Klohn Crippen Berger
500-2955 Virtual Way
Vancouver BC V5M 4X6
Canada

Re: Letter Agreement for Subconsulting Services on Searsville Watershed Restoration Project

Dear Mr. Borton:

McMillen, LLC dba McMillen Jacobs Associates (Owner) desires to retain your company's services in connection with the Searsville Watershed Restoration Project ("Project") for Stanford University ("Client"), under the terms described below.

The services that Klohn Crippen Berger (Subconsultant) will perform are described in Attachment "A" of this letter, with a not-to-exceed amount of **$27,528.00**. Owner's receipt of payments from the Subconsultant is a condition preceding Owner's payment to Subconsultant. Contractually, the Client has stated they will pay no later than 30 days after we submit our invoice.

All services will be performed in accordance with generally accepted standards of professional care and in compliance with all laws and regulations. In addition, all instruments of service will be in a form and format acceptable to Owner and will be sealed, when appropriate, by a properly registered professional.

The Owner may make changes to the scope of the Subconsultant's services, as it deems appropriate, by issuing a written authorization. If changes are made, your compensation and the time to complete your performance will be adjusted, as appropriate. The approximate start date shall be March 1, 2021.

Your company will indemnify and hold McMillen Jacobs Associates harmless from claims and losses arising out of the negligent performance of your services. McMillen Jacobs Associates will indemnify, defend, and hold Klohn Crippen harmless from claims and losses arising out of negligent performance of our services.

The Subonsultant's services may be terminated or suspended if Owner's agreement with the Client is terminated or suspended, or if your services under this agreement are unsatisfactory. In such case, you will be paid for all services satisfactorily performed to the date of termination or suspension, after Owner's receipt of payment for the Subonsultant's services from the Client.

The terms and conditions attached to this letter (Attachment B) represent the entire understanding between Subconsultant and Owner concerning subconsulting services on the Project. This agreement may only be modified in writing, signed by both of authorized representatives of both companies.

We look forward to working with you on this Project. If the terms of this agreement are acceptable, please sign two copies of this letter in the space provided below and return them to me. I will sign both copies and send you an original back for your files.

By: _____

Title: Director of Operations, VP

"Owner"

This Agreement is accepted this
1st day of March, 2021

Klohn Crippen Berger

"Subconsultant"

By: _____

Ryan Douglas, P.E.

Title: VP - Power & Transportation

Attachment A
Scope of Services

ATTACHMENT A
Stanford University
Searsville Watershed Restoration Project
Statement of Work

Background

McMillen Jacobs Associates (McMillen Jacobs) is under contract to provide design build services for the Searsville Watershed Restoration Project (Project). The work includes modification to the existing Searsville Dam to support sediment evacuation from the existing reservoir, restoration of the Delta/Reservoir area, installation of sediment traps downstream from the existing dam, and modification of the dam operation from a water supply storage reservoir to a short-term flow attenuation reservoir. As part of the dam modifications, a new 14-foot diameter horseshoe tunnel will be excavated through the dam and fitted with a roller gate on the upstream face. The new tunnel and gate will be used to flush sediment from the reservoir, then provide a fixed gate opening for future operation. McMillen Jacobs is completing the design for the tunnel and dam modifications, as well as completing the dam stability analysis to ensure there are no issues with dam stability under existing, construction, and post-construction operation loading conditions.

McMillen Jacobs performed a two-dimensional dam stability evaluation and sensitivity analysis during the schematic design phase of the project. This simplified method of analysis is based on several conservative assumptions and the stresses and factors of safety calculated were higher than maximum recommended values. Given the nature of this analysis these results are inconclusive regarding the seismic stability of the dam and McMillen Jacobs recommend proceeding with a full three-dimensional analysis using the finite-element method.

Klohn Crippen will collaborate with and provide technical support to the McMillen Jacobs team in an advisory capacity in completing the scope of work as summarized in the next section.

Scope of Work

1. Task 1: FEA Project Management & Coordination
    a. Work
        i. Prepare monthly progress reports to accompany invoicing.
        ii. Organize planning and progress meetings.
        iii. Send meeting notes by email.
    b. Deliverables

i. Progress reports with each invoice.
ii. Digital meeting agendas and notes.
iii. Email correspondence.

2. Task 2: Basis of Design / Analysis
    a. Work
        i. McMillen Jacobs will develop and maintain a detailed modeling and analysis design basis document summarizing design criteria, modeling properties, analysis procedures, etc. for internal coordination.
        ii. Klohn Crippen will advise and provide technical support and review of the design basis document throughout the project.

3. Task 3: FEM Geometry and Meshing
    a. Work
        i. McMillen Jacobs will develop CAD model of dam and canyon geometry for import into analysis pre-processing software.
        ii. McMillen Jacobs will build and mesh concrete dam models for the following scenarios.
            1. Existing Scenario:
                a. Concrete dam, existing conditions
            2. Construction Scenario:
                a. Concrete dam with tunnel, gate and cofferdam
            3. Final Scenario:
                a. Concrete dam with gate
        iii. McMillen Jacobs will build and mesh foundation model
        iv. McMillen Jacobs will apply appropriate contact and boundary conditions.
        v. Klohn Crippen will provide technical support and review of model geometry and mesh prepared by McMillen Jacobs.
        vi. Klohn Crippen will provide technical support and review of the applied contacts and boundary conditions incorporated into the FE models by McMillen Jacobs.
    b. Assumptions
        i. The model will include the concrete dam and foundation continuum. The reservoir will not be explicitly modeled. (Hydrostatic pressures will be applied for static analysis and added mass will be utilized for dynamic analysis.)
        ii. The model will utilize a massless foundation.
        iii. Limited as-built drawings are available, but they provide enough information to develop approximate geometry for the concrete dam and bedrock topography.
        iv. The cofferdam and gate will be modeled with “dummy” elements, i.e. they will be modeled to accurately distribute mass and imposed loads to the primary dam structure but not to determine load effects within the cofferdam and gate elements themselves.

v. All contacts will be tied so the model will be elastic.

4. Task 4: Material Properties
    a. Work
        i. McMillen Jacobs will document the assumed material property values for the Project and incorporate these properties into the FE models.
        ii. Klohn Crippen will provide technical support and review the material property assumptions developed by McMillen Jacobs.
    b. Assumptions
        i. Material properties for concrete, foundation rock, and reservoir silt will match those established by Dames & Moore (1998). This is appropriate for comparison of analysis results with previous studies. Additional geotechnical exploration and material testing is not required for modeling and analysis purposes.
        ii. Foundation elements will be modeled without mass.
        iii. All materials will be idealized as elastic.

5. Task 5: Static Loads and Load Combinations
    a. Work
        i. McMillen Jacobs will derive and implement the following static load cases in the analysis:
            1. Dead Load – self-weight of concrete but not foundation rock; will include cofferdam and gate where applicable.
            2. Hydrostatic Load – weight and static effects of water including uplift; applied to dam models (existing, cofferdam, final)
                a. PMF elevation (existing & final)
                b. Max reservoir elevation under normal operation (existing, cofferdam, and final)
                c. Minimum reservoir elevation (existing)
                d. Sediment flushing elevation (cofferdam)
                e. Post-project elevation (final)
                f. Silt Loading (existing, cofferdam, final)
        ii. McMillen Jacobs will develop models to capture the combined load effects of the following static load combinations:
            1. LC1 = Gravity (up to 3 models) + Hydrostatic (up to 3 levels)
        iii. Klohn Crippen will provide technical support and review of the load derivation, load implementation, and static analyses in the finite-element models.
    b. Assumptions
        i. Reservoir elevations for hydrostatic loading are defined and available.
        ii. Linear static analysis will be performed.
        iii. Thermal loading will be ignored.

6. Task 6: Dynamic Loads and Load Combinations
    a. Work
        i. McMillen Jacobs will derive and implement the following dynamic loads using linear-elastic response spectrum analysis and modal superposition methods:
            1. Maximum Design Earthquake (MDE) – 5% damped 84th percentile acceleration response spectrum for the maximum earthquake on the San Andreas Fault (M7.9) as defined in the "Searsville Alternatives Study – Dam Structural Condition Assessment Draft Final" by URS, dated May 2015. This report includes only horizontal response spectrum.
        ii. The following dynamic load combinations will be considered:
            1. Existing structure:
                a. LC2 = LC1 (max normal reservoir) + MDE
                b. LC3 = LC1 (min normal reservoir) + MDE
            2. Final structure:
                a. LC4 = LC1 (post-project reservoir) + MDE
        iii. Eigenvalue Analysis – determine fundamental mode shapes and vibration frequencies of the dam-foundation structure.
        iv. Response Spectrum Analysis – determine seismic load effects by response spectrum / modal superposition methods.
        v. Klohn Crippen will provide technical support and review of the dynamic loads derivation, dynamic loads implementation, and dynamic analyses.
    b. Assumptions
        i. Hydrodynamic loading will be determined by the "added mass" method.
        ii. 2-component horizontal and 1-component vertical response spectra will be provided by Stanford University. Note that the URS (2015) report provides horizontal deterministic spectra but not vertical spectra. If the MDE vertical spectra is not available, it will be assumed to equal 2/3 of the horizontal spectra.

7. Task 7: Analysis Results & Post Processing
    a. Work
        i. McMillen Jacobs will perform the following:
            1. Compare static and dynamic analysis results with previous analysis performed by Dames & Moore (1998).
            2. Validate model damping
            3. Validate hydrodynamic added mass
            4. Generate static displacements and stresses for each load combo
            5. Generate dynamic displacements and stresses for each load combo
            6. Perform seismic stability evaluation based on analysis results

ii. Klohn Crippen will provide technical support and review during the post-processing phase of the project.

b. Assumptions
   i. Specific results from the FEA are not required to design the tunnel liner, cofferdam, or gate structures.

8. Task 8: Reporting
   a. Work
      i. McMillen Jacobs will develop a report documenting the modeling and analysis approach, analysis results and conclusions. The report will be issued as a draft for Client and DSOD review. Comments will be addressed and incorporated into a final report.
      ii. Klohn Crippen will provide technical support and formal review of the Draft and Final reports prior to submittal to the Client and DSOD.
   b. Deliverables
      i. Draft report
      ii. Final report
      iii. Model input files will be provided upon request.

9. Task 9: DSOD Review and Coordination
   a. Work
      i. McMillen Jacobs will establish and coordinate basis of design including load cases, combinations, and stability acceptance criteria.
      ii. Respond to DSOD review comments.
   b. Assumptions
      i. Four (4) 1.5-hour meetings will be held with DSOD over the course of the project to discuss and establish consensus regarding the following:
         1. Design criteria and loading conditions.
         2. Analysis approach and methodology
         3. Preliminary (draft) analysis results and report
         4. Final analysis results and report

Budget

Klohn Crippen will provide the scope of work (SOW) described above on a time and materials (T&M) basis for a not-to-exceed fee of US **$27,528**.

Schedule

The work tasks as outlined above will be executed from December 2020 through approximately July 2021. We anticipate participation from Klohn Crippen Berger

throughout the Project execution to provide technical support and oversight of the McMillen Jacobs team.

Attachment B
Terms and Conditions

Terms and Conditions for Professional Services

1. **STANDARD OF PERFORMANCE**
The standard of care for all professional consulting and related services performed or furnished by SUBCONSULTANT and its employees under this Agreement will be the care and skill ordinarily used by members of SUBCONSULTANT's profession practicing under the same or similar circumstances at the same time and in the same locality. SUBCONSULTANT makes no warranties, express or implied, under this Agreement or otherwise, in connection with SUBCONSULTANT's services.

2. **INSURANCE**
SUBCONSULTANT agrees to procure and maintain, at its expense, Workers' Compensation insurance as required by statue; Employer's Liability of $250,000; Automobile Liability insurance of $1,000,000 combined single limit for bodily injury and property damage covering all vehicles, including hired vehicles, owned and non-owned vehicles; Commercial General Liability insurance of $1,000,000 combined single limit for personal injury and property damage; and Professional Liability insurance of $1,000,000 per claim and in aggregate for protection against claims arising out of the performance of services under this Agreement caused by negligent acts, errors, or omissions for which SUBCONSULTANT is legally liable. Upon request, OWNER shall be made an additional insured on Commercial General and Automobile Liability insurance policies and certificates of insurance will be furnished to the OWNER. SUBCONSULTANT agrees to indemnify OWNER for the claims covered by SUBCONSULTANT's insurance.

3. **OPINIONS OF PROBABLE COST (COST ESTIMATES)**
Any opinions of probable project cost or probable construction cost provided by SUBCONSULTANT are made on the basis of information available to SUBCONSULTANT and on the basis of SUBCONSULTANT's experience and qualifications, and represents its judgment as an experienced and qualified professional consultant. However, since SUBCONSULTANT has no control over the cost of labor, materials, equipment or services furnished by others, or over the contractor(s') methods of determining prices, or over competitive bidding or market conditions, SUBCONSULTANT does not guarantee that proposals, bids or actual project or construction cost will not vary from opinions of probable cost SUBCONSULTANT prepares.

4. **CONSTRUCTION PROCEDURES**
SUBCONSULTANT's observation or monitoring portions of the work performed under construction contracts shall not relieve the contractor from its responsibility for performing work in accordance with applicable contract documents. SUBCONSULTANT shall not control or have charge of, and shall not be responsible for, construction means, methods, techniques, sequences, procedures of construction, health or safety programs or precautions connected with the work and shall not manage, supervise, control or have charge of construction. SUBCONSULTANT shall not be responsible for the acts or omissions of the contractor or other parties on the project. SUBCONSULTANT shall be entitled to review all construction contract documents and to require that no provisions extend the duties or liabilities of SUBCONSULTANT beyond those set forth in this Agreement. OWNER agrees to include SUBCONSULTANT as an indemnified party in OWNER's construction contracts for the work, which shall protect SUBCONSULTANT to the same degree as OWNER. Further, OWNER agrees that SUBCONSULTANT shall be listed as an additional insured under the construction contractor's liability insurance policies.

5. **CONTROLLING LAW**
This Agreement is to be governed by the law of the state where SUBCONSULTANT's services are performed.

6. **SERVICES AND INFORMATION**
OWNER will provide all criteria and information pertaining to OWNER's requirements for the project, including design objectives and constraints, space, capacity and performance requirements, flexibility and expandability, and any budgetary limitations. OWNER will also provide copies of any OWNER-furnished Standard Details, Standard Specifications, or Standard Bidding Documents which are to be incorporated into the project.

OWNER will furnish the services of soils/geotechnical engineers or other consultants that include reports and appropriate professional recommendations when such services are deemed necessary by SUBCONSULTANT. The OWNER agrees to bear full responsibility for the technical accuracy and content of OWNER-furnished documents and services.

In performing professional consulting and related services hereunder, it is understood by OWNER that SUBCONSULTANT is not engaged in rendering any type of legal, insurance or accounting services, opinions or advice. Further, it is the OWNER's sole responsibility to obtain the advice of an attorney, insurance counselor or accountant to protect the OWNER's legal and financial interests. To that end, the OWNER agrees that OWNER or the OWNER's representative will examine all studies, reports, sketches, drawings, specifications, proposals and other documents, opinions or advice prepared or provided by SUBCONSULTANT, and will obtain

the advice of an attorney, insurance counselor or other consultant as the OWNER deems necessary to protect the OWNER's interests before OWNER takes action or forebears to take action based upon or relying upon the services provided by SUBCONSULTANT.

7. SUCCESSORS AND ASSIGNS

OWNER and SUBCONSULTANT, respectively, bind themselves, their partners, successors, assigns, and legal representatives to the covenants of this Agreement. Neither OWNER nor SUBCONSULTANT will assign, sublet, or transfer any interest in this AGREEMENT or claims arising there from without the written consent of the other.

8. RE-USE OF DOCUMENTS

All documents, including all reports, drawings, specifications, computer software or other items prepared or furnished by SUBCONSULTANT pursuant to this Agreement, are instruments of service with respect to the project. SUBCONSULTANT retains ownership of all such documents. OWNER may retain copies of the documents for its information and reference in connection with the project; however, none of the documents are intended or represented to be suitable for reuse by OWNER or others on extensions of the project or on any other project. Any reuse without written verification or adaptation by SUBCONSULTANT for the specific purpose intended will be at OWNER's sole risk and without liability or legal exposure to SUBCONSULTANT, and OWNER will defend, indemnify, and hold harmless SUBCONSULTANT from all claims, damages, losses and expenses, including attorney's fees, arising or resulting therefrom. Any such verification or adaptation will entitle SUBCONSULTANT to further compensation at rates to be agreed upon by OWNER and SUBCONSULTANT.

9. TERMINATION OF AGREEMENT

OWNER or SUBCONSULTANT may terminate the Agreement, in whole or in part, by giving seven (7) days written notice, if the other party substantially fails to fulfill its obligations under the Agreement through no fault of the terminating party. Where the method of payment is "lump sum," or cost reimbursement, the final invoice will include all services and expenses associated with the project up to the effective date of termination. An equitable adjustment shall also be made to provide for termination settlement costs SUBCONSULTANT incurs as a result of commitments that had become firm before termination, and a reasonable profit for services performed.

10. SEVERABILITY

If any provision of this agreement is held invalid or unenforceable, the remaining provisions shall be valid and binding upon the parties. One or more waivers by either party of any provision, term or condition shall not be construed by the other party as a waiver of any subsequent breach of the same provision, term or condition.

11. INVOICES

SUBCONSULTANT will submit monthly invoices for services rendered and OWNER will make prompt payments in response to SUBCONSULTANT's invoices.

SUBCONSULTANT will retain receipts for reimbursable expenses in general accordance with Internal Revenue Service rules pertaining to the support of expenditures for income tax purposes. Receipts will be available for inspection by OWNER's auditors upon request.

If OWNER disputes any items in SUBCONSULTANT's invoice for any reason, including the lack of supporting documentation, OWNER may temporarily delete the disputed item and pay the remaining amount of the invoice. OWNER will promptly notify SUBCONSULTANT of the dispute and request clarification and/or correction. After any dispute has been settled, SUBCONSULTANT will include the disputed item on a subsequent, regularly scheduled invoice, or on a special invoice for the disputed item only.

OWNER recognizes that late payment of invoices results in extra expenses for SUBCONSULTANT. SUBCONSULTANT retains the right to assess OWNER interest at the rate of one percent (1%) per month, but not to exceed the maximum rate allowed by law, on invoices which are not paid within thirty (30) days from the date of the invoice. In the event undisputed portions of SUBCONSULTANT's invoices are not paid when due, SUBCONSULTANT also reserves the right, after seven (7) days prior written notice, to suspend the performance of its services under this Agreement until all past due amounts have been paid in full.

12. CHANGES

The parties agree that no change or modification to this Agreement, or ay attachments hereto, shall have any force or effect unless the change is reduced to writing, dated, and made part of this Agreement. The execution of the change shall be authorized and signed in the same manner as this Agreement. Adjustments in the period of services and in compensation shall be in accordance with applicable paragraphs and sections of this Agreement. Any proposed fees by SUBCONSULTANT are estimates to perform the services required to complete the project as SUBCONSULTANT understands it to be defined. For those projects involving conceptual or process development services, activities often are not fully definable in the initial planning. In any event,

as the project progresses, the facts developed may dictate a change in the services to be performed, which may alter the scope. SUBCONSULTANT will inform OWNER of such situations so that changes in scope and adjustments to the time of performance and compensation can be made as required. If such change, additional services, or suspension of services results in an increase or decrease in the cost of or time required for performance of the services, an equitable adjustment shall be made, and the Agreement modified accordingly.

13. CONTROLLING AGREEMENT

These Terms and Conditions shall take precedence over any inconsistent or contradictory provisions contained in any proposal, contract, purchase order, requisition, notice-to-proceed, or like document.

14. EQUAL EMPLOYMENT AND NONDISCRIMINATION

In connection with the services under this Agreement, SUBCONSULTANT agrees to comply with the applicable provisions of federal and state Equal Employment Opportunity, and other employment, statutes and regulations.

15. HAZARDOUS MATERIALS

OWNER represents to SUBCONSULTANT that, to the best of its knowledge, no hazardous materials are present at the project site. However, in the event hazardous materials are known to be present, OWNER represents that to the best of its knowledge it has disclosed to SUBCONSULTANT the existence of all such hazardous materials, including but not limited to asbestos, PCB's, petroleum, hazardous waste, or radioactive material located at or near the project site, including type, quantity, and location of such hazardous materials. It is acknowledged by both parties that SUBCONSULTANT's scope of services do not include services related in any way to hazardous materials. In the event SUBCONSULTANT or any other party encounters undisclosed hazardous materials, SUBCONSULTANT shall have the obligation to notify OWNER and, to the extent required by law or regulation, the appropriate governmental officials, and SUBCONSULTANT may, at its option and without liability for delay, consequential or any other damages to OWNER, suspend performance of services on that portion of the project affected by hazardous materials until OWNER: (i) retains appropriate specialist consultant(s) or contractor(s) to identify and, as appropriate, abate, remediate, or remove the hazardous materials; and (ii) warrants that the project site is in full compliance with all applicable laws and regulations. OWNER acknowledges that SUBCONSULTANT is performing professional services for OWNER and that SUBCONSULTANT is not and shall not be required to become an "arranger," "operator," "generator," or "transporter" of hazardous materials, as defined in the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA), which are or may be encountered at or near the project site in connection with SUBCONSULTANT's services under this Agreement. If SUBCONSULTANT's services hereunder cannot be performed because of the existence of hazardous materials, SUBCONSULTANT shall be entitled to terminate this Agreement for cause on 30 days written notice. To the fullest extent permitted by law, OWNER shall indemnify and hold harmless SUBCONSULTANT, its officers, directors, partners, employees, and SUBCONSULTANTs from and against all costs, losses, and damages (including but not limited to all fees and charges of SUBCONSULTANTs, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting from hazardous materials, provided that (i) any such cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or injury to or destruction of tangible property (other than completed Work), including the loss of use resulting therefrom, and (ii) nothing in this paragraph shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's sole negligence or willful misconduct.

16. EXECUTION

This Agreement, including the exhibits and schedules made part thereof, constitute the entire Agreement between SUBCONSULTANT and OWNER, supersedes and controls over all prior written or oral understandings. This Agreement may be amended, supplemented or modified only by a written instrument duly executed by the parties.

17. LIMITATION OF LIABILITY

SUBCONSULTANT's and its employees' total liability to OWNER for any loss or damage, including but not limited to special and consequential damages arising out of or in connection with the performance of services or any other cause, including SUBCONSULTANT's and its employees' professional negligent acts, errors, or omissions, shall not exceed the greater of $50,000 or the total compensation received by SUBCONSULTANT hereunder, except as otherwise provided under this Agreement, and OWNER hereby releases and holds harmless SUBCONSULTANT and its employees from any liability above such amount.

The CLIENT agrees that any and all limitations or exclusions of SUBCONSULTANT's liability, including waivers of damages and indemnifications by the CLIENT to SUBCONSULTANT, shall extend to and be for the benefit of those individuals and entities SUBONSULTANT retains for performance of the Services under this Agreement, including but

not limited to SUBCONSULTANT's officers, directors, partners and employees, as well as SUBCONSULTANT's subconsultants and subcontractors.

The time for bring a claim or claims: SUBCONSULTANT's liability for all claims by the CLIENT arising out of the provision of Services shall absolutely cease to exist after a period of two (2) years from: a. SUBCONSULTANT's submission of its final documentation related to the Services; b. suspension, abandonment or termination of the Services or Project; or c. substantial completion of the Project; whichever shall first occur, and following the expiration of such period, the CLIENT shall have no claim whatsoever against the SUBCONSULTANT.

18. LITIGATION SUPPORT

In the event SUBCONSULTANT is required to respond to a subpoena, government inquiry or other legal process related to the services in connection with a legal or dispute resolution proceeding to which SUBCONSULTANT is not a party, OWNER shall reimburse SUBCONSULTANT for reasonable costs in responding and compensate SUBCONSULTANT at its then standard rates for reasonable time incurred in gathering information and documents and attending depositions, hearings, and trial.

Exhibit E: Consultant's Proposal

PROPOSAL

DAM 1 SPILLWAY GATES REPLACEMENT PROJECT

RFP NUMBER 00001831

MARCH 31, 2022

McMILLEN JACOBS ASSOCIATES

TABLE OF CONTENTS

1 COVER LETTER

March 31, 2022

City of Portland Water Bureau
Attn: Kevin Larson, Engineer III/Project Manager
Via Online Procurement Center: https://procure.portlandoregon.gov

Subject: Proposal for Dam 1 Spillway Gates Replacement Project | QBS-RFP Number 00001831

Dear Mr. Larson:

McMillen, LLC, dba McMillen Jacobs Associates (McMillen Jacobs), is pleased to submit our proposal to provide Portland Water Bureau (PWB) gate design services and construction support for the Dam 1 Spillway Gates Replacement Project (Project). We understand that the replacement of the vertical lift gates at Dam 1 is one of many improvement projects PWB is undertaking to enhance the Bull Run Watershed in support of the City of Portland's mission to serve safe and abundant water for generations to come. We believe our proposed team represents the most qualified team in the region, with specialized expertise to deliver **design solutions to benefit your future**, and provide the following advantages to PWB:

- **Local Leadership who Understands Your Perspective** – Project Manager James Boag is an Oregon registered professional engineer based in Portland, who brings a unique owner-centric perspective from his experience on the owner/operator side, including six years directly in plant operations and maintenance, and Chief of the Mechanical Design Section for the USACE Portland District. He will apply this knowledge to ensure our designs are focused on the long-term advantages for efficient, safe, and cost-effective operations and maintenance.
- **A Multi-Disciplinary Team with Experience that Speaks to Your Needs** – Our proposed team is centered around a Core Design Team comprised of our in-house, gate experts who have focused their careers on the evaluation and retrofit of hydraulic steel structures and operating equipment at existing dams. We have also strategically partnered with subconsulting firms who bring local Portland knowledge and highly specialized expertise in their respective fields.
- **An Approach Focused on Effective and Efficient Project Delivery** – We have planned our approach around PWB's project goals, anticipated possible challenges in each phase, and have committed a team of professionals with the technical insight and experience to mitigate those challenges. We are able to tap into lessons learned and best practices of all team members to provide PWB with designs that are constructible, meet FERC requirements, and will be cost-effective to build and operate.
- **A Corporate Commitment in Support of the City's Diversity and Sustainability Goals** – McMillen Jacobs has partnered with D/M/W/ESB subconsulting firms, to achieve PWB's goal of 20% utilization. In addition, we are a workplace who encourages a culture of equal opportunity, workforce diversity, community involvement and sustainability practices. We are committed to socially and environmentally responsible policies and processes.

McMillen Jacobs is an employee-owned company incorporated in 2004. Project Manager James Boag, PE, will serve as your primary point of contact should you have any questions. Mara McMillen is authorized to represent McMillen Jacobs in negotiations and sign any contract that may result. McMillen Jacobs is in full compliance with the City's Equal Benefits Program and is Equal Employment Opportunity (EEO) certified with the City of Portland. Our City of Portland Business Tax Registration Number is 658725. We are not an Oregon-certified D/M/W/ESB firm. We request no redactions.

On behalf of the entire team, we look forward to enhancing our relationship with PWB. If you have any questions or need any additional information, please do not hesitate to contact me directly at maramcmillen@mcmjac.com or (208) 342-4214.

Sincerely,

Mara McMillen

Mara McMillen
President of McMillen LLC,
dba McMillen Jacobs Associates

James Boag

James Boag, PE
Project Manager
1500 SW 1st Ave. Portland, OR 97201
(971) 272-2121, boag@mcmjac.com

2 PROJECT TEAM

2. PROJECT TEAM

HIGHLY QUALIFIED TEAM

We bring collective expertise in dam facilities, hydraulics and modeling, cathodic protection systems, geologic hazards and geotechnical engineering, seismic design, cost estimating, construction staging, security features, water quality, and project management.

19
people assigned to this project

28+
average years of experience on dam-related projects

300+
gate improvements including 40+ vertical lift gates

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

Table 2-1. Key Personnel Roles and Responsibilities

	NAME/TITLE	RESPONSIBILITIES
1.	**JAMES BOAG, PE** Project Manager *Core Design Team	Primary and direct point of contact for PWB, responsible for the day-to-day management of Project tasks. Will represent PWB's best interests and ensure project goals and objectives are met, commit necessary resources throughout the project duration, lead the design effort, manage schedule and budget, subconsultant coordination, stakeholder collaboration.
2.	**MARK MERKLEIN, PE** Principal Engineer (Structural)	Responsible for developing and implementing the project-speci c Quality Management Plan, providing technical assistance in design, and managing the review of all design documents (30/60/90%) and reports.
3.	**DON JARRETT, PE** Mechanical ITR **BRYAN DUEVEL, PE** Geotechnical ITR **JOHN BAKKEN, PE** Electrical ITR	Implement the Quality Management Plan, provide technical guidance on challenging aspects, conduct Independent Technical Reviews, review QC documentation for conformance with requirements.
4.	**MATT HESS, PE** Mechanical Lead *Core Design Team	Lead the mechanical design effort by developing hoist system criteria and alternatives, developing the design into bid documents, providing CM/GC consultant support for mechanical considerations, and supporting the mechanical effort through construction including performing submittal review, shop inspections, site visits, and commissioning.
5.	**GAVIN SMITH, PE** Structural Lead *Core Design Team	Lead the structural design effort by developing gate design criteria (including seismic and other gate hazard loading) and alternatives, developing the design into bid documents, providing CM/GC consultant support for structural considerations, and supporting the structural effort through construction including performing submittal review, shop inspections, site visits, and commissioning.
6.	**MATT LAWSON, PE** Electrical Lead *Core Design Team	Lead the electrical design effort by developing control system design criteria and alternatives, developing the design into bid documents, providing CM/GC consultant support for electrical considerations, and supporting the electrical effort through construction including performing submittal review, shop inspections, site visits, and commissioning.
7.	**TAYLOR BOWEN, PE** Structural Support/FE Modeling *Core Design Team	Develop a Finite Element model of the dam to quantify the seismic loading on the spillway gates and other relevant dam features.
8.	**MARC RYAN, PE, GE** Geotechnical Lead	Perform a site-speci c seismic hazard analysis (SHA) and coordinate ndings with the design team to determine the resulting seismic loading.
9.	**NATALIE EDWARDS** Permitting	Identify which permits are needed for proposed modi cations, influence conceptual designs based on Project issues, assist in preparing a list, schedule, and draft permits for all required regulatory permits and documentation, and anticipated level of dif culty to obtain them.

Extent of Company Principal Member's Involvement

MARA MCMILLEN, President/Project Executive, will be responsible for contract development, GMP approval, and nancial reporting. She will ensure PWB's overall satisfaction, and ensure the team is provided with the necessary resources, training, budget, and tools to effectively execute this project.

MORT MCMILLEN, Chief Engineer, will provide technical oversight and quality control/quality assurance to ensure all deliverables meet PWB's standards.

JAMES BOAG, PE | Project Manager
Commitment: Design 26%, Construction 7%

entire career

unique owner-centric perspective

19-year career in dam rehab projects

designed solutions for 100+ gates

managed multi-disciplinary engineering teams

Relev nt Projects (See Section 3)

1.
2.
3.
4.
5.

Unique Quali cations/Areas of Expertise

-
-
-

Current Assignments, Location, and Duration

•

“

Table 2-2. Key Personnel Quali cations and Experience Summary

28 Years of Experience

MARK MERKLEIN, PE, SE | Principal Engineer — Commitment: Design 6%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

Current Assignments, Location and Duration - [illegible]

48 Years of Experience

DON JARRETT, PE | Mechanical ITR — Commitment: Design 6%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

1. [illegible]
5. [illegible]

Additional Experience

- [illegible]

Current Assignments, Location and Duration - [illegible]

21 Years of Experience

BRYAN DUEVEL, PE, GE | Geotechnical ITR — Commitment: Design 6%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects

- [illegible]

Current Assignments, Location and Duration - [illegible]

39 Years of Experience

JOHN BAKKEN, PE | Electrical ITR — Commitment: Design 6%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

1. [illegible]
2. [illegible]

Additional Experience

- [illegible]

Current Assignments, Location and Duration - [illegible]

16 Years of Experience

MATT HESS, PE, PE | Mechanical Lead — Commitment: Design 8%, Construction 1%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

1. [illegible]
2. [illegible]
5. [illegible]

Current Assignments, Location and Duration - [illegible]

14 Years of Experience

GAVIN SMITH, PE | Structural Lead — Commitment: Design 23%, Construction 6%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

Current Assignments, Location and Duration - [illegible]

34 Years of Experience

MATT LAWSON, PE | Electrical Lead — Commitment: Design 7%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

5. [illegible]

Additional Experience

- [illegible]

Current Assignments, Location and Duration - [illegible]

12 Years of Experience

TAYLOR BOWEN, PE, SE | Structural Support/FE Modeling — Commitment: Design 11%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]

Relev nt Projects (See Section 3)

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]

Current Assignments, Location and Duration - [illegible]

Table 2-2. Key Personnel Quali cations and Experience Summary (cont'd)

21
Years of Experience

MARC RYAN, PE, GE | Geotechnical Lead — Commitment: Design 10%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]
- [illegible]
- [illegible]
- [illegible]

Relev nt Projects (See Section 3)

❹ [illegible]

Additional Experience

- [illegible]
- [illegible]
- [illegible]

Current Assignments, Location and Duration

[illegible]

20
Years of Experience

NATALIE EDWARDS | Permitting Lead — Commitment: Design 1%, Construction 0%

Unique Quali cations/Areas of Expertise

- [illegible]
- [illegible]
- [illegible]
- [illegible]

Relev nt Projects

- [illegible]
- [illegible]
- [illegible]

Current Assignments, Location and Duration

[illegible]

Quali cations and Experience

[illegible]

- [illegible] readily available to respond to Project needs d
- [illegible] better designs that are constructible, cost-effective, and safe and ef cient b
- [illegible] entire careers in the water resources industry [illegible]

Relevant Project Experience

Working Together

we are ready to get to work.

History of Working with Subconsultants

Team Contributions

3 PROPOSER'S CAPABILITIES

3. PROPOSER'S CAPABILITIES

MCMILLENJACOBS ATAGLANCE

LEGAL STRUCTURE:
Employee-owned corporation

AREAS OF EXPERTISE:
Hydroelectric and water resources including supporting facilities

LENGTH OF TIME IN BUSINESS:
17+ years

HOME OFFICE:
1471 Shoreline Drive, Suite 100
Boise, ID 83702

OFFICE MANAGING PROJECT:
1500 SW 1st Avenue
Portland, OR 97201

NUMBER OF EMPLOYEES:
500+

100+
damprojects

300+
gateprojects

Firm Information

McMillen Jacobs is a full-service environmental, engineering, and construction rm in the water resources and underground markets. We have earned a strong reputation as a self-executing design and construction rm, providing both in-house design and construction capabilities. We are fully quali ed to contribute to a project at all stages, from developing design and construction documents to self-performing construction, startup, and commissioning. We maintain in-house construction staff including equipment operators, concrete crews, excavation crews, and laborers, as well as project managers, cost estimators, schedulers, superintendents, foremen, and safety personnel, which enables us to self-perform a majority, if not all, of the work. Our integration of design and construction bene ts PWB because our design professionals are able to tap into the lessons learned and best practices of those in our construction group. Many times, they are currently executing similar work and can provide technical insights with constructability reviews and accurate cost estimates.

Our engineers design with constructability, safety, and operability in mind because we see the direct impact that quality designs have on our teammates in the eld.

Subconsultants

The following is a brief snapshot of the structure and experience of each of our valued subconsultants.

These partnerships achieve the City's aspirational goal of 20% or greater D/M/W/ESB participation.

Historical Research Associates, Inc.

Company Name:
Historical Research Associates, Inc.

Legal Structure: Corporation

D/M/W/ESB Certi cation: WBE

Areas of Expertise: Environmental consulting, cultural resources management

Length of Time in Business:
48 years

Number of Employees: 60

KMC Construction Consulting

Company Name:
KMC Construction Consulting

Legal Structure:
Limited Liability Corporation

D/M/W/ESB Certi cation: DBE, WBE

Areas of Expertise: Cost estimating, project risk analysis, construction scheduling, construction means and methods, critical design concepts

Length of Time in Business:
2 years, 3 months

Number of Employees: 12

SLATE Geotechnical Consultants

Company Name:
Slate Geotechnical Consultants

Legal Structure:
Limited Liability Corporation

D/M/W/ESB Certi cation: WBE (pending)

Areas of Expertise: Dam safety engineering, geotechnical engineering, seismic hazard, and earthquake-induced geologic hazards consulting

Length of Time in Business: 4 years

Number of Employees: 15

S&F Land Service

Company Name:
S&F Land Services

Legal Structure:
Limited Liability Corporation

D/M/W/ESB Certi cation: ESB

Areas of Expertise: Land surveying and remote sensing (imagery and LiDAR)

Length of Time in Business: 5 years

Number of Employees: 39

Wolf Water Resources

Company Name:
Wolf Water Resources

Legal Structure: Corporation

D/M/W/ESB Certi cation: DBE, ESB, WBE

Areas of Expertise: Natural resources science and engineering, environmental compliance and permitting

Length of Time in Business:
7.5 years

Number of Employees: 26

Relevant Experience

McMillen Jacobs' foundation was built on dams which remains one of our foremost business lines today. We have developed solutions for numerous dam rehabilitation projects that included gate replacements and modi cations to supporting components such as lifting hoists, electrical controls, and infrastructure upgrades, in addition to concrete modi cations and structural evaluations. We have also coordinated procurement and inspections with gate manufacturers and led installation and testing and commissioning.

Our well-rounded experience equips us to construct around conditions that are unique to this Project including dif cult and/or limited access, working over water and from barges, concrete repairs to accommodate new equipment, FERC compliance, and environmental concerns.

The McMillen Jacobs team understands PWB's goals and standards and will apply this knowledge, along with our best practices and lessons learned, to deliver safe, reliable, and long-lasting design solutions.

Table 3-1 identi es 15 dam, gate, or spillway projects demonstrating our depth of experience. Our ability to develop cost-effective, ef cient solutions is shown by the ve projects presented on the following pages. These relevant project examples involved elements similar to the Dam 1 Spillway Gates Replacement Project, including:

- McMillen Jacobs as Prime and Lead Designer
- Design/installation of gates, hoists, and supporting components
- Seismic evaluations and seismic dam response analysis
- Rehabilitation of existing and aging spillways
- Construction planning and elements unique to dams
- On budget and within schedule (cost control and suf cient resources)
- Completed or in progress within the last 15 years

Table 3-1. McMillen Jacobs' Sample Gate and Spillway Projects

Project & Location	Description of Services / Project Performance											
	Stoplogs and/or temp bulkheads	Gate hoist design	Vertical lift gates	Electrical/controls	Concrete work	Permitting	Constructability	FERC support & coordination	Seismic evals & seismic dam response analysis	Government agency coordination	On time	Within budget
❶Puget Sound Energy: Lower Baker Dam Crest Improvements & Vertical Gate Project; WA	❍	❍	❍	❍	❍		❍	❍	❍		❍	❍
❷North Western Energy: Morony Dam Vertical Lift Spillway Gate Design-Build Project; MT	❍	❍	❍	❍	❍	❍	❍	❍		❍	❍	❍
❸Idaho Power: Upper Salmon Spillway, Vertical Lift Reject Gate Replacement; ID	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
❹Stanford University: Searsville Watershed Restoration Design-Build; CA	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
❺Lewis County PUD: Cowlitz Falls Dam Sluice Gate Upgrades & Radial Gate Inspection; WA	❍	❍		❍	❍	❍	❍	❍	❍		❍	❍
SEAPA: Swan Lake Dam Raise & Spillway Gates; AK	❍	❍	❍	❍	❍	❍	❍	❍	❍		❍	❍
Central Rivers Power: Dietrich Drop Gate Replacements and Refurbishments; ID	❍	❍	❍	❍	❍			❍			❍	❍
Chelan County PUD: Rock Island Spillway Gate Handling Improvements Preliminary Engineering; WA		❍	❍		❍		❍	❍		❍	❍	❍
Chelan County PUD: Rocky Reach Tainter Gate Hoist and Gate Upgrades; WA		❍		❍			❍	❍			❍	❍
Metropolitan So CA: CRA Taint Gate Installation; CA	❍	❍		❍	❍					❍	❍	❍
Avista Utilities: Nine Mile Dam Sediment Bypass; WA	❍	❍		❍	❍		❍			❍	❍	❍
Idaho Power: Lower Malad Spillway Gate Replacement; ID	❍	❍		❍	❍						❍	❍
USACE ABQ: Coolidge Dam Outlet Gate Refurb; AZ	❍			❍	❍		❍			❍	❍	❍
Merced Irrigation District: Merced Falls and Exchequer Hydro Dams; CA	❍	❍		❍	❍					❍	❍	❍
USACE Walla Walla: Dworshak Dam Gate Refurbishment; ID		❍		❍	❍					❍	❍	❍

PUGET SOUND ENERGY: LOWER BAKER DAM CREST IMPROVEMENTS & VERTICAL GATE PROJECT

1

Near Concrete, Washington

The crest of the 93-year-old, 285-foot tall Lower Baker concrete arch dam experienced signi cant deterioration, requiring rehabilitation to address de ciencies in the structures and equipment to improve dam safety, worker safety, and operations reliability.

Under a separate contract in 2016, McMillen Jacobs participated in a Value Engineering session reviewing potential project improvements for the preliminary design of the Dam Crest Improvement Project (DCIP), which included the demolition and replacement of the existing dam deck and spillway gate equipment.

In 2018, McMillen Jacobs was awarded the design of the DCIP. To prevent overtopping and abutment erosion during a revised Probable Maximum Flood, the floodwalls will be raised approximately 15 feet, the top 6' below the ogee will be demolished, post-tension anchors will be installed, the top of the dam will be raised 6 feet. The existing spillway bays will be widened and the crest shape will be revised, resulting in a reduction in the number of spillway bays from 22 to 12. The existing 22-spillway gate system will be removed and replaced with 12 new 13.5-foot-high by 20.25-foot-wide vertical roller gates with wire rope hoist.

Our scope of work included plans, speci cations, and other supporting construction documents, a construction contractor submittal register, quantity and cost estimates, a proposed construction schedule, a design documentation report with calculations, risk register, quality control inspection plan, engineering considerations and instructions report, and a draft operations and maintenance manual.

One of the main challenges was that the existing spillway was under designed to pass the designed flows. Hydraulic concerns included a pulsating nappe and cavitation damage. A multi-discipline team of in-house experts, which included structural, mechanical, hydraulic, electrical, and geotechnical engineers worked together to develop solutions

Replacement of 22 gates with 12 vertical roller gates (13' x 20')

RelevancetoPWB

- High hazard dam
- Spillway modi cations
- Upgrade of electrical systems
- Design accomodated limited construction footprint and dif cult access
- Physical and CFD modeling of hydraulics
- FEA of dam for seismic response and dam safety checks
- Challenging geotechnical aspects
- FERC coordination

CLIENT
Puget Sound Energy

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Matt Hess | Mechanical Lead/Hoist SME
Gavin Smith | Structural/Gate Designer
Taylor Bowen | Structural Lead
Mitch Skelton | Electrical Engineer

PROJECT SCHEDULE
2016-2023

TOTAL VALUE
$2.8M

During the development of design we noticed that the spillway shape could potentially lead to a pulsating nappe and cavitation. Design improvements pointed toward a solution to alter the shape of the crest. An additional contract was administered to construct and test physical hydraulic models in support of the DCIP and scour analysis downstream of the dam. Our scope was modified to construct the models, interpret test results, and make design modifications.

including physical hydraulic models which resulted in design modi cations that will extend the life and stability of the dam.

Electrical Systems: In addition to the spillway and gate design, our team is responsible for the complete replacement and upgrade of all dam electrical systems. Our scope of work includes the modernization of power distribution, control, security surveillance, data communications, dam safety instrumentation, lighting, and gate controls. We are also providing one-line diagrams, lighting calculations, plan layouts, raceway and circuit schedules, control schematics and bills of material, and control narratives. Gate control systems are included, with detailed hardwire local controls and analog signals, digital communications and master PLC interfaces, and a de nition of integration into Lower Baker SCADA systems.

Dam Stability/3-D Modeling: Development of advanced 3-D nite element models are being used to determine the preliminary load conditions for raising the non-overflow concrete sections located on either side of the existing gated spillway. We are currently applying seismic loading to the crest to account for seismic loading from the existing 3-D nite element model to design the dam crest improvements. The design effort has included a due-diligence technical review of previous nite-element analysis (by others) of the dam and additional linear and nonlinear nite-element analysis to calibrate the model with existing survey and forced vibration test data. Additional nite-element analysis has also been performed to investigate the effects of dam-foundation and dam-reservoir interaction and establish appropriate seismic accelerations at the dam's crest to serve as the structural design basis for the improvements.

Geotechnical: We performed geologic reconnaissance of the abutments, a site investigation program including drilling through the dam crest, roped-access abutment mapping, scour analysis, abutment stability analysis, FERC coordination, and foundation and stability analysis of the new floodwall.

NORTH WESTERN ENERGY: MORONY DAM VERTICAL LIFT SPILLWAY GATE DESIGN BUILD

2

Cascade County, Montana

Morony Dam is a hydroelectric gravity dam located on the Missouri River. The dam is 883-feet-long and 94-feet-high and it has a 390-foot-wide spillway. Nine tainter gates and one sluice gate control the flow of water down the spillway.

McMillen Jacobs has completed the design and is currently installing new vertical gates for the Morony Dam. We are coordinating closely with the gate manufacturers on the inspections during manufacturing, transport, and delivery to site, unloading, supervision of site assembly and installation, site testing, and commissioning. We are also responsible for the partial demolition of concrete to accommodate the change from radial to vertical gates. Scope of work also includes the development, improvement, and maintenance of temporary access roads as well as environmental and permitting support. Our team provided VE suggestions that provided additional value within the budget.

Gates & Hoists: The existing tainter gates and hoists are at the end of their design life and are susceptible to ice buildup around the seals. McMillen Jacobs designed and is in the process of installing 9 new vertical lift spillway gates (36'W x 26'H) along with the construction of 18 new guide slot channels built into the existing concrete piers, requiring selective demolition, placement of heated embeds, and casting of concrete to accommodate the new gates. Design standards are according to the USACE guide ETL 1110-2-584 "Design of Hydraulic Steel Structures". Embedded and gate-mounted heating units will address extreme temperature and icing conditions at this Montana location where it can get to 20 or 30 degrees below zero Fahrenheit.

Replacement of 9 radial gates with 36' x 26' vertical roller gates (60kips each)

RelevancetoPWB

- New spillway gates
- FERC support and coordination
- Environmental and permitting support
- Value engineering
- Electrical controls
- Work from barges
- Geotechnical evaluation
- Hydraulic analysis

CLIENT
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John Bakken | ITR - Electrical
Matt Hess | Mechanical Support
Gavin Smith | Structural/Gate Designer
Taylor Bowen | Structural Support
Mitch Skelton | Electrical Engineer

PROJECT SCHEDULE
2020-2023

TOTAL VALUE
$29M

"Working with McMillen Jacobs and particularly Mark Merklein on the Morony Gate Replacement Project has been a great experience. Mark is very organized and thorough. He is constantly looking for ways to improve the project and is very responsive to comments and suggestions by us, the Owner. His proactive approach to this project has resulted in early FERC approvals and a betterment of the end product design."

Carrie Harris, Project Manager

Stoplogs/Bulkhead: Fabrication, delivery, and deployment of four new sets of dewatering bulkheads (stoplogs) (41'W x 15'H) used to isolate and dewater each of the nine gated spillway sections to allow for the removal of the old radial gate structures and retro t/install of the new vertical liftgate structures and hoist house. The steel stoplog slots are W-shaped and anchored to the pier noses with custom stoplog bearing seats and guide pins. The construction stoplogs are designed to span 41-feet between piers while also dewatering up to 32-feet. The new 40-ton hoist system runs continuously across the 370-foot length of the gated spillway.

Timely FERC Approvals: Despite a change in the gate design, through our proactive approach with FERC representatives and our team's thorough review packages, we received FERC approval ahead of schedule.

Electrical Controls: We designed the distribution and control systems for the new gate hoists and hoist building, including motor controls, gate heating systems, HVAC electrical support, one-line diagrams, power and lighting plans, cable tray design, grounding systems, and electrical calculations and details. Our scope of work also includes accommodating provisions for equipment operating temperatures down to -40 degrees Fahrenheit and the development of the thermodynamics and heat transfer calculation models for electric and forced ventilation de-icing system.

IDAHO POWER COMPANY: UPPER SALMON SPILLWAY, VERTICAL LIFT REJECT GATE REPLACEMENT

3

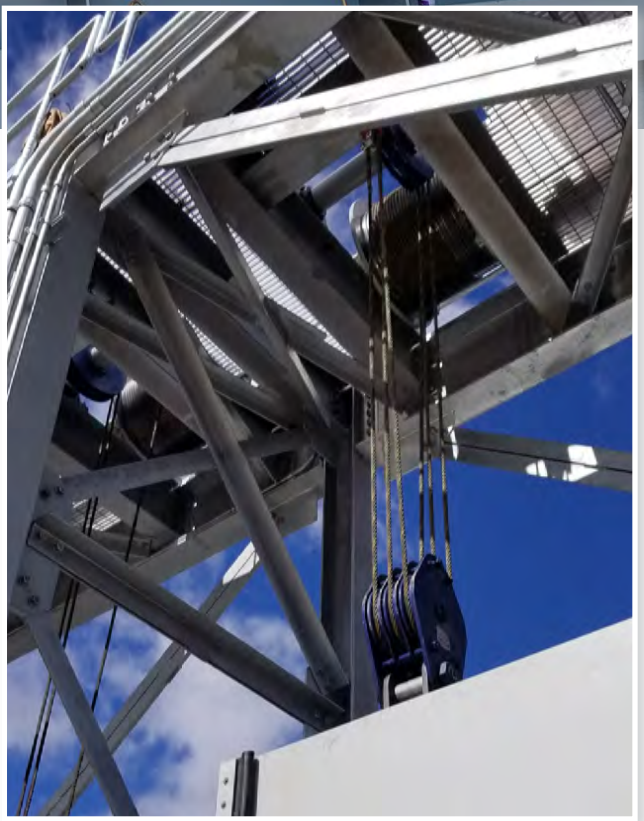
South of Hagerman, Idaho

McMillen Jacobs conducted a feasibility study to assess the preferred approach to rehabilitate or replace existing rejection gates and deteriorated concrete spillway structure. Due to extensive ASR damage, McMillen Jacobs recommended replacement of the gates and gate structures.

This project included a feasibility study to assess the preferred approach to rehabilitate or replace an existing rejection gate spillway structure. Due to extensive ASR damage and overall system age, McMillen Jacobs recommended that the entire spillway structure, gates, hoist, and hoist superstructure be replaced with an updated design.

Our scope of work included a feasibility study, cost estimates, detailed design, permitting and FERC support, and construction sequencing for the replacement of the concrete gate and spillway structure, 2 vertical spillway roller gates (17' x 21'; 20kips each), electrical controls, and the gate hoist structures. Design tasks included the design of new gates, hoist, and hoist superstructure; site dewatering to allow for the construction activities to occur; and design of a cofferdam and flow diversion, access road improvement, uplift evaluation, and underdrain system. The design required hydraulic modeling and site modi cations to ensure environmental flows for endangered species downstream during construction.

Our team was also responsible for engineering support during construction. Tasks included submittal and RFI reviews, site visits, and gate fabrication inspections.



McMillen Jacobs designed the new hoist structure, which is over two bays, 21 feet tall, 50 feet long, and seven feet wide

RelevancetoPWB

- Concrete spillway modi cations
- Replacement of gates and hoist structure
- FERC support and coordination
- Finite element modeling
- Electrical controls
- Construction engineering services
- Cost estimating and construction sequencing

CLIENT
IdahoPowerCompany

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Mark Merklein | Project Manager/Lead Structural Engineer
Gavin Smith | Structural Gate Design/ Fabrication QC Coordinator
Taylor Bowen | Structural Support
Mitch Skelton | Lead Electrical Engineer

PROJECT SCHEDULE
2019-2021

TOTAL VALUE
$680K

Gate Design: Gavin Smith designed new gates utilizing USACE ETL 584 design criteria. Using FEA, 3D modeling, and traditional analysis methods, he designed the gates and embedded steel design. The rollers were designed by James Boag utilizing stainless steel and self-lubricated elements and included an eccentric axle design to ensure uniform wheel loading while requiring less expensive fabrication means and methods.

Hoist Design: Our team designed two new hoist systems which raise the gate at 8 ft/min and consist of a six-part rope system, primary and secondary reducers, and gate limit and encoders for remote operation from the powerhouse.

Electrical Design: The electrical design included power distribution to the gate equipment, detailed control systems design and control panel design, and operation control narratives. We also developed detailed Power Utility Owner operations and maintenance-level nal as-built control and schematic diagrams for the gate controls, including detailed coordination with Idaho Power's engineering team on a wiring terminations point-to-point basis.

FERC Coordination: McMillen Jacobs coordinated with FERC in the submission and approval of a FERC dam safety review including a full review package with P&S, TEAC, & QCIP. The team received minimal comments.

STANFORD UNIVERSITY: SEARSVILLE WATERSHED RESTORATION DESIGN BUILD

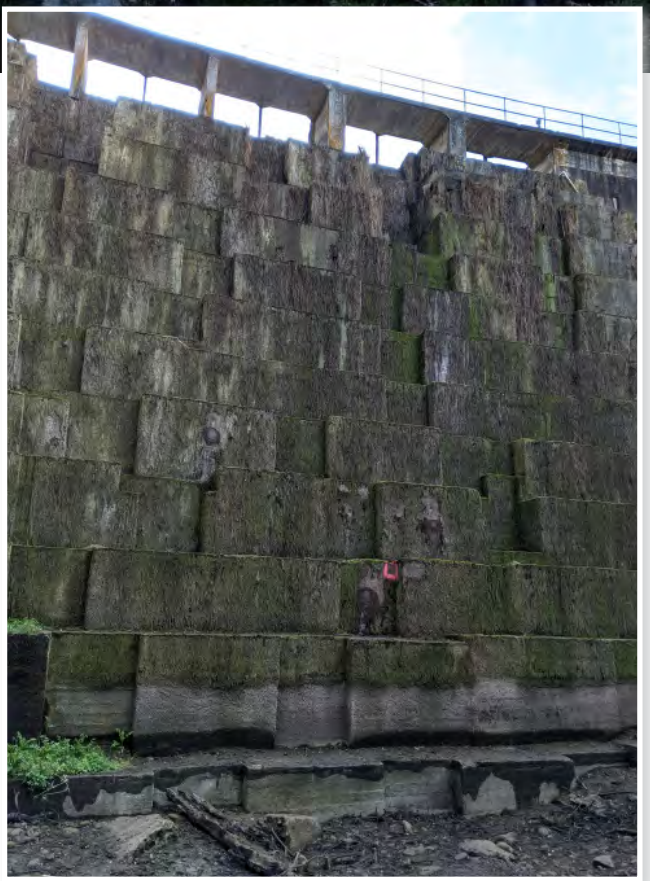
4

Stanford, California

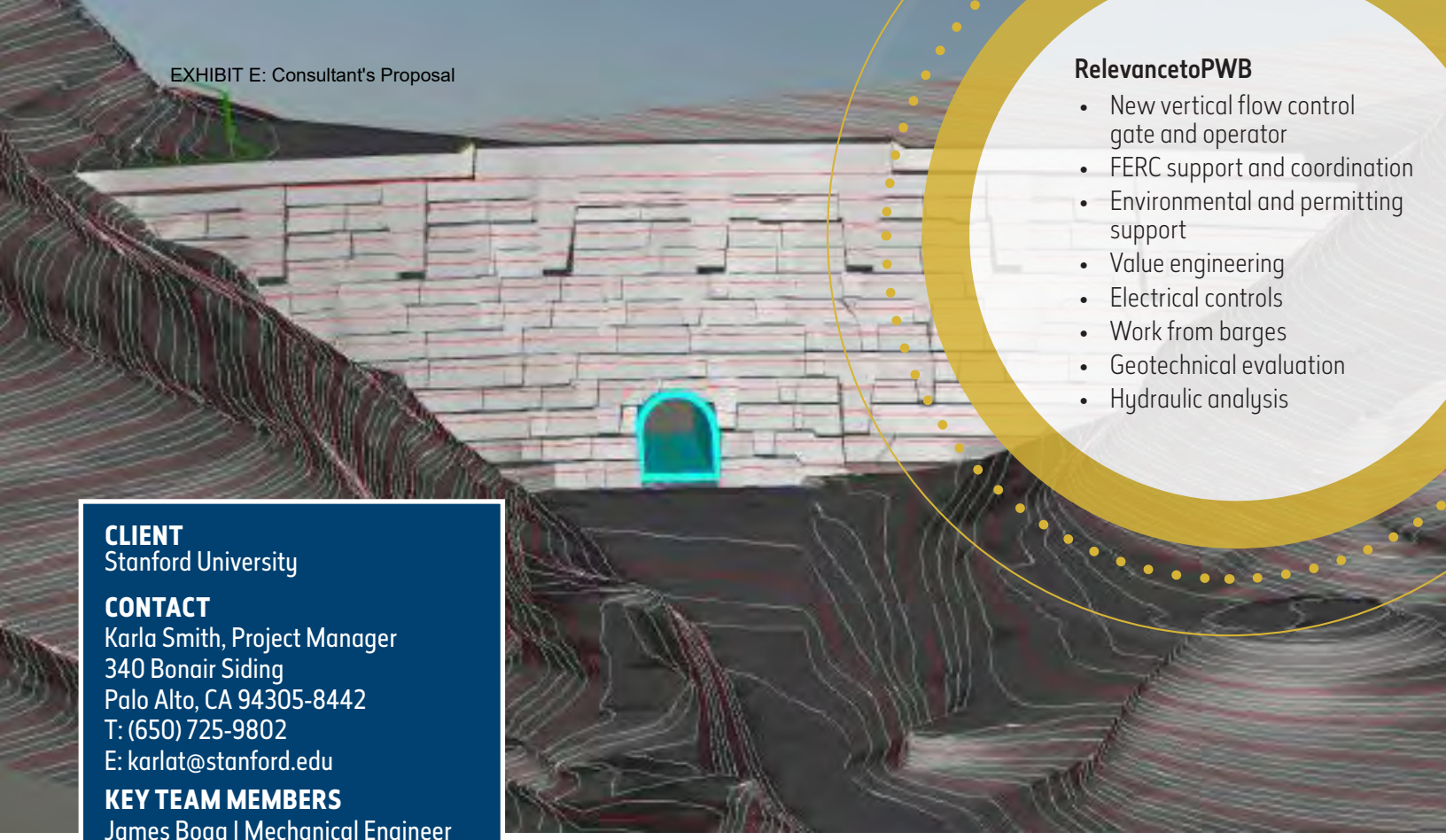
McMillen Jacobs is serving as the Design-Build lead, including analyzing alternatives and value engineering, environmental and permitting support, life-cycle cost analysis and risk assessment, and nal design and construction documents.

The Searsville Dam stores and delivers water for Stanford University facility operations, primarily landscape irrigation needs and re protection, and for habitat values and ecological research. The interlocking concrete block dam is in sound structural condition. However, the dam prevents sh passage to four creeks and has been trapping sediment in the watershed above the dam over the past 125+ years. If the dam is not modi ed to allow water flow, the watershed upstream will become lled with sediment. Roughly 2 million cubic yards of sediment have been deposited upstream over the last century. This project will flush 1 million cubic yards of sediment downstream to restore natural flow in the channel. This effort will drain the Searsville Reservoir.

Dam Stability/Dam Structural Evaluations: The design includes a detailed assessment of global dam stability under multiple load scenarios (including seismic events) associated with each phase of the project. Concrete stresses, as well as sliding and overturning potential, are being evaluated using three-dimensional (3D) nite-element modeling (FEM) and linear analysis of the dam and the foundation to capture the effects of foundation flexibility. The seismic response of the dam is approximated using response spectrum and modal superposition methods. The initial structural support of the tunnel throughout construction may include crown spiles, steel sets, rock bolts, and/or shotcrete. The nal lining system for the tunnel will consist of a permanent, cast-in-place, reinforced concrete lining with annulus back ll grouting. The global dam stability will be demonstrated in compliance with California Department of Water Resources Division of Safety of Dams (DSOD) guidelines and recommendations.



Searsville dam face



RelevancetoPWB

- New vertical flow control gate and operator
- FERC support and coordination
- Environmental and permitting support
- Value engineering
- Electrical controls
- Work from barges
- Geotechnical evaluation
- Hydraulic analysis

CLIENT
Stanford University

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Gavin Smith | Structural/Gates
Taylor Bowen | Structural Engineer
Mitch Skelton | Electrical Engineer

PROJECT SCHEDULE
2020-2023

TOTAL VALUE
Con dential

Gate Alternatives: Our team performed an analysis on various types of gates to determine the best solution. A roller slide low-level gate was selected to allow for adjustments to the gate opening size during the sediment flushing period. In addition, we considered a variety of mechanical hoisting systems for the selected gate. We investigated wire ropes, but because of the need to push and pull the gate, it was not a viable solution. We also looked at an electric screw hoist but did not have enough power to get through the mud in that location. Therefore, we selected the hydraulic cylinder hoist which has enough force to be able to push and pull the gate through the thick muds at the lake.

Gate Design: We designed the gate (16'-10" by 15' and 1'-8 ¾" deep) and will install it on the upstream end of the tunnel opening. The gate is designed to open and close under 50 feet of upstream hydraulic and lake sediment load. This is necessary to allow for adjustments to the gate opening size during the sediment flushing period. Following sediment flushing, the gate is expected to be set to a speci c, pre-determined height for long-term operation after project completion. The gate system will include a structural concrete guide frame on the upstream face of the dam; j-bulb seals; a hoisting system for lifting and lowering the gate; and instrumentation controls inclusive of a permanent power source. The system will require mechanical and electrical infrastructure at the dam crest, and we will likely construct a platform to allow for maintenance access. In order to prevent sediment and debris accumulation from restricting the gate operation, a sediment water flushing system will be installed to allow for flushing of the gate guides prior to gate operation. Following the sediment-flushing period, we anticipate setting a xed position that provides effective flood attenuation within the reservoir volume while maintaining sh passage conditions.

Electrical / SCADA: Electrical design components include the electrical distribution system and control systems (with remote SCADA) for the new hydraulic gate hoist, flushing pump skid, and deck lighting. Our scope of work also includes one-line diagrams, power and lighting plans, a permanent standby generator, and electrical calculations and details. Work includes the design for the installation of a new utility power service lateral and transformer. The equipment and instrumentation system on the new roller slide gate will tie into the existing Stanford University SCADA system.

Hydraulics and Hydrology: In addition to the one- and two-dimensional hydraulic sediment transport models previously created, McMillen Jacobsl developed a new three-dimensional computational fluid dynamics model to support the tunnel design and plunge pool analysis.

LEWIS COUNTY PUD: COWLITZ FALLS DAM SLUICE GATE UPGRADES & RADIAL GATE INSPECTION

5

Randle, Washington

The Cowlitz Falls Dam is a concrete gravity hydroelectric dam that was constructed in the early 1990s. It spans approximately 700 feet across the Cowlitz River and 140 feet high with a maximum height of 169 feet above the deepest part of the foundation.

McMillen Jacobs has completed a wide variety of task orders at the Cowlitz Falls Dam Facility. The dam has an ogee spillway section controlled by four radial gates operated by individual electric-powered hoists (65'x36' and 47' x 32'). There are also 2 low-level sluices (12' x 16'), in the base of a gate monolith. The sluices are controlled by hydraulically-operated vertical lift wheel gates and are intended to pass accumulated silt. They also have an emergency spillway bay (50 feet wide) controlled by 6-foot high wood flashboards.

Sluice Gate Upgrades: Since commissioning the sluice gates, the District had experienced issues with signi cant and potentially harmful vibrations within the structure when operated. When the District retained McMillen Jacobs to investigate and resolve the problem, we assembled a team that included hydraulics expertise in addition to structural and gate specialists. Our hydraulics engineer quickly identi ed the flow conditions and the geometry of the sluiceway intake as the root cause to the ongoing issues—something no other engineering group had discovered previously. This paradigm shift and fresh approach opened up new practical options for modifying the dam so that the sluice system will operate as originally intended. Alternative solutions included reshaping the entrance to prevent cavitation that was negatively affecting the sluice gate performance. We also suggested changing the gate style from a leaf gate to a top seal radial gate to provide an improved flow transition. It eliminates the gate slots that were damaged by

McMillen Jacobs is building a numerical and physical model of the sluice gates to develop modi cations and alternatives to the sluice intake, gate type, and exit

RelevancetoPWB

- Concrete dam
- Vertical lift gates
- Seismic analysis
- FERC compliance
- Gate inspection
- Hydraulic analysis
- CFD and physical modeling

CLIENT
Lewis County Public Utility District

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Gavin Smith | Structural/HSS Designer
Taylor Bowen | QA/QC

PROJECT SCHEDULE
2016-2019

TOTAL VALUE
$571K

During the root cause analysis phase, our hydraulics, structural, and gate specialists quickly identified the flow conditions and the geometry of the sluiceway intake as the root cause of the ongoing issues—something no other engineering group had discovered. This paradigm shift and fresh approach opened up new practical options for modifying the dam so that the sluice system will operate as originally intended.

sediment ball-milling, it provides a more stable gate that is less prone to experiencing vibrations, and the trunnion anchor is located out of the normal flow reducing exposure to sediment-laden and debris flow. McMillen Jacobs is working with the Utah Water Research Lab to test and build a numerical and physical model of the sluice gates and overlaying spillway bay no.4. The nalized con guration being currently tested is modifying the sluice intake, changing the gate type to a top seal radial gate, and modifying the sluice exit to allow concurrent sluice flows with the spillway flows. This will allow the District to operate the sluice gates as originally intended, to pass small regulating flows, and move sediment through the reservoir during large storm events.

Radial Gates Seismic Analysis: The seismic analysis was in response to a FERC request after a 2014 Seismic Determination Study for Cowlitz Falls Hydroelectric Project determined there was an increase in the site seismicity. The assessment determined that the updated seismic loading exceeds previously analyzed load cases including an extended gate Probable Maximum Flood loading. Based on this investigation, it was determined that the updated seismic loading surpassed the PFM loading and that a new more detailed analysis is required to assess the forces in the individual gate members and connections. Standards used for guidance include ETL 1110-2-584 (2014) Design of Hydraulic Steel Structures, Hydraulic Steel Structures and EM 1110-2-2702 (2000) Design of Tainter Gates, as well as EM 1110-2-2703 (1994) Lock Gates and Operating Equipment.

Appendix L Physical Inspection: McMillen Jacobs completed the inspection of the existing 4 radial gates. This project was in response to the FERC Tainter Gate Initiative implemented in 1998 and the 2001 revision requiring each dam with a Category 1 radial gate to submit a detailed Gate Inspection Report. Our team inspected the four radial gates combining rope inspection techniques. The trunnion hubs were accessed by a man-basket to inspect per FERC requirements. The team prepared the Gate Inspection Report in accordance meeting FERC compliance with Chapter 14, Appendix L, Detailed Radial Gates Inspection Reports.

Additional Team Capabilities

Dam Specialists

McMillen Jacobs has participated in the inspection, design, and/or construction of **100+ projects involving dams** as well as an additional facilities supporting dams such as gates and intakes/outlets. Dams have varied in size from only a few feet high to over 300 feet high. We design, inspect, and construct dams related to flood control, hydropower, irrigation systems, water resource facilities, recreational use, sheries, and water storage.

We have developed dams for ponds, lagoons, rivers, and reservoirs using many types of materials, including earth, concrete, and inflatable rubber including thin shell concrete arch dams. We have experience on all dam types, including gravity, arch, and embankment. Many of our projects have also contained repairs to supporting infrastructure including gates, valves, outlets, spillways, concrete structures, diversion structures, intakes, large-diameter pipelines, pumps and generators, and tunnels.

We bring together our in-house civil, structural, mechanical, electrical, instrumentation and controls, hydraulics and hydrology, geotechnical and geological, cost estimating and analysis, and operations simulation/optimization teams. Our engineering analyses include dam stability, hydraulic design of spillway and outlet works, intakes and outlet stilling basins, and mechanical/electrical structures with expertise in instrumentations and controls such as SCADA integration. We also bring years of experience obtaining and implementing various licensing, permitting, and regulatory approvals.

Our team understands the challenges unique to this Project including in-water work, dif cult access, limited construction footprint, complex dewatering systems, environmentally sensitive locations, and coordination with numerous project stakeholders. We have the tools, equipment, and expert resources to effectively mitigate risk and facilitate a safe working environment.

A Well-versed Gate Team

Because we regularly design and build dam improvement projects, we are comprehensively familiar with a wide range of gate types and uses. Members of our team have participated in the evaluation, design, and/or installation of a variety of gates including vertical lift roller gates, tainter gates, hinged flap gates, slide gates, Obermeyer weirs, large ori ce plates, crest gates, rolling drum (sector) gates, piano key weirs, miter gates, wicket gates, telescoping weir gates, knife gates, miter or swing gates, and more. Uses of these gates have varied including spillway gates, sluice gates, outlets, intakes, and structures for navigation locks.

Morony Dam Spillway Gates Replacement

We have also designed or rehabilitated supporting infrastructure including concrete spillways, hoists or bridge cranes, electrical controls (including SCADA and PLC), actuators, and outlet conduits.

Career Gate Experts

Another unique quali cation we offer is in-house personnel who have focused their careers on the evaluation and retro t of hydraulic steel structures at existing dams. For example, Mechanical Lead Matt Hess has focused his career on hydraulic steel structures at hydroelectric facilities. He is a mechanical engineer who has inspected, evaluated, designed, and rehabilitated 30 gate projects. He earned a strong reputation as the expert on gate rehabilitation. USACE districts across the nation have called on his expertise to solve the more technically challenging issues with the mechanical aspects of hydraulic steel structures.

Proposed Structural Lead Gavin Smith has participated in the rehabilitation of over 20 gate projects. He has authored papers on gate retro ts and performed the analysis, design, and engineering during construction for the rehabilitation or replacement of several gates. The majority of his analysis and design focused on the previously ignored trunnion friction loads.

Our well-rounded experience equips us to design for conditions that are unique to dams including dif cult and/or limited access, working over water, concrete repairs to accommodate new equipment, FERC compliance, and environmental concerns.

Experience with Government Agencies

McMillen Jacobs maintains a client base of public, municipal, and government agencies throughout the northwest and nationally. We value our public sector experience because it enables us to understand the perspectives of all dam owners so we can better serve their needs. Speci cally, we have been able to use our knowledge of procurement, contractual, and funding constraints to advise our clients on how to **minimizeschedule, cost,andothercontractualrisks** . Four of our proposed Core Design Team members were previously employed by owners of dam and hydro facilities. This experience is carried into our design packages through development of speci cations and bid documents to effectively minimize risk. Examples of our experience with government agencies speci c to dam related projects are shown on Table 3-1.

Experience with PWB

For over 20 years, McMillen Jacobs has worked closely with PWB and other Oregon public agencies, including Bureau of Environmental Services, Tualatin Valley Water District, Clean Water Services, and the Joint Water Commission. Our long-standing relationship with PWB has gained McMillen Jacobs a deeper understanding of project expectations and processes. Furthermore, our local engineers and geologists are very familiar with the subsurface conditions in the region. The combination of our solid relationship with PWB and our regional technical knowledge has proven to bene t entire project teams.

McMillen Jacobs has successfully completed projects for the following government agencies:

- Portland Water Bureau
- Oregon Water Resource Department
- USACE Portland, Seattle, Walla Walla, San Francisco, Sacramento, Albuquerque, St. Louis, Omaha, and Tulsa Districts
- Bureau of Reclamation
- US Fish and Wildlife Services - Regions 1,2,3,5,6,7 and 8
- Bureau of Land Management
- US Department of Agriculture, National Resource Conservation Service
- National Parks Service
- USDA Forest Service
- United States Geological Survey
- Bureau of Indian Affairs
- Federal Highway Association

McMillenJacobsandPWBhavebeen successfullypartneringoverthelast10years onthefollowingprojects:

- Bull Run Filtration Facility (in progress)
- Fulton Pump Mains Replacement (in progress)
- Willamette River Crossing (in progress)
- Powell Butte Reservoir #2
- Washington Park Reservoir Improvements

Resources to Perform the Work

Our team has the necessary management, technical, and production resources to complete all scope of work elements on schedule, within budget, and with proactive planning to avoid surprises. We have the technical capabilities of a large national rm, yet are small enough to provide flexible, same day resolution to issues, and cost-ef cient services to PWB. We accomplish this through open sharing of staff and technology between all of our of ces.

In addition to the personnel identi ed in Section 2, we have over 500 professional staff, providing us the capacity to provide resources as needed, with the goal of maintaining flexibility, expandability, same-day resolution to issues, and cost-ef cient services to PWB. Our clients have expressed that our responsiveness and ability to scale up and down through various phases of the project is unique to the industry and they appreciate working with us repeatedly for that reason.

More than 80% of our team's assignments have come from existing clients. Our successful working relationships with long-term clients exist because we continually strive to understand our clients' needs and provide the high-quality expertise they expect.

Long-Term Team Commitment

Over the past year, we have been tracking and preparing for the Dam 1 Spillway Gates Replacement Project, and have strategically developed workload forecasts for our key staff that will allow this Project to take priority. McMillen Jacobs fully understands the level of commitment required to deliver this Project and Project Manager James Boag is empowered by upper management to commit any and all resources to successfully complete the Project on schedule.

To promote long-term tenure, McMillen Jacobs offers a diverse workplace with competitive compensation, training and development opportunities, an employee ownership stock program, succession planning, and concentrated employee engagement efforts.

High Quality Standards for a High-Quality Product

USACE is known throughout the industry for their stringent quality requirements. Our internal QA/QC program and procedures are based on the requirements of the USACE ER 1110-1-12 (Quality Management) and ER 110-2-1150 (Engineering and Design for Civil Works Projects). Our program also meets the requirements of FERC as outlined in their project design manual. Using these guidelines as a foundation will meet PWB requirements on this Project.

Work Quality and Cost Control

Work Quality

We have established a Quality Assurance/Quality Control (QA/QC) Program that is robust but not so complicated that it hinders progress. It will result in products that are based on accurate calculations, guided by industry standards, and in agreement with PWB's expectations. We are committed to delivering high-quality results at every level of the team and for every aspect of work.

All team members will work under the guidance of an established Quality Management Plan (QMP) that we have developed through years of practical experience on similar projects. Our standard QMP will be tailored to accommodate PWB's standards. Of all the elements of our QMP, we have found the most bene t from our quality review process. Figure 3-1 illustrates our process which will result in the following bene ts to PWB:

- All design packages will be reviewed thoroughly internally before they are submitted to PWB to ensure our submittals are accurate and complete. This reduces PWB's review time and budget.
- Our team will communicate closely with PWB prior to the contract deliverables to verify our intended solutions are in line with your overall goals, objectives, and preferences.

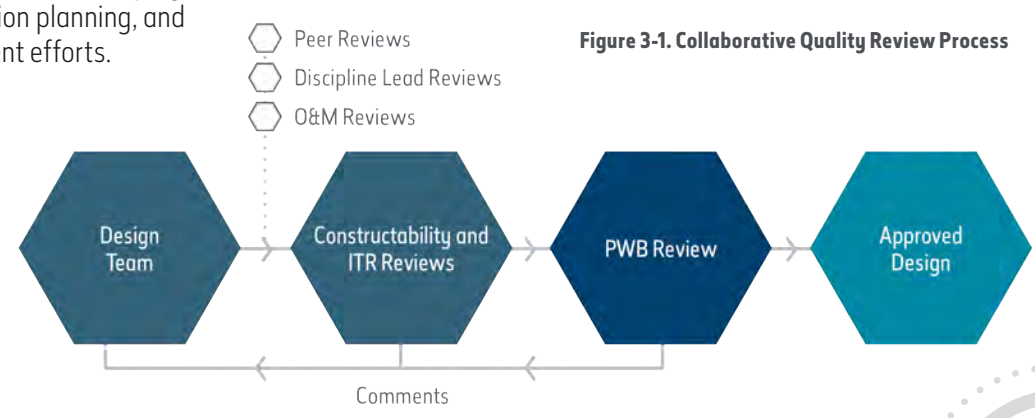


Figure 3-1. Collaborative Quality Review Process

Project Manager James Boag has the overall responsibility to ensure quality standards are met. As a technical project manager, James has the knowledge, skills, and ability to review the Project as a whole and ensure other reviewers are making meaningful review comments. He will provide valuable reviews focused on operability and cost ef ciencies drawing from 16 years' experience on the owner-operator side of dam and hydropower facilities. James will lead deliverable reviews but also audit the discipline leads periodically to ensure QA/QC processes remain robust and in compliance with contract requirements. James will also ensure adequate quality control resources are assigned.

Throughout the design process, peer reviews provide checks of analysis, logic, coverage completeness, number and computation accuracy, consistency, grammar, and regulatory requirement compliance. Checks include veri cation of references, assumptions, approaches, calculations, numerical modeling boundary conditions and results, and drawings. Peer reviews provide inspections of work in progress checking representative samples of data, computations, and facts for accuracy.

McMillen Jacobs' discipline leads also provide quality checks for work performed under their direct charge. This includes supporting staff and coordinating with other disciplines to ensure all elements are properly coordinated to ensure the project is reviewed holistically.

Cost Control

During the design phase, we provide a realistic construction approach and cost estimate that reflects the identi ed goals, objectives, and actual eld conditions. Because our in-house estimators are gathering costs and creating budgets for our construction jobs every day, they are able to produce accurate and cost-effective engineer's estimates. Additionally, as an integrated design-build rm, we often are tasked with executing the construction on projects we have designed with engineer's cost estimates. Therefore, we offer our clients an advantage when estimating construction costs for our designs.

Management and Organizational Capabilities

Our management team has the authority to request support as needed and are empowered to make decisions that bene t our clients. In addition to James Boag being the point of contact for PWB, the company founders, Mara and Mort McMillen, are easily accessible, and the staff has the ability to make one phone call and get the resources they need within hours—not days.

Approach to Overall Management and Integration of Activities

The successful completion of hundreds of dam and water resources projects provides McMillen Jacobs a strong foundation for successful contract execution. Our management structure, ef cient processes, and agreed-upon procedures will be based on PWB's requirements and supplemented by our standards that have been key to the delivery of design projects on time and within budget.

Section 4 details our management and integration techniques to successfully complete the work requirements. Our developed project approach, experienced management team, realistic budget and schedule, and proactive communication will mitigate challenges, issues, and risks on this Project.

Effective and Proactive Communication

Upon notice to proceed, the rst objective of the execution process is to assure that all key stakeholders and our team members fully understand the requirements. Meeting this goal requires close coordination among the key members and other professionals assigned to the Project. To provide guidance to the team, we will develop a detailed Project Management Plan (PMP) that will outline intended scope, schedule, direction on reporting and standards, communication protocols, and organization of team with escalation paths if needed. Throughout the Project, our team will focus on:

- Clear, concise meeting agendas and materials developed and distributed in advance of the meeting
- Scheduled coordination meetings between team members
- Use of appropriate communication tools

We will also develop and maintain an action item list throughout Project execution. This list will clearly outline tasks, identify responsible parties, and denote required completion dates. McMillen Jacobs uses our action items lists for the entire team, including our clients, to provide an effective, yet simple tool to ensure issues are addressed and work activities are accomplished in a timely manner.

Lines of Authority

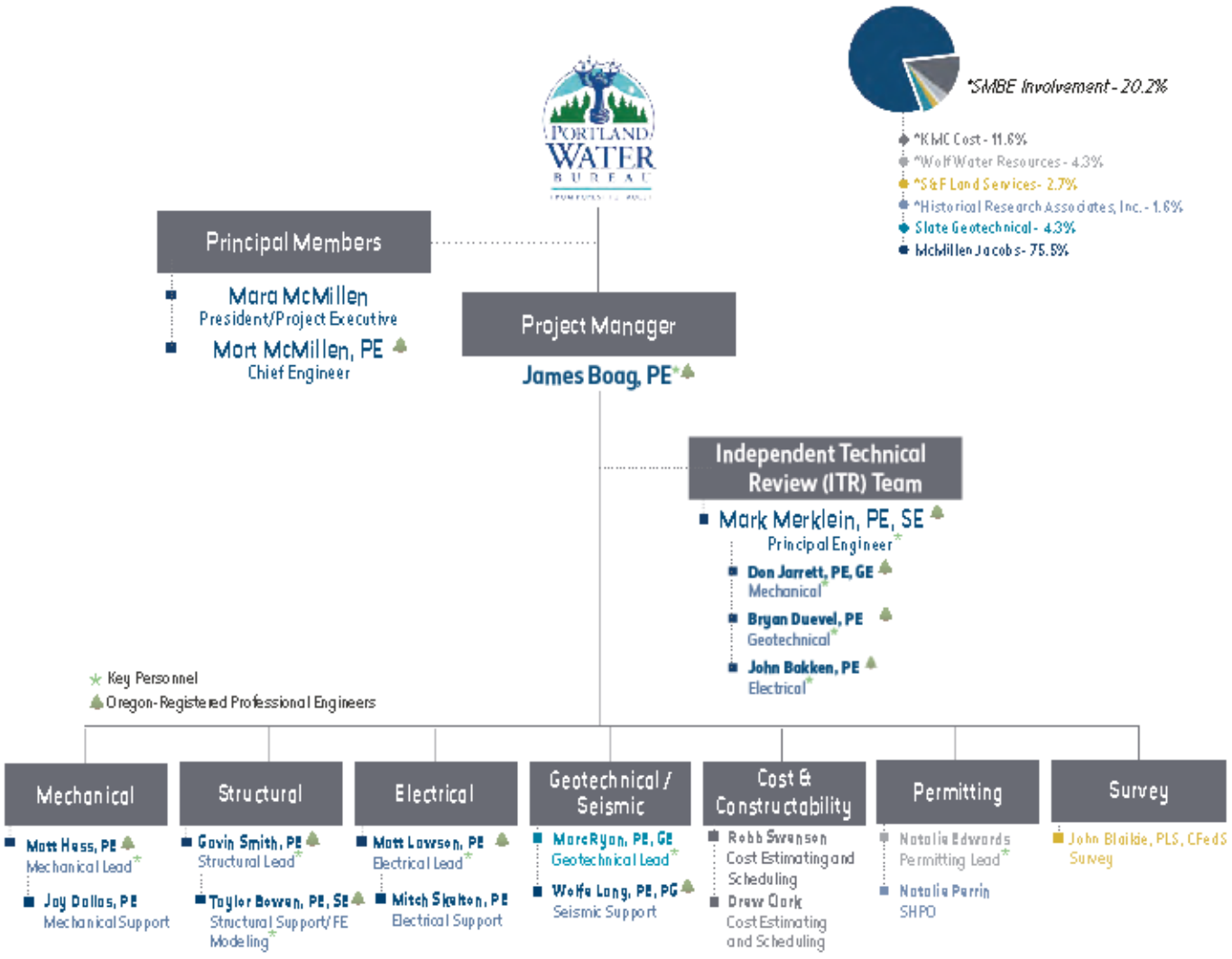
McMillen Jacobs will resolve any issues as they arise at the project level. Project Manager James Boag will have the ability to elevate as necessary to our principal members. These lines of authority are shown in the adjacent Figure 3-2 and in our team organizational chart Figure 3-3.

Figure 3-2. Lines of Authority

Organizational Chart

Our team will provide PWB with a proven, reliable, and experienced team that will exceed your expectations with respect to cost, budget, and schedule requirements. We believe our methods are successful because we commit well-managed teams with the necessary resources and proven approaches to meet client expectations. We will commit this same level of excellence to PWB. Figure 3-3 below reflects the structure of our proposed team, which is specifically designed to successfully execute the scope of work described for the Dam 1 Spillway Gates Replacement Project.

Figure 3-3. Organizational Chart



Project Schedule and Changes to Scope

Failure to meet the client's expectations can often be traced to a poorly developed initial schedule. If the schedule is not representative of the actual timelines required to complete the work task, often additional resources will be added to the project resulting in inef cient execution, delays, and change orders. It is important at the kickoff meeting to work through individual work tasks with our clients. "Frank and open" communication on what is realistic, clear identi cation of risks associated with the schedule, and a plan to mitigate the risk is required at the project inception. A clear understanding of the goals and objectives coupled with effective manpower scheduling will facilitate achievement of PWB's milestone and Project completion goals.

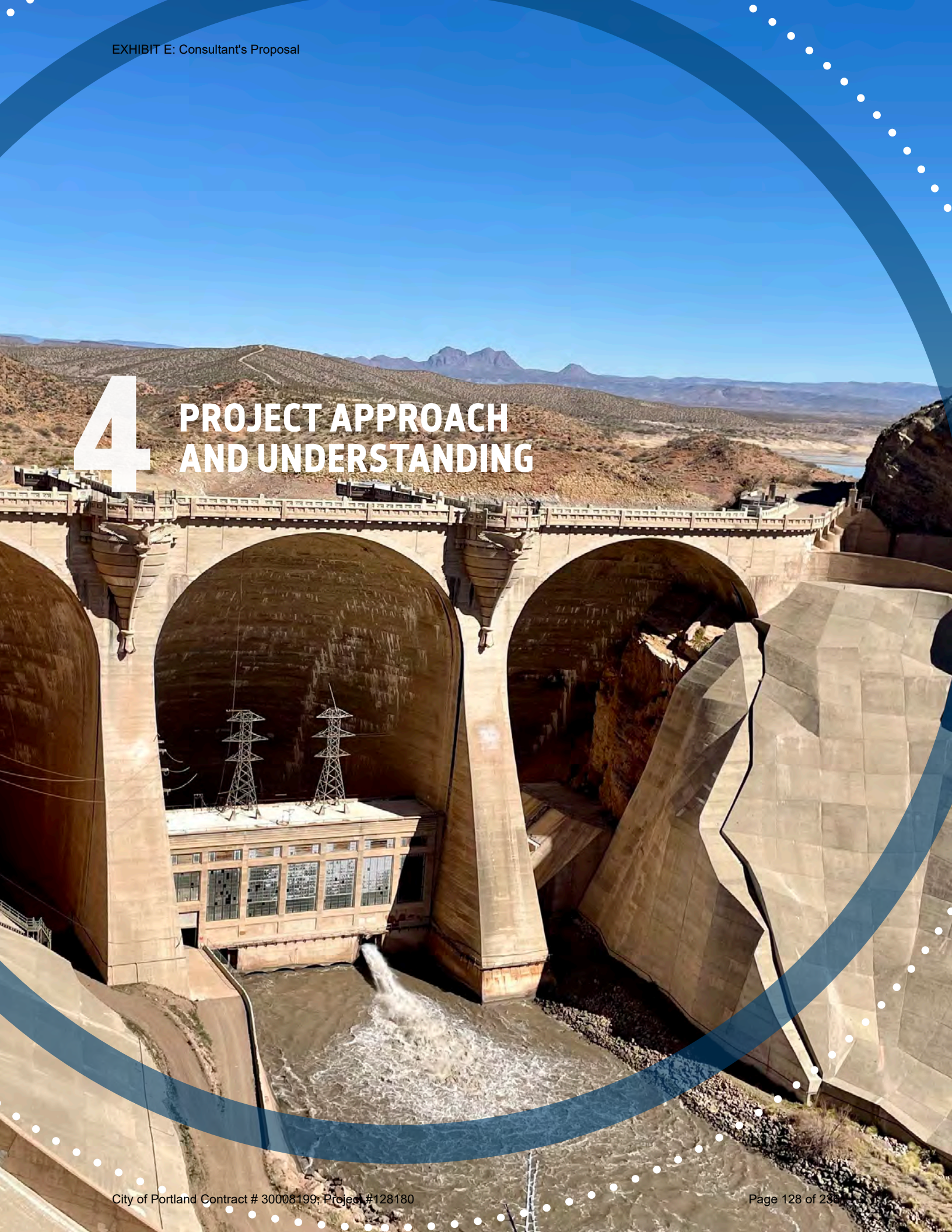
During the planning of our projects, we provide a realistic approach and cost estimates that reflect the RFP requirements. These estimates can then be used as a sound basis for developing a schedule throughout all phases of the project.

Changes in scope and unanticipated project delays do happen even with the best-intentioned team. The goal is to manage any changes or delays in a straightforward way through early and open communication. Prior to any changes, there are indications that a change may happen. It is important to recognize potential changes, document them, and communicate them. Changes may be related to schedule, scope, budget, and may happen at the design, bid, and construction levels. They may be directed by owner, agencies, designer, or construction company. During the design phase, any potential changes will be communicated to or by James. Each change will be evaluated on potential bene t and impacts.

Our personnel quali cations (Section 2) offer PWB con dence in our ability to complete the required services within budget by May 2025.

We are committed to staying within budget and schedule. Any attempt will be made to rectify the course. For most of the smaller changes, the team will try to work within the available budget and schedule. As the Project advances, and through weekly progress meetings, it will be clear if the budget will be exceeded or not. Early communication, along with logged changes and associated analysis of potential cost and budget impacts, will limit or eliminate any surprises, resulting in easier change management.

> "At every stage of the project, McMillen Jacobs have maintained safety, quality, and environmental compliance as their top commitment while also providing a level of transparency of operations to Avista that facilitated a true partnership... they have been consistent in proactively examining project risks and mitigation strategies that minimize cost, schedule and compliance risks to the project...They have consistently demonstrated performance in a very professional, ef cient, and competent manner."
>
> Meghan Lunney, Avista Corporation
> Long Lake Dam Design-Build Improvements



4 PROJECT APPROACH AND UNDERSTANDING

4. PROJECT APPROACH AND UNDERSTANDING

DESIGN SOLUTIONS FOR LONG-TERM BENEFIT

McMillen Jacobs brings unique qualifications that give our engineering staff an advantage in working through concept design alternatives and collaborating to achieve consensus for the final design. We offer integrated water resource design engineers and construction staff that construct those designs. Our construction crews regularly perform gate replacements that our engineers design. This enables our team to be uniquely in tune with constructability means and methods for design alternatives, feasibility of design concepts, and the direct costs of design choices.

We have also strategically partnered with subconsulting firms who complement our local Portland knowledge and expertise in their own respective fields. Our collective multi-disciplinary team will result in efficient design delivery and timely advancement of the Project.

Learn more about the solutions and benefits we bring to PWB and the Project in the following pages.

Project Understanding

The City of Portland operates two dams along the Bull Run River, which produce reservoirs to store water that is later treated to provide quality drinking water to the City. This project focuses on Dam 1 and the central spillway controlled by three vertical lift gates, which are lowered each year to raise reservoir levels. The 2017 Federal Energy Regulatory Commission (FERC) inspection identified that the gates are in need of cleaning to remove rust and repainting. PWB then completed an alternatives analysis to establish the most cost-effective way to address these issues, and determined that replacement of the gates was the most advantageous solution for PWB.

As part of the City's vast water system and one of many significant projects underway in the Bull Run Watershed Closure Area, we understand the vertical lift gates are a critical component in PWB's infrastructure. Our project team and approach will provide PWB with a design that meets FERC and permitting requirements, minimizes construction and cost risk to PWB, and assures the gates will operate reliably for a new 50+ year lifecycle.

We have reviewed the RFP and accompanying background documents and have developed a team and approach to facilitate operational reliability, safety, and long-term viability at Dam 1. We will partner with PWB to define performance objectives for the spillway structure, gate and hoist systems, and controls and establish up-to-date design criteria that prioritizes dam safety and risk mitigation based on current site-specific hazard information, industry standards, and FERC requirements. To achieve this goal, we built our proposed project team around a Core Design Team comprising in-house, Portland-based gate experts who will lead the design and engineering efforts and provide CM/GC and construction support services.

Overall Solution to the Project

McMillen Jacobs' collective team brings extensive multi-disciplinary project management and hyper-focused gate and seismic technical expertise, rounded out with personal and professional connections within the City of Portland. The combination of these traits enables us to proactively identify potential issues and develop solutions that mitigate risk and costly time impacts. To facilitate effective and efficient project delivery and achieve PWB's goals, we have identified preliminary challenges and solutions throughout each phase of the Project.

Conceptual Design Refinement and Consensus

Challenge: Designers often lack an understanding of why design code requirements exist. As a result, they may blindly follow codes without understanding the justification, limitations, or exceptions of code requirements, resulting in designers making poor choices or ruling out a feasible design option. Solution: Members of our Core Design Team helped author design codes (USACE Engineering Manuals) commonly seen as the industry standard for design of dam features and frequently referenced by FERC: EM 1110-2-2610 Mechanical and Electrical Design for Lock and Dam Operating Equipment; EM 1110-2-1424 Lubricants and Hydraulic Fluids (authored self-lubricated material content) EM 1110-2-3200 Wire Rope for Civil Works Structures; Unified Facilities Guide Specification 35 05 40.17 Self-Lubricated Materials, Fabrication, Handling, and Assembly. Benefit to PWB: Our unique staff insight and understanding of code requirements, limitations, and exceptions ensure sound decision making and reliable designs PWB can be confident in.

Challenge: Choosing and evaluating successful design concepts requires staff to possess sound judgement in design and constructability of complete gate systems. Solution: Our design staff have direct experience working for USACE Portland on spillway and other gate replacement programs, as well as regularly create designs for gate replacement projects that our in-house construction crews build. Benefit to PWB: Our understanding of how design choices directly influence cost results in accurate estimates, constructible designs, and fewer field changes.

Challenge: Under-representation of the interests of operations staff and dam owners. Solution: Members of our Core Design Team were previously employed by dam owners and operators, and therefore have first hand experience resolving operational issues resulting from design weaknesses. Benefit to PWB: Specialized expertise resulting in better designs that are constructible, cost-effective, safe, and efficient to operate.

Design Services

Challenge: Lack of continuity of the team from the concept phase through development of plans and specifications and construction. Solution: Our "Core Design Team" is specifically resourced to take a "cradle-to-grave" approach by providing the primary support for the project from concept phase through construction. Benefit to PWB: Having the same team from start of finish of a project minimizes schedule risk and outstanding issues that can "fall through the cracks."

Challenge: Key design staff can get overwhelmed during P&S milestones due to the amount of work that needs to be accomplished in a short timeframe. Solution: A well thought out team, from management to support level, who are available and committed wherever they are needed throughout the duration of the Project. Benefit to PWB: Having access to additional resources that know how to support the Core Design Team will minimize schedule risk.

Challenge: Designers fail to incorporate the needs of the dam owners, end users, (operations and maintenance staff), and stakeholders. Solution: One of our core philosophies is to engage with our customers regularly and proactively especially during design phases to catch and address concerns, requests, or design issues before they become larger and more costly design changes. Benefit to PWB: Clear lines of communication to facilitate accountability and encourage engagement from PWB and other stakeholders.

Challenge: Calculations and other engineering design analysis methods fail to address FERC concerns and regulations. Solution: We have a robust quality control (QC) program that aligns with FERC requirements as outlined in their design manual. This QC program includes process reviews, Independent Technical Reviews (ITR), and constructability reviews and operate independently under the leadership of our Principal Engineer, who will report concerns directly to the project manager. Benefit to PWB: Assurance that there will not be any blind spots in designs and that designs will be verified with confidence to meet FERC requirements.

Environmental Permitting Phase

Challenge: Agencies requesting analyses that were not included in the permit application Solution: Engagement from all stakeholders early in the process is essential to avoid a last-minute request for analysis. We propose that a permitting strategy be established early in the project lifecycle that engages all shareholders to ensure the field investigation methodology and analyses are acceptable

and adequate to address the concerns of each agency. Benefit to PWB: Early stakeholder buy-in minimizes the potential for changes down the road which reduces schedule and cost risks.

Challenge: Necessary permit or approval not secured. Solution: The development of a permitting strategy and engagement with federal, state and local agencies early in the process will help identify all necessary permits and approvals required. Benefit to PWB: A proactive approach will help prevent costly project delays.

Selection of CM/GC Contractor

Challenge: Finding technical staff that have direct experience with local general contractors. Solution: Project Manager James Boag and three other members of our Core Design Team have worked for USACE Portland and were heavily involved in their recent spillway gate rehab/repair program. These team members have firsthand experience working with local general contractors qualified to perform the Bull Run gate replacement. Our team members have even participated on many of the source selection boards to select contractors for past spillway gate projects. Benefit to PWB: This experience allows our staff to have firsthand knowledge of qualified local gate fabricators, machine shops, electrical panel shops, and other local suppliers that would be used by the selected CM/GC. This experience helps us understand what issues to look out for and how to advise PWB on choosing the best CM/GC partner.

Challenge: Finding technical staff that understand the perspective of Government agencies and dam owners when selecting a contractor. Solution: We have been through the contractor selection process for spillway gate rehabilitations/replacements as both government employees and dam owners. Benefit to PWB: We have firsthand experience working through the risks and challenges of government contracting and procurement processes and can help leverage our past lessons learned to mitigate PWB's risks with the CM/GC selection process.

Challenge: Finding staff that understand local construction challenges and costs. Solution: To supplement our Portland based Core Design Staff, we have partnered with KMC Consulting, a local firm specializing in construction risk and constructability. This team has substantial construction and cost experience and is highly qualified to advise on the GMP and feasibility of the proposed construction means and methods. Benefit to PWB: Close proximity to the Project makes our team easily available for in-person meetings and site visits and ensures we are familiar with the local set of subcontractors, cost considerations, and construction considerations unique to the local area.

Construction Support

Challenge: Finding staff that have practical experience and good judgment evaluating and solving gate replacement and repair construction problems and providing engineering during construction support. Solution: Each of our Core Design Team members performs engineering during construction for our in-house construction crews. We are regularly called upon to evaluate problems encountered by construction staff in the field and come up with reasonable solutions that don't compromise the design intent and functionality. Our staff also regularly performs shop inspections, onsite QA inspections, and assists with developing and implementing commissioning and testing plans to confirm our gate designs are installed and functioning correctly. Benefit to PWB: The experience of our staff will help ensure construction problems are solved quickly and with confidence that they are done right.

Challenge: Finding staff that can respond quickly to urgent construction issues. Solution: The majority of our Core Design Team is in the Portland area. This allows us to easily dispatch to the site to perform in person engagement on construction issues, onsite inspections, attend contractor meetings, and have maximum flexibility with changing commissioning schedules. Benefit to PWB: Our team is ready and able to respond quickly to avoid costly construction impacts.

Challenge: Finding staff that understand Government challenges, risks, and constraints with administering construction contracts. Solution: The majority of our Core Design Team has direct government experience performing engineering during construction for USACE. Benefit to PWB: Leveraging our Government experience will help ensure our Construction Support Services minimize PWB's contractual risks.

Proposed Work Tasks and Activities

In alignment with the RFP, we have structured our project approach around proposed work tasks under the following five phases of major work activities:

1. Conceptual Design Refinement and Consensus
2. Design Services (30%, 60% 90%, and Final Design)
3. Environmental Permitting
4. CM/GC Consultant Support
5. Construction Support Services

The following pages define our approach to accomplish the work tasks for each phase, the involved team members and the work products that will result.

Conceptual Design Refinement and Consensus (Basis of Design)

Based on previous preliminary engineering, the goal of this phase is to review the existing background documents and reports, outline the project issues and develop our approach to address the issues. We will then perform an alternatives analysis to evaluate design options, provide our recommendation, and collaboratively achieve consensus with PWB and additional stakeholders on the selected design concept.

Major Work Tasks

- **Identify Global Parameters for Gate Design –** After reviewing all previous documentation and record information, our team will produce a Design Criteria Memorandum to guide the design process and establish a framework within which the team will work. Contents will include optimal performance requirements, minimum standards, constraints, and operational "musts" and "nice to haves."
- **Permitting –** Permitting Lead Natalie Edwards will work with PWB's permitting staff to review all regulatory requirements to identify and develop a list of existing and forthcoming permits. We will coordinate with PWB's permitting lead to track the status of each application to ensure the project stays on schedule.
- **Alternative Analysis –** We will evaluate design, construction sequencing, and constructability alternatives based on original concepts that we will develop, as well as any alternatives that PWB would like to carry forward from previous efforts. The alternative analysis will consider and evaluate permit requirements, seismic loading, operations and maintenance, constructability and other potential construction issues, and construction sequencing. Feasible concepts will be developed to a 10% conceptual level. A Class 5 construction cost estimate and schedule will be prepared.
- **Seismic Analysis –** We will establish seismic design criteria for the spillway gates by producing an updated site-specific SHA and performing a linear dynamic finite-element analysis of the dam-foundation-reservoir system to estimate accelerations at the gate supports during the design seismic event.
- **Collaborative Workshop -** We will meet with PWB and project stakeholders, such as US Forest Service (USFS) and Oregon State Historic Preservation Office (SHPO), to review and discuss the alternatives analysis, delineate design elements, provide our recommendations and work together to achieve consensus on the desired design.
- **Technical Memorandums –** We will create technical memorandums that will be used to document technical topics, questions, or concerns that PWB identifies.
- **Basis of Design Report –** The basis of design will be used to document and help establish final consensus on the chosen design alternative. We will produce a Basis of Design Report documenting the selected design alternative which will include an executive summary, design criteria, conclusions, recommendations, outstanding issues, costs, and reference material. We will hold a Basis of Design presentation meeting with PWB and stakeholders to present the selected design alternative and establish consensus before moving into design services.

WORK TASKS	DELIVERABLES	TASK LEADS
Identify Global Parameters	Design Criteria Memorandum	Core Design Team
Permitting	List of existing and forthcoming permits and anticipated schedule	Natalie Edwards, Natalie Perrin
Alternative Analysis	Alternative Analysis Matrix, Alternative Analysis Presentation, workshop with PWB stakeholders	Core Design Team
Seismic Analysis	Site-Specific Seismic Hazard Analysis (SHA) Report, Linear Response Analysis for Gate Design Report	Taylor Bowen, Marc Ryan
Technical Memorandums	Technical Memos documenting various technical topics (minimum of five)	Core Design Team
Basis of Design Report	Basis of Design Report, agendas and minutes from Basis of Design Presentation Meeting, updated project schedule	Taylor Bowen, Marc Ryan

Design Services (30%, 60%, 90%, and Final Design)

The goal of the design services phase is to carry the Basis of Design concept to a detailed design shown on a complete set of bid documents essential for construction. Our team will also prepare all required documentation to support PWB in submitting the permit packages to the appropriate regulatory agencies.

Major Work Tasks

Contract Documents

- **30% Design –** We will take the chosen 10% concepts from the Basis of Design and refine them to a 30% plans and specifications (P&S) level. This will involve performing sizing calculations for the structural, mechanical, and electrical systems and using this sizing to build the design. This milestone (and each design milestone after) will include site civil (layout, utilities, construction staging, drainage, waterway protection), concrete restoration of features of the existing spillway bridge, gate designs that incorporate seismic accelerations, design of welded connections per appropriate structural codes, security and safety features, cathodic protection, gate controllers, access ports, lighting, power, telemetry instruments, and SCADA interfaces. We will also develop a 3D CADD model of the dam features required for the design. Plans will be developed from the 3D model and specification will be started. We will update a Class 5 cost estimate to confirm the rough order construction costs. After the PWB review period, we will hold a design review meeting with PWB to discuss any design concerns or issues.
- **60% Design –** To progress to the 60% design level we will refine our calculations, 3D CADD model, plans, specifications, and other deliverables to a level where we can validate the feasibility of the design and confirm the major design decisions are finalized. The design level will be used to perform a FERC supplemental PFMA and develop a Constructability Technical Memorandum.
- **90% Design –** The 90% design will be treated as a complete and final set. The engineering products will be in a state that is ready to be stamped and signed. The package will be suitable for the CM/GC Guaranteed Maximum Price (GMP). We will review the CM/GC's GMP at this stage. To progress the 90% design to this level the calculations, 3D CADD model, plans, specifications, and other deliverables will be progressed to a final stage.
- **Final (100%) Design –** At the 100% design we will submit a set of 100% documents that incorporates the comments from the 90% and all previous reviews. After receiving PWB approval, the engineering documents will be signed/stamped and submitted to PWB for team signatures.

Design Review Meetings

After submittal of each of the designs described above, PWB will have a designated review period. Upon completion of PWB's review, our team will then take the necessary steps to advance design to the next stage.

WORK TASKS	DELIVERABLES	TASK LEADS
30% Design	30% Calculations, Plans, and Specification outline, class 5 cost estimate, Engineers' narrative detailing progress and process, design notebooks detailing assumptions, a list of unresolved issues and next steps, agenda/minutes from 30% stakeholder review meeting, helicopter flight path, updated project schedule	Core Design Team, Robb Swenson, Drew Clark, Mark Merklein
60% Design	60% Calculations, Plans, and Specifications, class 4 cost Estimate, schedule of Values, agenda/minutes from 60% design stakeholder & FERC review meetings, pre-construction PFMA, tabulated comment log, constructability technical memorandum, updated project schedule	Core Design Team, Robb Swenson, Drew Clark, Mark Merklein
90% Design	90% Calculations, Plans, and Specifications, class 3 cost estimate, schedule of values, tabulated comment log, draft O&M manual, CM/GC GMP review comments, updated project schedule	Core Design Team, Robb Swenson, Drew Clark, Mark Merklein
Final Design	Final calculations, plans, and specifications, class 2 cost estimate, schedule of values, updated project schedule	Core Design Team, Robb Swenson, Drew Clark, Mark Merklein

Environmental Permitting

The goal of permitting services is to efficiently navigate the permitting and regulatory landscape by developing a permitting strategy early in the project that engages stakeholders including federal (FERC, USFS, National Marine Fisheries Service), State of Oregon (SHPO, Department of Environmental Quality, Department of Fish and Wildlife), and local agencies. Early coordination and integration into the design process will help identify and resolve potential permitting issues to avoid potential schedule delay.

Major Work Tasks

- **PWB Coordination –** Wolf Water Resources (W2R) will produce a draft permitting strategy memorandum for PWB to review. The memorandum will identify the federal, state, and local permits that may be required for the proposed construction. At this time, we anticipate the permits required may include: a Special Use Permit from the USFS for the potential use of USFS land for construction staging areas and laydown yards, a review through the Oregon SHPO due to the age of the dam and the local recognition of the structure, and approval from FERC and compliance with the National Environmental Policy Act (NEPA). If the use of helicopters is required, a meeting with the US Fish and Wildlife Service (USFWS) should be conducted to discuss the possible disturbance to spotted owl nesting. If the use of helicopters is not required, USFWS would not likely have concerns regarding this Project. Because the construction footprint is not anticipated to extend into the reservoir or downstream, a permit or authorization from USACE is likely not required.

  McMillen Jacobs and W2R will meet with PWB to review the memorandum and discuss any comments or concerns. The memorandum will provide an overview of the permit, the information required, and a timeline for completing the application or supporting documentation. Once the memorandum has been reviewed and approved by PWB, we propose that a single meeting or individual meetings be held with each agency that issues the permits or provides authorization to discuss the project and the permitting process. We understand that all communication with permitting agencies and any permit submissions will go through PWB.

  W2R will remain in constant contact with PWB throughout the permitting process to remain responsive to any revisions, questions, or concerns.

- **USFS Special Use Permit -** W2R, in coordination with PWB, will consult with USFS about the need for a Special Use Permit if construction activities or storage of equipment occur within the USFS boundary. PWB will coordinate with USFS to set up a pre-application meeting to discuss the Project. At this meeting USFS would identify what field assessments would be required and present the timeline and process for acquiring a Special Use Permit. If a Special Use Permit is required, the decision to issue one by USFS would require compliance with NEPA, likely achieved through a Categorical Exclusion document based on the temporary nature and likely small area of USFS affected by construction. Currently we believe the use of USFS land for construction purposes is unlikely.
- **Oregon SHPO –** Due to the age of the dam and its significance to the region, we expect that a cultural and historical review and report will be necessary. Historical Research Associates will conduct the work and develop the report for submittal by PWB. It is anticipated that a site visit would be required to document the current dam through photographs.
- **FERC Review and Approval -** The gate replacement is required due to a FERC dam inspection; therefore, we assume that neither a capacity amendment nor non-capacity amendment to the existing license is required. The FERC approval would require collaborating with FERC during the evolution of the designs. Compliance with NEPA would be achieved through a FERC Categorical Exclusion checklist as captured in the design review meetings discussed previously.

WORK TASKS	DELIVERABLES	TASK LEADS
PWB Coordination	Permitting Strategy Memo	Natalie Edwards
USFS Special Use Permit	Special Use Permit/Categorical Exclusion	Natalie Edwards
Oregon SHPO	National Historic Preservation Act Section 106 clearance	Natalie Perrin
FERC Review and Approval	FERC approval of designs	James Boag

CM/GC Consultant Support

The goal of the CM/GC consultant support phase is to assist PWB with evaluating and selecting a qualified CM/GC to perform the spillway gate replacement and evaluate the accuracy of their construction proposal and GMP. To provide PWB the best support possible for the CM/GC process, we have assembled a team that is local to the Portland area, has substantial government procurement experience, and are experts in gate system rehabilitations/replacements, constructability, and cost estimating.

Major Work Tasks

- **Meetings –** We will attend and assist with negotiation, coordination, and other needed meetings and prepare meeting minutes.
- **Site Visits –** We willl perform a minimum of three site visits to advise PWB on engineering and design topics, investigate and discuss constructability questions or concerns, address CM/GC questions and inquires, and provide any other onsite support required to facilitate the CM/GC selection process.
- **Design Inquiries –** We will address design inquires and questions, advise on suitable material and equipment substitutions that will meet the design intent, and provide written responses or addenda to bid documents as required.
- **CM/GC Selection Support –** We will help to prequalify contractors and otherwise support the CM/GC selection process. We will evaluate CM/GC proposals and use our expertise to provide recommendations on how well they match the construction documents. This includes preparing a final construction cost estimate prior to GMP negotiations and memos that document our evaluation of the GMP and CM/GC proposals.

WORK TASKS	DELIVERABLES	TASK LEADS
Meetings	Meeting minutes	Core Design Team, Robb Swenson, Drew Clark
Site Visits	Site visit reports / field notes	Core Design Team, Robb Swenson, Drew Clark
Design Inquiries	Design inquiry responses, design document addenda (to clarify inquiries)	Core Design Team, Robb Swenson, Drew Clark
CM/GC Selection Support	CM/GC proposal evaluation comments, final construction cost estimate (prior to GMP negotiations), memo evaluating how well CM/GC proposal matches design RFP, memo evaluating CM/GC GMP including market conditions, risk, completeness, comparison to construction cost estimate, and comparison of differences	Core Design Team, Robb Swenson, Drew Clark

Construction Support Services

The goal of the construction support phase is to assist PWB with administering the gate replacement construction contract. Our local team of gate experts has direct experience performing this work for numerous past spillway gate rehabs and repairs.

Major Work Tasks

- **Meetings –** We will attend the pre-construction meeting and prepare meeting minutes.
- **Preconstruction Activities –** We will perform the primary review of submittals, shop drawings, material certifications, welding procedures, work plans, and other preconstruction documents. Written responses for reviews will be provided to PWB.
- **Shop Inspection and Site Visits –** We will perform shop inspections and site visit inspections to ensure the design is constructed meeting the design intent and acceptable quality standards. After a shop inspection or site visit is performed a report will be created documenting the observations and findings of the inspection.
- **Change Management -** We will create or perform reviews and provide recommended responses for change management documents including RFI's, variations, change orders, field orders, modifications, and assistance with claims.
- **Commissioning and Testing –** We will provide onsite inspections and technical support for commissioning and testing activities. This includes helping to advise on troubleshooting issues that may be encountered during construction.
- **Closeout Support -** We will provide the final review of closeout submittals and other construction documents. This includes as-built redlines, final O&M manuals, punchlists, schedules.

WORK TASKS	DELIVERABLES	TASK LEADS
Meetings	Meeting minutes	Core Design Team, Robb Swenson, Drew Clark
Preconstruction Activities	Written responses to questions, written clarifications to design intent, review comments to submittals (shop drawings, material certifications, product information, work plans, etc.)	Core Design Team, Robb Swenson, Drew Clark
Shop Inspection and Site Visits	Inspection reports	Core Design Team
Change Management	Field orders, change orders, written responses to RFIs, assistance with claims	Core Design Team
Commissioning and Testing	Review comments for commissioning and testing plans, site visit reports documenting the results of the commissioning and testing	Core Design Team
Closeout Support	Punch lists, review comments for the CM/GC contributions to the O&M manuals, final O&M manuals, written notice to PWB and the PWB Contractor that the work is acceptable	Core Design Team

Estimated Time Frame to Complete Each Task

Our committed resources, unique advantages, and experience qualifications, and developed approach will enable us to deliver final design by August 2023. Figure 4-1 identifies the time frame estimated to complete each task. See Section 6 for a detailed Project schedule.

Methods to Assess Seismic, Landslide, and Other Potential Hazard Loadings

One critical aspect of establishing the current design criteria for the gate replacement and objectives for the spillway gate systems is understanding the behavior of the dam under the seismic hazard loading scenarios and calculating the resulting magnitude of hydrodynamic loading on the gates and piers.

Seismic Loading

Seismic hazard loadings for the gates and piers will be determined in two stages:

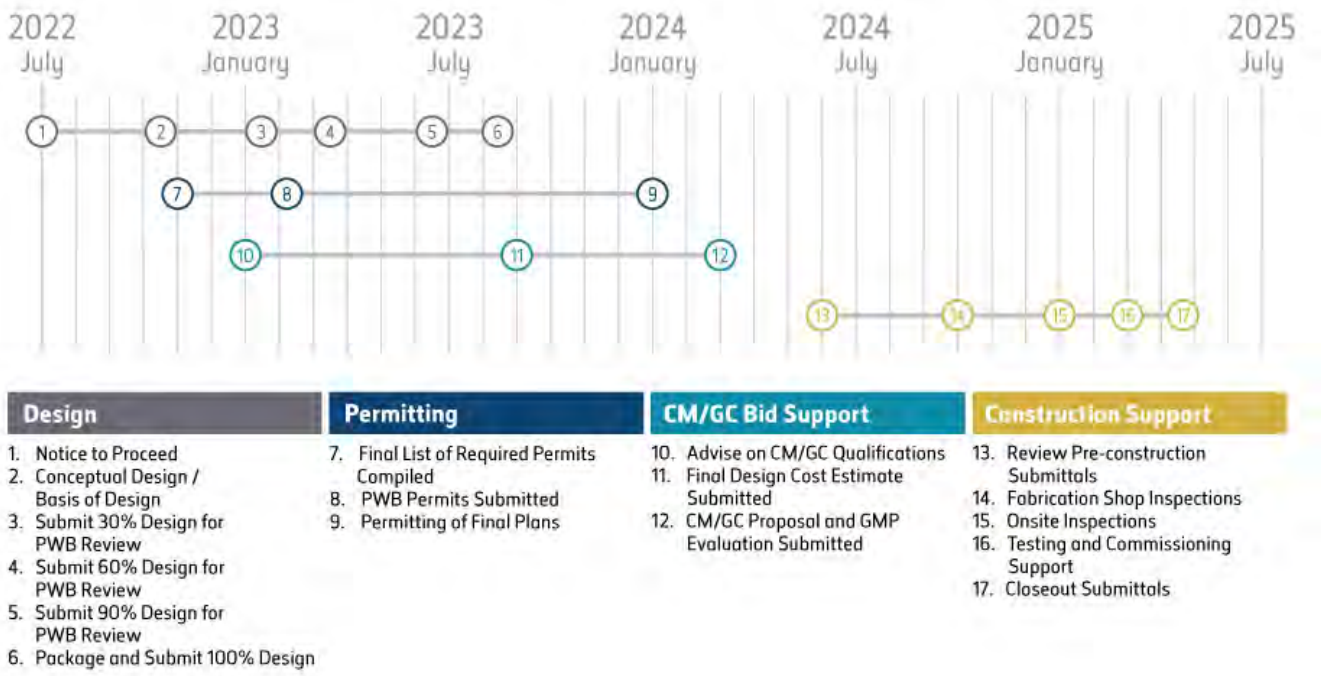
1. Develop an updated site-specific SHA
2. Perform a linear dynamic analysis of the dam using a finite-element model

Seismic Hazard Analysis

Slate Geotechnical Consultants (Slate) will perform a comprehensive site-specific SHA for use in the analysis and design of the replacement gates. Slate has reviewed the FERC comments regarding the existing SHA and concurs that the SHA does not currently address the requirements of FERC Chapter 13. Slate will perform a comprehensive SHA that meets all requirements of FERC Chapter 13 and addresses the FERC comments presented in the RFP.

Slate will perform a seismic source characterization for all potential fault sources affecting the project site including the Cascadia Subduction Zone, the Blue Ridge fault zone, and the Twin Lakes Fault. They will prepare a table that summarizes the fault characteristics for each source including magnitude, distance to site, fault type, dip angle, slip rate, and downdip rupture width. These characteristics will then be used in the appropriate ground motion prediction equations (GMPEs) to develop horizontal deterministic ground motions at the site. Slate will use the recently published NGA-Subduction GMPEs to estimate ground motions from the Cascadia Subduction Zone and the NGAWest-2 GMPEs to estimate ground motions from the shallow crustal faults near the site, such as the Blue Ridge fault zone, and the Twin Lakes Fault deterministic ground motions will be developed at the appropriate statistical level (median to 84th percentile) for each fault based on the evaluation of fault slip rates, in accordance with Section 6.3 of the FERC Chapter 13 Guidelines. Frequency-dependent published relationships will then be used to scale the horizontal response spectra to estimate vertical response spectra. Response spectra will be developed for a range of damping ratios from 2 to 10 percent.

Figure 4-1. Estimated Time Frame



Linear Dynamic Analysis

McMillen Jacobs will use the results from the SHA, specifically the acceleration response spectra, as input to estimate seismic accelerations at the gate supports using dynamic response spectrum analysis of a linear-elastic 3D finite-element model. This analysis procedure is computationally efficient and appropriate for establishing design criteria for the spillway gate design. The model will be developed to approximate the interaction of the dam-water-foundation system by explicitly modeling the dam and the foundation rock and by either incorporating hydrodynamic added mass and applied hydrostatic pressure to account for the reservoir or using fluid-like elements to model the effects of the reservoir explicitly. The foundation rock in the model will be massless, meaning the flexibility of the foundation system will be captured in the model and that the dam-water-foundation system will be subjected to uniform ground motion or acceleration along the dam-foundation interface. The analysis results of interest, specifically the peak crest-level acceleration response, will inform the seismic design criteria for the gates. This model will not be used to evaluate the stability of concrete stresses in the dam or spillway piers under static or dynamic loading.

While we are not aware of what analysis methods were employed previously to assess dam stability under MCE loading, we understand that complying with the possible Part 12 Report recommendations will require the development of a 3D finite-element model of the dam. Concurrent or staggered development of two independent finite-element models of the dam under separate contracts—one for the spillway gate design and one for the global dam stability assessment—may complicate future FERC reviews for the work of both contracts. These models are likely to use different software packages, analysis methods and procedures to investigate different aspects of the seismic response of the dam. From a regulatory standpoint it is unlikely that the models will be treated as independent studies. For example, if seismic design criteria for the gates is established based on one finite-element model only to discover that the other finite-element model investigating stability shows higher crest-level accelerations, then the differences will have to be reconciled. We highlight this to clarify that our scope of work does not account for this risk and to identify an opportunity for PWB to consider directing the development of a single holistic analysis model to both inform the gate design and evaluate global stability that will mitigate this risk and achieve general project delivery efficiencies.

Landslide Analysis

A rare yet possible gate hazard loading is hydrodynamic loading from a landslide event. Our geotechnical specialists will evaluate the slope stability around the reservoir to determine the potential for a landslide event. If a landslide potential exists, the landslide-generated wave size will be estimated to quantify the hydrodynamic loading on the gates. Structural members will be sized for all applicable hydrodynamic loads including wave height. If needed for this task, McMillen Jacobs can bring in an in-house California registered geologist.

Spillway Gate Design

After determining the hazard loadings and other criteria for the gate system, Structural Lead Gavin Smith will design the gates in accordance with USACE ETL 1110-2-584 and current best practices as follows:

- Sizing members with a corrosion allowance. This is done to ensure localized corrosion of critical gate members does not result in gate instability and permits time for inspection and repair.
- All fabrication and welding will be performed per AWS D1.5 Bridge Welding Code. This is done to ensure tight tolerances are maintained during and after final fabrication. In addition, any gate member deemed to be fracture, or failure, critical shall be tested and inspected per D1.5 Chapter 12 requirements.
- The spillway gates will be fabricated from ASTM A709 Gr.50 Zone 2 steel. This grade provides toughness and resistance to fracture and fatigue. It is also the only steel that is prequalified for all AWS D1.5 welding procedures.
- Detailing fatigue friendly structural connections, joints, and features for each component in accordance with the AISC Steel Construction Manual Appendix 3. It is our standard practice to use a category C detailing or better whenever possible.

Constructability

One of the main challenges of the gate replacement effort will be the constructability of the new design. Specifically, the spillway stairs prevent easy vehicle or crane access up to the spillway gates. The design of the new system will need to be performed considering how the design will be constructed and installed.

McMillen Jacobs is a design-build firm with a self-performing construction division. Our designers work side-by-side with construction staff daily and understand the difference between a technically correct design, and

a cost effective design that is highly constructable and lowers risk for the engineers, owner, and contractors. In addition to our in-house team, we will engage area industry experts KMC Cost and Consulting (KMC). KMC brings local expertise in cost estimating, constructability, means and methods, and other construction support services. Together, McMillen Jacobs and KMC will provide significant value in the constructability portion of the project and help evaluate likely means and methods to help inform the development of the design.

Ability to Meet Project Schedule

Project Manager James Boag has resourced the project team to accomplish each proposed task within the scheduled timeframe. Backed by McMillen Jacobs' executive leadership, we have reserved capacity for the team members identified in Section 2. Our resourcing was performed such that no single team member is resourced over 50% for the project duration and no more than 75% for a given month. This enables each team member to work on ongoing projects without conflict. The manpower loaded spreadsheet containing our work breakdown structure and team labor loading is provided separately.

Solution for Staffing Challenges

Our proposed project manager, James Boag, serves as McMillen Jacobs' Mechanical Discipline Lead, and has substantial experience leading multidisciplinary teams in gate replacement or rehabilitation projects of similar complexity. James will manage the schedule and budget using an earned value approach, which measures progress against dollars spent. This enables us to proactively identify negative trends and quickly implement corrective actions to improve costs and complete the work on time and within budget. We ask the right questions to quickly determine the best corrective actions:

- Who is billing time to the project?
- What have they accomplished?
- If not as much as anticipated, what remedial measures are need?
- Are assignments distributed to the right people?
- Are items being designed to the defined criteria and are those designs meeting the overall project intent?

James will keep the PWB Project Manager apprised of the status through routine communication. Official budget updates will be provided to PWB in monthly progress reports. Our team will also review invoices prior to sending them to PWB to verify accuracy in hours, reimbursable costs, current contract amount, and percent complete. Additionally, McMillen Jacobs' executive team routinely audits projects to confirm all aspects of project management functions are being executed correctly and that the project is trending on budget and within schedule. This is an additional measure to ensure this Project will meet PWB expectations.

We organize our communication to ensure frequent coordination with our clients, internal team members, and subcontractors. We use a wide range of communication tools including web-based meeting software such as Level3 XpressMeet, which allow graphic presentation of material to team members located in various offices. We also believe in proactive communication to ensure issues are quickly identified and resolved at the lowest level possible. Time is money and quick resolution of issues translates to staying on schedule and budget.

Approach to Ensuring Consistent Performance

To ensure consistent and reliable team performance on long duration projects we employ two common strategies:

1. Select the Core Design Team members to create redundancy and a depth of resources

During the selection of our key personnel, James strategically chose personnel that could logically be considered for succession planning of senior-level positions on the team if needed. This redundancy in design expertise will result in no single point of failure. McMillen Jacobs has the depth of resources to adapt should staffing changes occur.

2. Use a rigorous quality control program

Our Quality Control Program will be implemented though the Quality Control Plan and will be designed to check the quality of our engineering products and ensure consistent and reliable performance from the team. Principal Engineer Mark Merklein and the ITR team will use process reviews and independent technical reviews to ensure the quality, consistency, and reliability of the team's products.

5 CORPORATE RESPONSIBILITY

5. CORPORATE RESPONSIBILITY

DIVERSITY & INCLUSION AT A GLANCE

29% Women

24% Minorities

15% Technical Female Staff

$150K Annual Match to Charitable Programs

A Culture of Equal Opportunity

McMillen Jacobs provides equal employment opportunity in all aspects of employment to all persons without regard to their race, color, creed, religion, sexual orientation, marital status, national origin or ancestry, sex, age, physical or mental disability, medical condition, or veteran status and to promote the full realization of equal employment opportunities through a positive and continuous program. Our company endeavors to recruit and hire without regard to race, religion, creed, sexual orientation, marital status, sex, color nation origin or ancestry, age, physical or mental disability, medical condition or veteran status. Equal opportunity and consideration are afforded to all applicants and employees in personnel actions, which include recruiting and hiring, selection for training, promotion, rates of pay or other compensation, transfer, discipline, layoff, recall, or termination. It is our intention to provide full employment opportunities at all job levels for members of minority groups, women, individuals with disabilities, and veterans through aggressive upgrading and recruiting actions. Further, it is our policy to maintain a working environment free of all forms of sexual harassment and harassment because of pregnancy, childbirth, or related medical conditions as well as any other basis protected by federal, state, or local law or ordinance or regulation. We are mindful that non-employees such as clients and vendors also abide by similar policies. We will verify that our policies governing this Project are in harmony with the City of Portland's Equal Benefits Program as prescribed in City Code 5.33.077.

Disadvantaged, Minority, Women and Emerging Small Business Subcontracting

McMillen Jacobs has partnered with the following D/M/W/ESB firms to reach the City's aspirational goal at 20.2%.

- KMC Construction Consultants - DBE/WBE (11.6%)
- Wolf Water Resources - DBE/WBE/ESB (4.3%)
- S&F Land Services - ESB (2.7%)
- Historical Research Associates, Inc. (1.6%)

McMillen Jacobs has also teamed with Slate Geotechnical, a woman-owned business. Slate's certification in the State of Oregon is currently pending and should be in-place before work begins on this project. We anticipate their involvement to be approximately 4.3%, therefore our overall participation percentage will be 24.5%.

Additional details regarding each of these subconsulting firms can be found on our completed PTE Participation Disclosure Statement (Form 1), which is included at the end of this section.

Workforce Diversity and Community Involvement

Workforce Demographics

Our commitment to a diverse supplier community does not just stop with our subcontracted work, rather it is critical to the foundation and growth of our workforce demographics. Of our total workforce, 29% are women and 24% are minorities. We are committed to encouraging and fostering diversity in the workforce by providing opportunities for training and advancement for all employees including women and people of color. We attend university career fairs to seek out and recruit candidates that include women and minority groups. We have established a WISE Network (Women in Science & Engineering), an employee resource group that is highlighted during our recruiting efforts and intended to promote mentorship and development for the women in our workforce. We promote our women leaders throughout the company on LinkedIn and other social media channels to share our commitment to women in the workforce.

Professional Development Opportunities

McMillen Jacobs is committed to providing technical training for our engineers (internal and external) and covers the cost for attendance at conferences and seminars, professional association memberships, license and renewal fees. Our Construction division offers ongoing training including safety trainings, competent person training, and quality control. We offer a two-day training session to our Construction staff annually that covers CPR/First Aid, Rigging and Signaling, Competent Persons Training in equipment and excavation, OSHA 10-hour, Trench Safety, Fall Protection, ears and eye protection, and more. We recognize that educational development is important and should be encouraged. Therefore, we provide an education assistance plan to encourage employees to obtain additional education or training in order to increase their competence in their present jobs and to prepare for future advancements within the company. These opportunities are afforded to all employees. Our WISE Network mentioned earlier provides a forum to encourage and create mentor relationships among the women in our company.

Employee Compensation Structure

McMillen Jacobs uses market-driven data to analyze and ensure our compensation practices and wages are competitive and equitable for all employees. We review and adjust pay annually. We provide a 401(k) program, a full healthcare coverage plan (comprehensive medical, dental, vision benefits, life, accidental death and dismemberment, and disability insurance) and a generous Paid Time Off program. Additionally, we provide an Employee Stock Ownership Plan (ESOP) so employees can share in the value and growth of the company as they build an ownership interest in the stock of the company.

Commitment to Community Service

McMillen Jacobs is committed to serving the communities in which our employees live and work. Our President, Mara McMillen, was selected as a Tribute to Women in Industry (TWIN) Honoree in 2012 and we recently became one of the primary partners for The Salvation Army's Building Futures Campaign to assist young mothers stay in school and graduate and become future leaders. We are a strategic Partner with Women's and Children's Alliance (WCA), Paint the Town, Engineers without Borders (community service in South America), local programs that encourage alternative transportation and sustainability, local schools (built a playground, donated backpacks with school supplies, purchased track and basketball uniforms, built softball field for local high school), donated money to the Salvation Army Boise Chapter to assist with the construction of a new school for pregnant teens aspiring to obtain their high school diplomas. Participating in these activities enriches the lives of our employees and our communities. We also look for opportunities to give charitable monetary donations. To encourage our

employees to donate, McMillen Jacobs matches up to $10,000 each year for any employee contribution to qualified non-profits. We allocate $150,000 annually.

Sustainable Business Practices

Our core mission is to assist our clients with reducing their environmental and carbon foot print while improving and keeping our planet clean and vibrant for generations to come. We provide a wide range of environmentally sustainable engineering and construction services to our clients, from helping with development of clean hydroelectric energy, to design and construction of large fish hatcheries and fish passage facilities, tunnel design for high density transportation systems moving people and goods with less energy, to water and wastewater treatment designs and construction reducing pollution, and finally reclamation of wet lands and care of environmentally sensitive areas.

We understand that our environmental impacts begin at home, so we are building a sustainable culture into our office environments. This mindset feeds into our designs and into construction practices.

1. Sustainability Starts at Home

We take our role in protecting our natural resources to heart, and we have implemented strategies in our offices to ensure that we re reducing our footprint.

Recycling: Whenever possible, we buy recycled materials and we recycle as a standard practice in all of our offices.

Online Meetings and Training: We utilize web-based project meetings as well as online seminars and professional development trainings that do not require travel to a central location. This reduces air emissions from cars, airplanes, and associated petroleum-based transportation systems.

Remote and Hybrid Workforce: The Covid-19 pandemic spurred us to pursue options for a remote workforce. As health restrictions are lifted, our policies allow for some employees to opt for remote or hybrid schedules which reduce the amount of time staff spends on the road. These policies also enable us to conserve office space and energy.

Public Transportation FSA: For those who do travel to the office, we offer employees a flexible spending account (pre-tax) for public transportation to incentivize environmentally-friendly methods of transportation.

Strategic Office Locations: Our headquarters is located near a city greenbelt and bicycle paths to encourage individuals to bike to work. Other offices are located near public transit lines and bikeable streets to ease reliance on cars when traveling to work.

2. Designing Eco-friendly Infrastructure

We are committed to incorporating environmentally-conscious features into our designs. We outline standards and design criteria at the start of each project which incorporates green design principles into our specifications and bid documents. Select examples include low-flow water fixtures, high-efficiency motors, and onsite stormwater containment and reuse systems, as well as use of recycled products.

3. Designing for Limited Construction Impacts

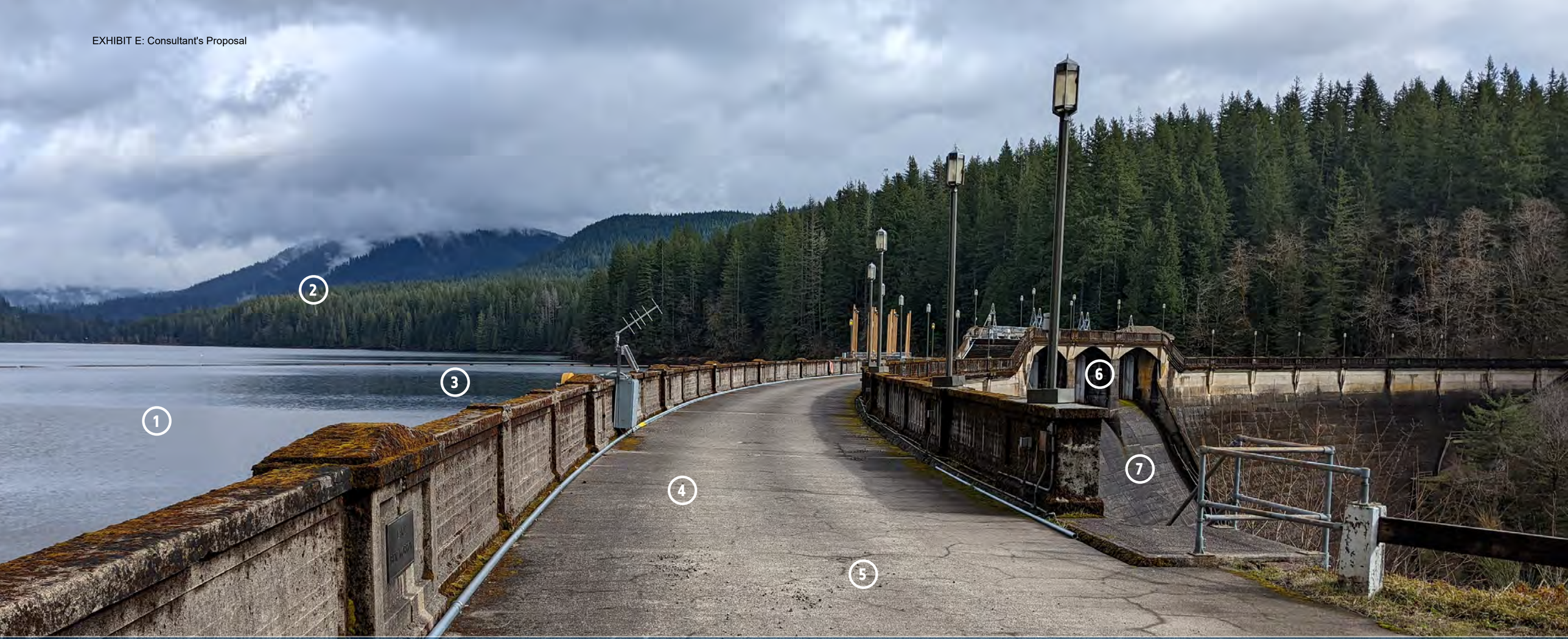
Our designs are developed with construction impacts in mind. Designs are tailored to each site with considerations that go beyond environmental compliance and focus instead on environmental stewardship.

We have been able to reduce environmental construction impacts without increasing construction costs during design by 1) evaluating alternatives to protect fish, riparian, or wildlife impact, water quality, aesthetics, use of natural light, etc.; and 2) conducting constructability reviews to evaluate the environmental impact during construction. We discuss any environmental concerns with the entire project team to make decisions that are friendly to the environment while still meeting the client's goals and objectives. See the following page for examples of where we will consider construction impacts as we progress the design.

As design transitions to construction, our team is available to help guide the selected CM/GC in implementing sustainability strategies.

Third-party Certifications

McMillen Jacobs does not hold any third-party certifications related to sustainable business operations. However, our teaming partner, Wolf Water Resources, is gold-certified through the City of Portland Sustainability at Work program.



1. Pollution Control

We design gate systems to minimize oil and spill risks. Our design approach is to first use self-lubricated materials where feasible. Where these are not feasible (operating machinery gearboxes and some bearings), we've developed other standardized methods to minimize the risks and consequences of oil and grease spills. These include the use of Environmental Acceptable Lubricants (EAL's) and the use of secondary containment systems around operating machinery.

2. Environmental Monitoring

To reduce impacts to the environment and comply with regulatory requirements, our environmental specialists are available to work with constructors. We can develop site-specific Environmental Protection Plans, Tree Preservation Plans, Stormwater Pollution Prevention Plans, Endangered Species Protection Plans, Spill Protection Control and Countermeasures Plans, and Waste Management Plans. We also provide onsite Environmental Compliance Management services.

3. Water Efficiency

During design, we implement measures to minimize water consumption and use of potable water. Further opportunities for water minimisation and reuse are investigated when procuring plant and equipment and during construction.

4. Transportation and Staging

We pinpoint limited-impact staging areas for staff to park. Additionally, we coordinate transportation into the work area to minimize vehicle trips into the site.

5. Laydown Areas

Throughout design, we will identify ways to minimize laydown areas to maintain the smallest possible environmental footprint. We consider how to secure materials and equipment so they are contained and least likely to pollute the surrounding ecosystem.

6. Waste and Materials

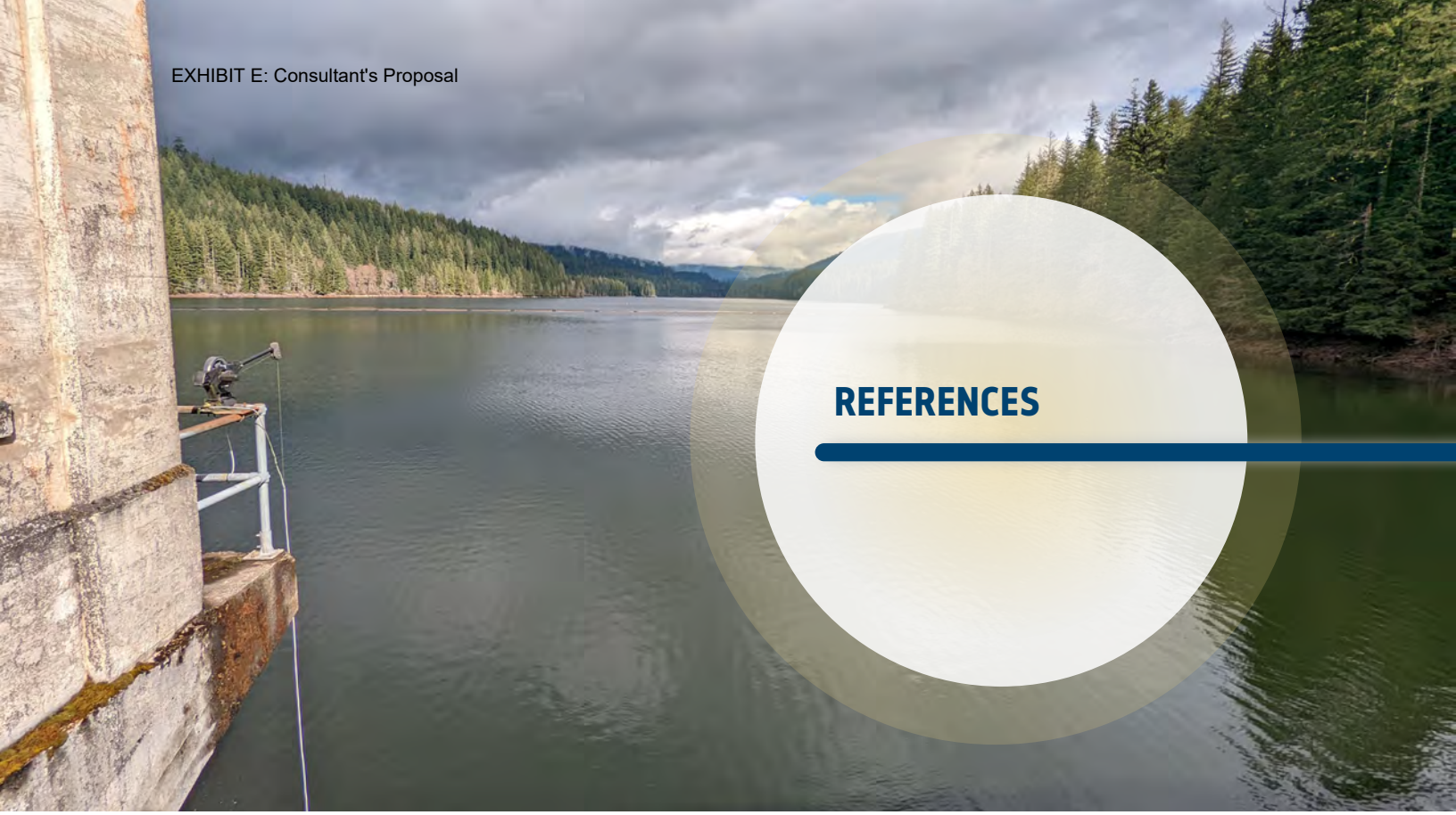
Our design team has specialized experience designing and using self-lubricated materials for our gate system designs. When designed properly, these material can eliminate the need to supply grease or oil to gate rollers and mechanical bearings systems on a gate or directly above a waterway. This will not only help minimize PWB's long-term dependency on hydrocarbons but also minimize the risk of oil/grease spills. Our team has direct experience designing critical gate bearing systems to eliminate oil and grease on over 30 spillway gates across 10 different dam sites in Oregon.

7. Community Benefit

During design, opportunities to enhance community benefit and minimize any adverse impacts on the community are considered. This includes, but is not limited to, designing noise attenuation structures (e.g., acoustic sheds, noise walls, etc.) to minimize noise impacts on surrounding receivers, considering Crime Prevention Through Environmental Design (CPTED) elements during construction, designing appropriate site fencing and hoarding, avoiding impacts to known heritage items, and considering vehicle and pedestrian movements around worksites.

6 SUPPORTING INFORMATION

References



REFERENCES

Lower Baker Dam Crest Improvements & Vertical Gate Project (2016-2023)

Nate McGowen, Project Manager
10885 NE 4th Street | Bellevue, Washington 98004
T: (253) 234-6482 E: nate.mcgowan@pse.com

Morony Dam Vertical Lift Spillway Gate Design-Build (2020-2023)

Carrie Harris, Project Manager
11 East Park Street | Butte, Montana 59701
T: (406) 490-1769 E: carrie.harris@northwestern.com

Upper Salmon Spillway, Vertical Lift Reject Gate Replacement (2019-2021)

Justin Hitt, Project Manager
1221 West Idaho Street | Boise, Idaho 83702
T: (208) 388-5695 E: jhitt@idahopower.com

Searsville Watershed Restoration Design-Build (2020-2023)

Karla Smith, Project Manager
340 Bonair Siding | Palo Alto, CA 94305-8442
T: (650) 725-9802 E: karlat@stanford.edu

Cowlitz Falls Dam Sluice Gate Upgrades & Radial Gate Inspection (2016-2019)

Joe First, Superintendent
321 Pacific Avenue | Chehalis, WA 98532
T: (360) 497-5351 E: joef@lcpud.org

Resumes

James Boag, PE

Project Manager

James Boag is a Registered Professional Engineer in Oregon, and his entire 19-year career has been focused on the engineering, construction, and operation of dam and hydroelectric facilities. Sixteen of those years were on the owner/operator's side, including six years directly in plant operations and maintenance. Therefore, his designs focus on improving enhanced safety, ease of operations, and lower maintenance costs.

He has been involved in designing and rehabilitating multiple mechanical structures related to 100+ spillway gates (up to 50+ feet wide) and gate hoists and cranes (up to 500-ton), including vertical slide gates. Specific design elements have consisted of gate operators, gate rollers, seals, concrete guide frames, and lifting beams. He has led condition assessments, design, installation, and repairs for in-service equipment.

James has managed multi-disciplinary engineering teams, including civil, mechanical, electrical, geotechnical, hydraulics/hydrology, and environmental/permitting, throughout his tenure at McMillen Jacobs and previous employers. He is currently leading the $2.8M design on a project valued at $95M. Also, while serving as Chief of the Mechanical Design section of USACE's Portland District, he was responsible for all mechanical design products for more than 100 projects. USACE recognized and rewarded his effective project management and technical understanding with several notable commendations.

His expertise will benefit all phases of work—scoping; early planning; pre-design activities; final design; construction and construction staging; installation; startup and commissioning; maintenance; and repair of existing facilities. James emphasizes the initial scoping effort to define the project, criteria and constraints, and roles and responsibilities. He will minimize schedule and cost risk with meticulous scoping during the initial project phases.

Education

- BS, Mechanical Engineering Portland State University (2003)

Years of Experience

- 19 years

Registrations/Licenses/Certs

- **PE: Oregon (#72816PE)**
- PE: AK, CA, HI, ID, MT, WA

Areas of Specialty

- 16 years of experience on the owner/operator side results in better designs
- 6 years direct experience with plant operations and maintenance
- Designed solutions for 100+ spillway gates (up to 50+ feet wide)
- Hoists and cranes up to 500-ton
- Valves up to 10-foot diameter
- Regulating outlets including slide gates and tainter valves
- USACE standards and requirements
- Served as a mechanical engineer at USACE Portland District for over 13 years and Chelan PUD for 4 years
- Currently leading a similar multi-disciplinary design team ($2.8M design fee)

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Project Manager.** James serves as the project manager for the concept design through the final design. He is responsible for the new intake gantry crane, lifting beams, and twelve new intake gate hoists. *($2.8M; 2018 – 2023)*

❷ **North Western Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Mechanical Lead.** James is responsible for the design of the gate hoists, embed heating, gate body heating system, gate rollers, and other miscellaneous features. *($29M; 2020 – Design 100%; Construction est. 2023)*

❸ **Idaho Power; Upper Salmon Spillway, Vertical Lift Gate Replacement, ID – Mechanical Lead.** James designed the new hoist system and adjustable gate rollers. The rollers utilized stainless steel and self-

James Boag, PE

lubricated elements and included an eccentric axle design to ensure uniform wheel loading while requiring less expensive fabrication means and methods. *($680k; 2019 – 2021)*

❹ **Stanford University; Searsville Dam Modifications and Watershed Restoration Design-Build, CA – Mechanical Engineer.** James is responsible for the mechanical features of the gate system, which will include a structural concrete guide frame, seals, a hydraulic hoisting system for lifting and lowering the gate, and instrumentation controls. *(2020 – 2023)*

❺ **Lewis County PUD; Cowlitz Falls Dam Engineering Services Including Gate Inspections and Upgrades, WA – Program Manager.** As Program Manager, James is responsible for overall contract management, resourcing, and quality management. *($571k est; 2020 – 2024)*

Chelan County PUD; Rock Island Dam Gate Handling Improvements – Project Manager. This project significantly revises 13 of the 31 30-foot x 55-foot vertical deep gates and associated equipment at Rock Island Dam to improve spillway performance, function, and safety. The design scope includes updates in gate storage, over-under gates, notch gates, gate connection, and gate dogging. *($600k; 2022 - 2026)*

Chelan County PUD; Rocky Reach Dam Tainter Gate & Hoist Upgrades, WA – Project Manager. James serves as the Program Manager for the current MSA contract. He led 8 out of the 11 completed task orders. His team performed a condition assessment as a first step to modernizing the 12 Rocky Reach Dam spillway tainter gates (50' x 58'). This effort will consist of new gate hoists, controls, seals, cathodic protection, and miscellaneous improvements to provide a 40-50-year service life. The ~200-ton hoists will be improved to increase reliability, reduce maintenance, and reduce the risk of hydrocarbon spills. Scope of work includes a feasibility analysis and design. *($420k; 2022-Ongoing)*

USACE Portland District; Multiple Projects for Bonneville Dam's Vertical Lift Gates, OR – ITR/Mechanical Engineer.* This effort involved a major rehabilitation report to address the various issues with the aging Bonneville Dam spillway. Leading QA/QC, James performed a variety of dam safety inspections and a PFMA workshop on this spillway. The effort also included:

- **Spillway Gate Full-Flow Hoists:** This work involved overseeing a consultant performing a design for new generation-4 hoists (rated up to 317 tons) that could lift the 18 spillway gates (53' x 60' and 244 tons) entirely out of the PMF flow without splitting the gates.
- **Spillway Gantry Crane Evaluations (rated at 500 tons):** This involved an assessment of the crane hoist lifting capacity and condition assessments. It also involved coordinating the structural condition assessment, which evaluated flaws, including corrosive section loss discovered during a structural inspection. The effort concluded with a recommendation to create a new project to look at ways to upgrade limited components of the crane to extend the reliable life until a replacement could take place under a larger rehab effort for the entire spillway.

James has managed or contributed engineering support for gates and hoists on the following projects:

- **USACE; Comprehensive Spillway Gate Rehabilitation for Multiple Dams*** *(James received a Design Excellence Award for his work on this program.)*
  - Big Cliff Dam, 3 gates (46' x 46')
  - Lookout Point Dam, 5 gates (43' x 43')
  - Blue River Dam, 2 gates (35' x 37')
  - Hills Creek Dam, 3 gates (42' x 48')
  - Fall Creek Dam, 2 gates (43' x 43')
  - Cougar Dam, 2 gates (40’ x 43’)
  - Detroit Dam, 6 gates (42’ x 33’)
  - Green Peter Dam, 2 gates (45' x 47')
  - Folsom Dam Emergency Gate Pool Raise, 6 gates (36' x 55')

**Project completed while employed by the previous firm.*

Mark Merklein, SE, PE

Principal Engineer

Mark Merklein is a Registered Professional Engineer in Oregon and has over 28 years of experience in structural engineering. He has extensive experience designing hydraulic structures for dams, hydropower, and heavy civil projects. Mark has overcome challenges unique to designing and constructing structural components around exiting dams and spillways without impacting operations, such as concrete removal over water, constrained access, underwater construction, and in-water river work. Credentials

He has managed a design region with 137 multi-disciplined engineers and support staff for water resources, hydropower, and municipal projects. As a project manager on the Idaho Power Reject Gates Replacement project, he was responsible for establishing design budgets and managing multi-discipline teams from preliminary design through construction. On the Consolidated Home Supply Big Dam Diversion Structure Repairs in Colorado, he served as QA/QC for design and construction. Mark is currently managing a multi-disciplinary design team on the Morony Gate Replacement EPC project and serves as a structural lead to replacing nine radial gates with nine new vertical roller gates, hoist structures, and buildings.

He is also proficient in structural design that meets USACE Engineering Manuals, Technical Memorandums, and standards. His structural expertise and detailed reviews of structural elements are exemplified on several hydro facilities, including Puu Opae Energy Pumped Storage EPC and Cowlitz Falls Dam.

Education

- MS, Civil Engineering, Purdue University (1994)
- BS, Civil Engineering, Michigan Tech University (1993)

Years of Experience

- 28 years

Registrations/Licenses/Certs

- **SE & PE: Oregon (#58357)**
- PE: AK, CO, ID, MT, NV, TX, WA

Leadership

- AWWA committee 198-member, cast-in-place conventionally reinforced concrete tanks*

Area of Specialty

- Structural elements at dam/hydro facilities and reservoirs (spillways, gates, and other supporting infrastructure)
- Structural design and QA/QC on vertical lift spillway gate projects
- Concrete structures for dams, hydropower, heavy civil, and other water resources projects
- Managed multi-disciplinary design teams from alternatives analysis through final design

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Structural QA/QC.** Mark provided the structural review, including reviewing calculations, drawings, specifications, and inter-discipline coordination. *($2.8M; 2018 – 2023)*

❷**North Western Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Design Manager.** Mark was responsible for leading the multi-discipline design team. His responsibilities included running weekly client meetings, coordinating a staged delivery for FERC review, and working alongside the construction team to engage a cohesive team of owners, owners' engineers, design and construction team, and fabricators. Mark continues to support the project coordinating the design team efforts for services during construction and performing fabrication and site inspection visits. *($29M; 2020 – Design 100%; Construction est. 2023)*

❸ **Idaho Power; Upper Salmon Spillway, Vertical Lift Gate Replacement, ID – Project Manager/Lead Structural Engineer.** Mark served as the project manager and QA/QC on the final design. *($680k; 2019 – 2021)*

Mark Merklein, SE, PE

❹ **Stanford University; Searsville Dam Modifications and Watershed Restoration Design-Build, CA – Structural QA/QC.** Mark is providing the structural review for all structural engineering efforts, including a review of calculations, drawings, specifications, and inter-discipline coordination. *(2020 – 2023)*

❺ **Lewis County PUD; Cowlitz Falls Dam Sluice & Spillway Gates and Spillway Gantry Crane Rail Extension, WA – Project Manager/Structural Lead/QA/QC.** Mark led the structural engineering work on multiple task orders involving low-level fixed wheel sluice gates (12' x 16') and top-seal radial gates. He led the structural work on the Radial Gates Seismic Analysis and Appendix L Physical Inspection, concrete repairs, sluice gate evaluation, and preliminary design. Mark was responsible for all aspects of the gate inspection report and provided structural evaluations for all work, including a revised set of construction documents to tailor the concrete repairs to budgetary limitations and meet FERC's requested repair work. He also provided structural engineering for the alternative's analysis for the spillway gantry crane rail extension and will be involved during the final design of the selected alternative in 2022. *($571k est.; 2020 – 2024)*

Central Rivers Power; Dietrich Drop Hydroelectric Gate Improvement Design-Build, ID – Structural QA/QC. Improvements included an emergency repair to the 5,000-pound bypass tainter gate system (17' x 18') with new hoists and controls. Additional work included concrete repairs to the bypass channel. We were responsible for the design, fabrication, and installation of a new fixed-wheel type vertical lift intake gate (24' x 13') weighing 12 tons, a new stainless-steel tilt-up tailrace gate (25' x 9') to span the turbine draft tube opening, and all associated guide frame, hoists, and controls. Mark provided a structural review of the calculations, drawings, and specifications for designing a new wheel gate and modifying the existing radial gate. He documented all QC comments and responses from the lead engineer before closing out review cycles. *($1.9M; 2019 - 2020)*

Chelan County PUD; Rock Island Powerhouse (slots 11&12), WA – Structural ITR. This project included investigations and analysis of design options and construction alternatives to develop a bypass between slots 11&12. Upgrades considered included new intake gates, bulkheads, gate operators, power, and controls; and modifications to the road deck, the powerhouse oil-water-separator, a downstream guide wall, and spillway apron. Mark attended the site visit and provided structural input. *($27k; 2019 – 2019)*

Consolidated Home Supply; Big Dam Diversion Structure Repairs, CO – Structural Engineer/ITR.* Mark provided engineering review during design and construction representing the City of Loveland. He provided Independent Technical Review (ITR) of the design and ITR of the construction works to repair the dam crest, right and left abutment repairs and renovations, and the installation of an Obermeyer weir. The purpose of the diversion structure was to ensure reliable irrigation and potable water diversion for the City of Loveland along the left bank. *($2.2M; 2016)*

AES; West Kauai Energy Project (aka Puu Opae) EPC, HI – Lead Structural Engineer. McMillen Jacobs leads the design and construction of this new pumped storage project via an EPC contract. It contains both rehabilitation of existing infrastructure and new construction. New aspects of the project include 6-miles of pressurized penstocks, two new hydropower stations, gate and intake structures, and a pump station. Mark is responsible for the structural aspects of two new reservoirs, gates, canals, powerhouses with a pump station, and intake structures. *($150M; 2018 – 2024)*

Confederated Salish and Kootenai Tribes; Jocko K Canal Headworks, MT – Structural Engineering Support. The facility has identified operational and operator safety issues, end-of-service life considerations, and fisheries management and protection deficiencies. Services we are providing include the scoping, survey, data and information collection, initial analysis, development of conceptual alternatives, preliminary engineering, 90% design development, and then 100% design. The scope also includes work on two vertical slide sluice gates (7'x5'), a control gate (8'x6'), an isolation gate (8'x4'), and a fishway gate (4'x7'). *($154k; 2020 – 2022)*

**Project completed while employed by the previous firm.*

Don Jarrett, PE

Mechanical ITR

Don Jarrett is a Registered Professional Engineer in Oregon. He brings 49 years of experience in the hydroelectric industry; this includes the design, procurement, and installation support of spillway gates and associated mechanical elements, including hoists. The gates have included vertical lift gates, spillway and outlet gates, intake gates, bypass gates, slide gates, radial gates, emergency closure gates, and tailgates. Don has also designed, procured, and supported the installation of the gate and valve operators and butterfly, spherical, poly-jet, and fixed cone valves.

He has been involved in the full lifecycle of dam and hydro facilities from early reconnaissance, licensing/permitting, design, and procurement through start-up and commissioning, and operations management. He has personally started up four-generation projects.

In addition to the technical expertise to design and construct hydro facilities, Don has a strong background in the operations of power plants.While employed with a previous employer, he developed business plans and schedules for the hydro rehabilitation facilities and managed operations and maintenance personnel at more than 20 operating projects. This experience brings a unique owner's perspective tohis evaluations and designs, which will benefit PWB.

Education

- BS, Mechanical Engineering, University of California at Berkeley (1973)

Years of Experience

- 49 years

Registrations/Licenses/Certs

- **PE: Oregon (#09803)**
- PE: AK, CA, ID, MT, WA

Affiliations & Organizations

- American Society of Mechanical Engineers
- Past Director, Northwest Hydroelectric Association
- American Welding Society
- American Society of Heating, Ventilating and Air Conditioning Engineers

Area of Specialty

- Dam/hydroelectric industry focus
- Owner's perspective = unique insight to operations and maintenance issues
- Worked on projects involving new vertical lift spillway gates and hoists and a 100-ton spillway gantry crane
- Project manager for multiple new hydro projects.
- Mechanical design for gates and installation support at dams
- Reconnaissance, procurement, design, construction oversight, and startup and commissioning

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvement & Vertical Gate, WA – Lead Mechanical Engineer.** Don participated in a Value Engineering session where he evaluated several types of gates, including radial gates. *($2.8M; 2018 – 2023)*

❺ **Lewis County PUD; Cowlitz Falls Dam, Spill Gate Upgrades, Load Cell Evaluation, and Concept Development, WA – QA/QC Review Mechanical.** Don has led the mechanical work on various task orders at Cowlitz Falls Dam, including the Strainer Seal Replacement Design, Cathodic Protection Evaluation, Sluice Gate Evaluation, Preliminary Design, Dam Condition Assessment, Spill Gate Upgrades, and Load Cell Evaluation and Concept Development. As part of these tasks, he assessed the project's condition and feasibility level cost estimate for any significant or critical improvements, and he provided QA/QC on the work. *(2015 – 2020)*

Southeast Alaska Power Authority; Swan Lake Dam Raise, AK – Lead Mechanical. The goal of this project was to raise the reservoir from a normal full pool elevation of 330.0 feet to 345.0 feet by modifying the 174-foot tall by 430-foot long thin-shell-arch dam. Scope of work included modifications of the concrete dam crest, a new vertical liftgate (23' wide x 16' tall), a steel emergency flashboard system (78' wide x 17' tall), mechanical and electrical modifications, a 30-foot reinforced concrete pier and modification to the existing parapet walls, and modifications to the intake gatehouse. McMillen Jacobs served as the design lead with integrated civil, geotechnical, hydraulic, electrical,

Donald Jarrett, PE

mechanical, and structural designs, including finite element modeling. We coordinated closely with the vertical lift gate and flashboard manufacturers, who provided the only system of its kind in the world. We also provided engineering support during construction and coordinated FERC requirements and compliance. Challenges included the remote area in Southeast Alaska with access limited by air or water, limited access, and a small footprint of the laydown area at the dam abutments.. Don evaluated the existing power tunnel intake gate, hoist, and powerhouse equipment for the increased pressure associated with the dam rise. Additionally, Don developed bid documents to procure a new vertical spillway fixed wheel gate and hoist. *($11M; 2015 –2017)*

Avista Utilities; Cabinet Gorge 273 MW Hydro Intake Gate Replacement, ID – Project Manager. This project required a design for four new headgates that replaced the existing 1950's vintage riveted steel intake gates located upstream from the spillway of Cabinet Gorge Dam. Scope of work included the development of a finite element model for the replacement intake gates and a desktop study to calculate hydraulic down-pull gate forces that occur under a range of forebay and flowrate conditions. It included preparing the complete design, fabrication, and installation plans and specs for four 25-foot by 25-foot vertical roller lift gates to replace four intake roller gates. In addition to providing design support and overall project management, McMillen Jacobs developed bid documents and installation contract documents for Avista. (*$261k; 2017 - 2018)*

Pend Oreille PUD; Variety of Projects at the Box Canyon Hydro Dam (90 MW), WA – Lead Mechanical Engineer/Project Manager. Don assisted with several mechanical repairs and upgrades from 2000 through 2018. Scope of work has included the initial assessment, procurement assistance, design, and start-up and commissioning. For example, he provided engineering support for replacing generator air coolers. Later, he developed the spillway crane modernization bid documents and provided construction management services for a 100-ton spillway gantry crane. Scope of work also included developing powerhouse crane rehabilitation bid documents and providing construction management services for the 150-ton gantry crane. *($1M powerhouse upgrades/$1.3M TDG abatement; 1999 – 2011* & 2011 – 2015)*

USACE; Dworshak Dam Radial Gate (RO Valve) Rehabilitation, ID – Project Manager/Lead Mechanical Engineer. Don provided project management in developing new hydraulic operators, hydraulic power units, and new controls for the existing radial gates works tainter valves commissioned in 1970. A SolidWorks model was developed to verify gate loading and perform kinematic analysis of the operating cylinders and seal pressing system. After the initial inspection of existing equipment, Don provided project management for design, plans, and specifications for the refurbishment of these three large radial gates. *($407k; 2015 – 2016 analysis and design) ($75k; 2019 design updates) ($274k 2020 – 2022 construction support)*

USACE; Ice Harbor Lock & Dam, WA – Project Manager/Lead Mechanical Engineer. This project aimed to refurbish the lower lock gate (700-tons) hoisting equipment and control system. Don led a multidisciplinary team of engineers for this project. This project performed mechanical design and stress analysis of the hoist sheave shaft and sheave (12-foot diameter sheave). New VFD motors and gearboxes were reviewed as part of the work. *(2014 – 2017)*

Avista Utilities; Nine Mile Dam Sediment Bypass System, WA – Mechanical Oversight. This project aimed to upgrade the inoperable sediment bypass system (SBS). Tasks included a new 50' tall, fabricated steel intake structure with a 12'x10' wheel roller gate with rope hoist, a new Kunz trash rack, and 18'x10' bulkhead; a knife gate inside the powerhouse; a cable-mounted segmented debris boom; replacement of pre-cast access bridge; and the automated controls to integrate the new components into the existing system. Don reviewed submittals for the new bulkhead, emergency fixed wheel gate, and knife gate and provided engineering support to install this equipment during construction. *($8.6M; 2017 –2019)*

**Project completed while employed by the previous firm.*

Bryan Duevel, PE, GE

Geotechnical ITR

Bryan Duevel is a Registered Professional Civil and Geotechnical Engineer in Oregon. He has 21 years of geotechnical and construction engineering experience on several dam rehabilitation, water resources, and hydroelectric infrastructure projects. He has also managed teams while leading the geotechnical designs for large, multidisciplinary projects through all phases, including initial field investigation programs, detailed design, and support during construction.

Bryan has experience evaluating the suitability of potential dam sites, developing conceptual dam designs, and identification of geologic and operational risks. As part of a FERC Part 12D inspection team, Bryan led the abutment stability evaluation for a 175-foot-tall concrete arch dam constructed in 1914. Bryan's team performed geologic reconnaissance using roped access methods, stereographic analysis, and wedge and slope stability analyses.

Bryan brings extensive knowledge in site characterization, rock/soil slope stability analyses, embankment design, excavation support systems, seismic hazard evaluations, tunnel condition assessments, rehabilitation, and design.

Education

- MS, Geological Engineering, University of Wisconsin, Madison, 1997
- BS, Geological Engineering, University of Minnesota, Twin Cities, 1995

Years of Experience

- 21 years

Registrations/Licenses/Certs

- **PE & GE: Oregon (#59847PE)**
- PE: AK, ID, WA
- FHWA Tunnel Inspection

Areas of Spceialty

- Geotechnical engineering
- Geologic hazard analysis
- Seismic hazard analysis and seismic design
- Dam rehabiliations projects
- Experience with FERC Part 12D inspections
- Rock and soil slope stability analysis
- Rock mass characterization
- Tunnel condition assessment
- Tunnel design
- Temporary excavation support
- Trenchless technologies

Relevant Experience

Southeast Alaska Power Authority; Swan Lake Dam Raise, AK – Lead Geotechnical Designer. Bryan managed the project team and led the geotechnical design. The dam had a 100-foot-wide ungated ogee spillway 15-feet below the dam abutments. Dam modifications were needed to accommodate the rise of the existing dam and appurtenant structures (gatehouse and its equipment). Work included a 23-foot-wide vertical operating, fixed wheel gate, and an emergency steel flashboard gate system across the remaining 78-feet of the spillway. The new spillway flashboards design maximized pool storage while minimizing adverse dam loading and construction costs. *(2014 - 2017)*

Sutherlin Water Control District; Plat I and Cooper Creek Dams Rehabilitation, OR – Geotechnical ITR. Our firm led the preliminary engineering and environmental assessment. Both dams were constructed in the 1960s and are seismically deficient. Bryan performed an independent technical review of the geotechnical investigation, analyses, and reporting and led the preliminary deformation analyses of the dams under seismic loading. He also developed geotechnical data reports summarizing the results of a comprehensive field and laboratory investigation program completed in 2019. *(2016 - 2019)*

Sacramento Metropolitan Utility District; South Fork Powerhouse & Boating Flow Release Facility Design-Build, CA – Geotechnical Design Engineer. Bryan led the geotechnical design of rock-cut and tie-down anchor support for a new 2.7MW powerhouse, penstock, and boating flow release facility (BFRF). Bryan also performed the foundation design of a new riverside-retaining wall. During construction, assisted construction team with field modifications required for rock-cut slopes and foundation conditions. *(2016 - 2021)*

Bryan Duevel, PE, GE

Yuba Water Agency; Bullard Bar Reservoir Secondary Spillway, CA – Lead Geotechnical Engineer. The client developed a supplementary flood control system and spillway redundancy for the New Bullards Bar Dam, a 645-foot tall concrete arch dam that impounds nearly 1 million acre-feet of water. The primary improvements to the dam included a new intake structure, spillway tunnel, and outlet structure. The new tunnel is approximately 400-feet-long and has an excavated diameter of 50-feet. Bryan led the rock mass characterization, tunnel initial support design, and rock-cut design for the downstream outlet, including rock cuts up to 50-feet high. *(2020)*

Chugach Electric Association; Eklutna Dam PSI, Palmer, AK – Lead Geotechnical Engineer. Bryan performed a detailed dam inspection and project review as part of an Alaska DNR Periodic Safety Inspection for the 41-ft tall, 890-ft-long earthfill dam. He also led the review of site seismicity, design ground motions, liquefaction potential, stability analyses, PMF, and potential failure modes. Bryan authored the PSI report. *(2018)*

Warden Reservoir Stability Evaluation, WA - Lead Geotechnical Engineer. Bryan led the stability evaluation of the proposed agricultural wastewater reservoir with a maximum embankment height of 35-feet. The reservoir falls under Washington State Dam Safety jurisdiction and must meet their seismic requirements. McMillen Jacobs performed stability analyses for static, rapid-drawdown, and seismic conditions as a part of a larger permit application. *(2018)*

Avista Utilities; Nine Mile Dam Sediment Bypass System, WA - Geotechnical Engineer. This project aimed to upgrade the existing inoperable sediment bypass system to prevent debris from entering the turbine and causing damage. Bryan evaluated the geotechnical capacity of an existing bridge foundation supported by the existing concrete dam to accept additional loads. He performed scour analyses for the new bypass jet impact area downstream of the dam. The bridge foundation evaluation identified that the bridge could take on additional loads, providing significant cost savings over the proposed foundation upgrades. *(2017 - 2018)*

Brookfield Renewables; Powell and Lois Lake Dam Safety Evaluations, BC - Geotechnical Engineering Support. Bryan assisted with the geotechnical evaluation of Powell and Lois Lake Dams. Both dams are very high hazard concrete gravity structures. He also evaluated foundation and abutment rock mass conditions, assessed previous stability analyses, developed recommendations for future studies, and assisted with evaluating piezometric data. *(2017 - 2018)*

AEL&P; Salmon Creek Dam Abutment Evaluation, AK - Lead Geotechnical Engineer. As part of a FERC Part 12D inspection team, Bryan led the abutment stability evaluation for a 175-foot-tall concrete arch dam constructed in 1914. Bryan's team performed geologic reconnaissance using roped access methods, stereographic analysis, and wedge and slope stability analyses for both dam abutments. *(2017)*

Clean Water Services; Abbey Creek Dam, OR - Lead Geotechnical Engineer. The new dam stores stormwater during large events and releases flow in a controlled manner. McMillen Jacobs evaluated the existing embankment across the creek and assessed its suitability for raising it approximately 6-feet. We performed stability, and seepage analyses developed alternative spillway concepts (including fuse-plug and open channel overflow), scour and erosion control systems, and embankment plans and specifications for the final structure. *(2016)*

Confidential Client; Dam and Reservoir, Western U.S. - Lead Geotechnical Engineer. Bryan was the lead geotechnical engineer and was responsible for evaluating the suitability of potential dam sites, tunnel layout, development of conceptual dam design, and identification of geologic and operational risks. A private developer evaluated the feasibility of potential hydropower and water storage alternatives at a site in the western United States. The challenging site included porous limestone and potential karstic features. The dam under consideration will have a maximum height of 100 to 150-feet. *(2013 - 2016)*

John Bakken, PE

Electrical ITR

John Bakken is a Registered Professional Engineer in Oregon and has 39 years of engineering experience. He has performed independent technical reviews (ITR) on several large complex hydroelectric projects in North America, South America, and Asia. John's experience spans complete project lifecycles, including planning studies, concept development, detail design development, and engineering services during construction.

He has also performed the designs and the ITR of electrical and control system designs for various hydroelectric gate projects. This experience includes the Instrumentation & Controls (I&C) of the three gates at Dworshak Dam and vertical lift gates at the Lower Baker Dam, Morony Spillway Gate, and Box Canyon Dam. He also has 30 years of experience providing consulting and electrical engineering services to Pacific Northwest utilities. This experience contributes to John's ability to effectively communicate with multi-disciplinary teams and manage responsibilities across multiple project sites. Area of Specialty

Education

- MSEE, Electrical Power Engineering, The University of Washington, Seattle, Washington (1982)
- MSc, Electrical Power Engineering, The Norwegian Institute of Technology, Trondheim, Norway (1980)

Years of Experience

- 39 years

Registrations/Licenses/Certs

- **PE: Orgeon (#76837PE)**
- PE: AK, CA, HI, MT, UT, WA, WY

Area of Specialty

- Instrumentation & controls for vertical lift gates
- Focus on dam/hydro facilities
- PLC and SCADA controls
- Experience on Chelan's Rock Island Dam project
- Electrical systems to support gate rehab projects
- Completed independent technical reviews on hydro projects across the Pacific Northwest

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Electrical ITR.** John provided reviews of the instrumentation and controls, and electrical power. *($2.8M; 2021 – 2023)*

❷ **North Western Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Electrical ITR.** John is responsible for the instrumentation and controls and electrical power reviews. *($29M; 2021 – Design 100%; Construction est. 2023)*

Pend Oreille County PUD; Box Canyon Hydroelectric, Vertical Lift Gate TDG Mitigation, WA – Electrical Engineer.* An element of this project was to reduce spillway discharges from 10,000 to 60,000 cfs by changing the gates' operation. John provided the reviews of the original instrumentation, controls, and electrical power. He also prepared design drawings and specs for power supply and control systems for spillway gate hydraulic hoists. They were installed to modify operations of the spillway vertical lift gates to lessen dissolved oxygen absorption during spill events. The electrical systems included new power feeders from the powerhouse to the spillway, PLC-based hoist control, and integration with the powerhouse. *($106M; 2012 – 2015)*

USACE; Dworshak Dam Regulating Outlet Valves Equipment Upgrades – Electrical ITR. McMillen Jacobs provided construction documents for upgrading the existing mechanical and controls equipment for the three Regulating Outlet Valves at Dworshak Dam. The scope of the contract included the replacement of the existing hydraulic system, including two 8-inch bore hydraulic cylinders and a hydraulic power unit for each valve. John performed Independent Technical Reviews of electrical and control system designs during various stages of project design development. *($407k; 2015 – 2016)*

John Bakken, PE

Idaho Power; Lower Malad Hydro Facility, Flop Gate Replacement, ID – Electrical ITR. We identified and compared solutions for the aged flop gates and scouring issues. Our feasibility study report described a variety of solutions and collaborated with Idaho Power for the optimum solution. Our final design included the replacement with similar flop (hinged) gates and concrete modifications on the bridge deck, apron, and spillway crest. *($244k; 2021 – Ongoing)*

Southeast Alaska Power Authority; Swan Lake Reservoir Expansion, Dam Raise, AK - Electrical ITR. The project goal was to raise the reservoir from a normal full pool elevation of 330.0 feet to 345.0 feet by modifying the 174-foot tall by 430-foot long thin-shell-arch dam. Scope of work included modifications of the concrete dam crest, a new vertical liftgate (23' wide x 16' tall), a steel emergency flashboard system (78' wide x 17' tall), mechanical and electrical modifications, a 30-foot reinforced concrete pier, modification to the existing parapet walls, and modifications to the intake gatehouse. McMillen Jacobs served as the design lead with integrated civil, geotechnical, hydraulic, electrical, mechanical, and structural designs, including finite element modeling. We coordinated closely with vertical lift gate and flashboard manufacturers who provided the only system of its kind in the world. We also provided engineering support during construction and coordinated FERC requirements and compliance. Challenges included a remote area in Southeast Alaska with access limited by air or water and a small footprint of the laydown area at the dam abutments. John performed an Independent Technical Review of the electrical design elements, including power distribution and control systems. *($11M; 2016 – 2017)*

Okanogan PUD; Enloe Dam Hydro Renovations, WA – Electrical ITR. As the Owner's Advisor, John provided technical review of design and specifications for electrical equipment and systems, including generator, step-up transformer, switchgear, control, and protection systems, as well as SCADA and communication systems. This $30+M project includes crest gates, instream flow outlet works, a new power intake structure, and steel penstocks for a new 9 MW hydroelectric power plant. *($123k fee; 2018)*

Confidential Client; 6.7 MW Hydroelectric – Electrical ITR.* This project included a new powerhouse with a 6.7 MW two-jet horizontal Pelton turbine and generator and a 35-ton bridge crane for servicing the equipment. Other project elements included an automatic trash rack (14' x 15') installed with a debris deck and sluice and slide gates at the intake. Challenges included clay soils, steep slopes, rugged terrain, remote area, limited footprint and access, rain events, volcanic rock excavation, and environmental protection issues. John prepared cost estimates and evaluation of overhead vs. underground transmission line configuration to connect this power plant to an existing distribution circuit. He performed independent technical review of the procurement documents for the water-to-wire equipment package and assisted with equipment layout of the plant's switchyard. *($30M total installed; 2013 - 2015)*

Monterey County Water Resources Agency; Interlake Tunnel and San Antonio Spillway Modification, Salinas, CA – Electrical ITR. We produced the 30% level designs for the San Antonio Spillway Modifications updated the Probable Maximum Flood estimate and routing for the San Antonio spillway. Once water rights issues are rectified, we will provide the final design. John performed independent technical reviews of electrical and control system designs during various stages of project design development. *($4.6M Design Fee; 2017 – Ongoing)*

Lewis County PUD; Task Order 17-12 Cowlitz Falls Dam Condition Assessment, WA – Electrical Engineer. John participated in a site visit to review electrical equipment and systems condition and to interview plant operating personnel. He generated projections for future equipment renewal and upgrade costs. The electrical equipment and systems included the generators and their auxiliary systems, ac and dc station service systems, generator step-up transformers, 230-kV high-voltage substation equipment, control and protection systems, and communication systems. *($115k; 2017 – 2018)*

**Project completed while employed by the previous firm.*

Matt Hess, PE

Mechanical Lead

Matt Hess is a Registered Professional Engineer in Oregon and has 16 years of experience as a mechanical engineer, specializing in designing hydraulic gate hoisting and operating systems for dam facilities. Matt has also participated on U.S. Army Corps of Engineers teams to author design criteria/guidance for mechanical gate systems used widely by dam owners, including federal agencies, state agencies, and local utilities. In addition, Matt has participated as a member of the CEATI Gates Task Force (GTF) to collaborate with dam owners worldwide on gate design, maintenance, and operating topics.

He has retrofitted or refurbished over 60 spillway gates across multiple sites. His gate experience includes supporting infrastructure to operate spillway, sluice, and navigation lock gates, including radial gates, Obermeyer weirs, hinged gates, vertical lift gates, miter, and slide and knife gates. Supporting mechanics include wire rope hoists and associated ropes or chains; cathodic protection, trunnion systems, strut arms, motors, primary (worm) reducers, beams and anchors, load-limiting torque transducers, gearboxes, shafting, couplings, bearings and seals, gearbox oil spill containment system, and associated controls and limit switch systems.

Matt's investigations have included determining appropriate load cases, calculating the capacity of the hoist system, and developing recommendations to retrofit the existing hoist equipment to address components that did not meet the approved load cases. His designs have enabled lifting gates over 317-tons. Matt has developed feasible and cost-effective solutions to trunnion friction, structural load issues, excessive vibrations, binding issues, and unbalanced loads with uneven hoisting.

Education

- MS, Mechanical Engineering, Portland State University (2016)
- BS, Mechanical Engineering, Case Western Reserve University (2006)

Years of Experience

- 16 years

Registrations/Licenses/Certs

- **PE: Oregon (#85104PE)**
- PE: WA

Area of Specialty

- Mechanical engineer
- Career focused on gate hoists (rated up to 317 tons) & vertical lift spillway gates (up to 245 tons)
- Has worked on 200+ gates
- Unique perspective working in O&M for owner of hydro facilities = better designs
- Assisted in developing industry-leading standards
- Hydraulic steel structures
- Contributing USACE Author:
  - EM 1110-2-2610
  - EM 1110-2-3200
  - EM 1110-2-1424
  - UFGS 35 05 40.17
- Cathodic protection systems
- Dam safety inspections

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Mechanical Lead/Hoist SME.** Matt is the designer of the hoist and mechanical systems for these gates and the other mechanical systems being replaced. *($2.8M; 2021 – 2023)*

❷ **NorthWestern Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Mechanical Technical Support.** Matt serves as a subject matter expert during the installation, alignment, testing, and commissioning of the 40-ton hoist system. *($29M; 2021 – Ongoing; Design 100%; Construction est. 2023)*

❺ **Lewis County PUD; Cowlitz Falls Spillway Crane Rail Extension, Randle, WA. – Mechanical Engineer/Task Order Project Manager.** Matt provided mechanical support on the rail extension task order and will serve as task order project manager for the sluice gate upgrades. *($135k; 2021 – 2021)*

Chelan County PUD; Rock Island Dam Gate Handling Improvements – Mechanical Engineer. This project significantly revises 13 of the 31 30-foot x 55-foot vertical deep gates and associated equipment

Matt Hess, PE

at Rock Island Dam to improve spillway performance, function, and safety. The design scope includes updates in gate storage, over-under gates, notch gates, gate connection, and gate dogging. *($600k; 2022 - 2026)*

Chelan County PUD; Rocky Reach Tainter Gate and Hoist Upgrades, WA – Mechanical Lead. McMillen Jacobs performed a condition assessment as a first step to modernizing the 12 Rocky Reach Dam spillway tainter gates (50' x 58'). This effort will consist of new gate hoists, controls, seals, cathodic protection, and miscellaneous improvements to provide a 40-50-year service life. The ~200-ton hoists will be improved to increase reliability, and reduce maintenance and risk of hydrocarbon spills. Scope of work includes a feasibility analysis and design. Matt performed the condition assessment and will perform the design work for the future hoist replacement. *($525k est.; 2020 – 2021; final design anticipated in 2022)*

USACE; Comprehensive Spillway Gate Rehabilitation for Multiple Dams – Mechanical Lead.*

- Big Cliff Dam, 3 gates, new hoists, (46' x 46')
- Blue River Dam, 3 gates, new hoists (35' x 37')
- Hills Creek Dam, 3 gates, new hoists (42' x 48')
- Fall Creek Dam, 2 gates, new hoists (43' x 43')
- Foster Dam, 4 gates, hoist retrofit (45' x 46')
- Cougar Dam, 2 gates (40’ x 43’)
- Dexter Dam, 7 gates, hoist rehab (38' x 44')
- Green Peter Dam, 2 gates, new hoists (45' x 47')
- Applegate Dam, 2 gates, hoist retrofit (50' x 45')

USACE Portland District; Multiple Projects for Bonneville Dam's Vertical Lift Gates, Cascade Locks, OR – Technical/Mechanical Lead.*

- **Spillway Gate Full-Flow Hoists:** Oversight of a consultant designing a new generation-4 hoist (rated up to 317 tons) that could lift the 18 spillway gates entirely out of the PMF flow without splitting the gates. Matt scoped the design, wrote, negotiated, and awarded the AE task. *(2011 – 2013)*
- **Spillway Gate Hoist Rehab:** Matt led this effort to address safety issues with the spillway gate generation-1 & 2 hoists. The effort involved overseeing a consultant performing a design for retrofits to the hoists. Matt scoped the rehabilitation effort, then wrote, negotiated, and awarded the AE task order. The retrofit included the replacement of the hoist motors, brakes, and couplings and rehabilitation of the hoist gearboxes. *(2009 – 2011)*
- **Spillway Gantry Crane Evaluations (rated at 500-tons)**: This involved an assessment of the crane hoist lifting capacity and condition assessments. It also involved coordinating the structural condition assessment, which evaluated flaws, including corrosive section loss discovered during a structural inspection. The effort concluded with a recommendation to create a new project to look at ways to upgrade limited components of the crane to extend the reliable life until a replacement could take place under a larger rehab effort for the entire spillway.

USACE Portland District; Lookout Point Dam Vertical Lift Penstock Gate Rehab, Lowell, OR – Mechanical Lead.* After discovering severe corrosion of the penstock gates and roller chains which caused the roller chain to seize, the District began rehabilitation of three penstock gates (12.3' x 26.25', 60,000 lbs.). Matt performed design, which included the replacement of wire ropes and wire rope equalization sheaves/load block utilizing a new self-lubricating roller chain, cathodic protection, and new gate seals. The effort also included repainting and hydraulic structural steel HSS inspections. *($1.5M; 2009 – 2010)*

USACE Sacramento District; Folsom Dam Auxiliary Spillway Bulkhead Gate Corrosion Issue, Folsom, CA – Mechanical SME.* Matt was the mechanical subject matter expert for this effort to evaluate and suggest repairs to a galvanic corrosion issue on the auxiliary spillway bulkhead gate load block at Folsom Dam (23.75' x 39', 228,000 lbs.). Matt worked to identify all components impacted by the galvanic corrosion issue before advising a junior engineer on redesigning the load block using different materials. Matt advised the client to pursue a latent defect claim against the original contractor. *(2020 – 2021)*

**Project completed while employed by a previous firm.*

Gavin Smith, PE

Structural Lead

Gavin Smith is a Registered Professional Engineer in Oregon. He brings 15 years of experience with a strong focus on designing, installing, and commissioning various Hydraulic Steel Structures (HSS), including vertical lift spillway gates. He has authored papers on spillway gate retrofits. Recently, Gavin has been selected to serve on the USSD Gates and Valves Subcommittee under the broader Committee on Hydraulics of Dams.

Previously, he served as the USACE HSS Program Manager and Lead Inspector for the Portland District. In addition to his role as Engineer-of-Record for six major Willamette Valley gate rehabilitations, he was the structural lead for developing the Portland District's standardization guide for upcoming regulating outlet rehabilitations. Gavin designed, installed, and commissioned a wide variety of gates, including a two-million-pound John Day Dam nav lock gate that spans 90-feet-wide and 120-feet tall, and the Dalles Dam miter gate weighed one million pounds per gate leaf.

Gavin has developed advanced computer modeling of complex structures using frame analysis and finite element methods, foundation analysis, and design. He has utilized STAAD.Pro- for 12+ years and has taught webinars and engineers how to correctly build and interpret results from modeling and analysis. He has also built 100+ models and reports and participated in USACE's user-group teams providing examples of models to be used in training. He has also used the Inventor Analysis Module NASTRAN in modeling a 300-foot-tall concrete tower made of individual concrete segments.

Education

- BS, Civil Engineering, Oregon State University (2007)

Years of Experience

- 15 years of experience
- 11 years of experience as Fabrication QCM

Registrations/Licenses/Certs

- **PE: Oregon (#80501PE)**
- PE: CA, ID, MT, WA

Affiliations & Organizations

- United States Society on Dams (USSD) – Member & serves on Subcommittee for Gates & Valves

Area of Specialty

- Hydraulic steel structures up to 90' x 120' & 907 tons
- 100+ gates including vertical lift gates
- 10 years of experience maintaining operations = better designs
- Vendor/supplier coordination to manufacture large gate structures
- Modeling (STAAD.Pro, RISA 3-D, ANSYS, NASTRAN, LS-DYNA, ROBOT, REVIT, SOLIDWORKS, INVENTOR)
- Startup, testing, & commissioning

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Structural/Gate Designer.** Gavin developed five alternative spillway crest gate designs as multiple gate designs were needed to evaluate the economy and feasibility of 13-foot, 21-foot, 25-foot, and 50-foot bay sizes. *($2.8M; 2018 – 2023)*

❷ **North Western Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Structural/Gate Designer.** Gavin is responsible for gate design. *($29M; 2020 - Design 100%; Construction est. 2023)*

❸ **Idaho Power; Upper Salmon Spillway, Vertical Lift Reject Gate Replacement, ID – Structural Gate Design/Fabrication QC Coordinator.** Gavin participated in the pre-fabrication conference with the owner, manufacturer, and prime contractor. They reviewed welding procedures, required submittals, work plans, material certification requirements, logistics for the safe delivery of the gates, and potential means and methods for lifting and installing the gates. Gavin designed the new gates utilizing USACE ETL 584 design criteria. He designed the gates and embedded stell design using FEA, 3D modeling, and traditional analysis methods. *($680k; 2019 – 2021)*

Gavin Smith, PE

❹ **Stanford University; Searsville Dam Modifications Design-Build, CA – Structural/Gates.** Gavin is responsible for the gate system design, including a structural concrete guide frame, seals, a hoisting system for lifting and lowering the gate, and instrumentation controls. *(2020 – 2023)*

❺ **Lewis County PUD; Cowlitz Falls Dam Sluice Gate Upgrades & Radial Gate Inspections, WA – Structural/HSS Designer.** Gavin completed the analysis of the four radial gates. *($571k est; 2020 – 2024)*

USACE; John Day Lock & Dam Emergency Intake Gates & Draft Tube Bulkhead, OR – Project Manage/Technical Lead.* Gavin led the design team for USACE to design and fabricate two new emergency unit intake gates (50' x 25') weighing 150,000 lbs each and two new draft tube bulkheads weighing 190,000 lbs. each. Gates were designed for 163 and 140 ft of hydrostatic head. *(2017)*

Chelan County PUD; Rock Island Dam Gate Handling Improvements, WA – Structural Engineer. This project significantly revises 13 of the 31 30-foot x 55-foot vertical deep gates and associated equipment at Rock Island Dam to improve spillway performance, function, and safety. The design includes updates in gate storage, over-under gates, notch gates, gate connection, and gate dogging. *($600k; 2022 - 2026)*

Chelan County PUD; Rocky Reach Dam Tainter Gate & Hoist Upgrades, WA – Structural Engineer. Our team performed a condition assessment as a first step to modernizing the 12 Rocky Reach Dam spillway tainter gates (50' x 58'). This effort will consist of new gate hoists, controls, seals, cathodic protection, and miscellaneous improvements to provide a 40-50-year service life. The ~200-ton hoists will be improved to increase reliability, reduce maintenance, and reduce the risk of hydrocarbon spills. Scope of work includes a feasibility analysis and design. *($420k; 2022- Ongoing)*

USACE; Radial Gate Rehabilitation Program, OR – Engineer-of-Record.* The type of rehabilitation varied for seven different dams due to different types of steel and many configurations. Gates are open under the max pool to regulate water and were made of thick steel to resist high machinery loadings. These gates were typically 50' x 50' x 40' radius, weighing 200,000 pounds. Procedures were modified to accommodate the presence of endangered turtles. Gavin performed the analysis and designed the rehabilitation considering trunnion friction and increased machinery loadings. He also supported the installation of new radial gates and associated construction. *($10M - $20M each; 2012 – 2019)*

USACE; John Day Lock & Dam Downstream Navigation Vertical Lift Roller Gate, OR – Fabrication QC Coordinator/Structural Engineer.* Gavin participated in the design and analysis of a downstream navigation lock gate. He created an FEA STAAD model of the roller gate to check design hand calculations and compared the weights of individual components of the new gate the existing gate. The final gate measured 90-feet-wide and 120-feet tall and weighed 2M pounds. *($20M; 2007 - 2009)*

USACE; Dalles Lock & Dam, Downstream Navigation Miter Gate & Stoplogs, OR - Fabrication QC Coordinator/Structural Engineer (for USACE).* Gavin created a large finite element model in STAAD.Pro was made up of 200,000 plate elements and was used to calculate the deflections and stresses of the newly installed miter gate and included deep truss navigation lock stoplogs to dewater the downstream miter gate. The stoplogs are 86-feet wide and are stacked to 50-feet-tall to dewater the navigation lock. He also supported construction during the large picks from a barge with STAAD models to review the contractor's lift and installation procedures. *($20M; 2009 – 2013)*

Pend Oreille PUD; FERC Part 12D Sullivan Creek and Box Canyon Dams, WA – Structural QA/QC. The principal project features are a 62-foot-high, 260-foot-long concrete structure with an integral spillway, diversion tunnel, forebay channel, auxiliary spillway, and powerhouse. Gavin was responsible for the structural review of the Part 12D supporting technical information document and cross canyon seismic analysis of the spillway piers. *($67k; 02/2020 – 12/2020)*

**Project completed while employed by the previous firm.*

Mathew Lawson, PE

Electrical Lead

Matt Lawson is a Registered Professional Engineer in Oregon. He has 34 years of experience in generation, automation, industrial and utility plant controls, including designing and constructing new and retrofit water projects. Matt has prepared many gate and flow control designs for dams, generators, valves, and gate operation, including new controllers for regulating outlet gates at Dworshak Dam, upgrading four spill gate controllers at Lewis County PUD's Cowlitz Falls Dam, and new intake gate controls (as well as plant controls) for the Mahoning Creek greenfield hydro project located on USACE's Mahoning Creek flood control dam. He completed the design, installation, and commissioning of a water treatment control system for the Naughton generating project (EPC contract).

He was the lead electrical designer for the new Swan Lake Dam spillway gate system in conjunction with the dam raise project, installing a hydraulic spill gate operator and controls. He also designed automated gate control systems for the Seattle City Light Boundary intake gates, governor, and plant auxiliary systems. These control schemes provided local control, remote PLC automated operation with HMIs, and standard utility SCADA/RTU interfacing.

Education

- BSEE, Brigham Young University Utah (1987)

Years of Experience

- 34 years

Registrations/Licenses/Certs

- **PE: Oregon (#65133)**
- PE: AK, CA, CO, ID, NV, UT, WA

Affiliations & Organizations

- Institute of Electrical and Electronics Engineers

Relevant Experience

- Electrical controls for vertical lift gates
- Gate control design, upgrades, and modifications at dam/hydro facilities
- O&M training and operations support with 17 years as owner/operator
- Electrical power system studies, including fault, coordination, and arc flash studies
- Security features
- Remote PLC and SCADA
- Plans, specifications, design documents, and construction documents
- Field installation and commissioning
- Power generation and substation facilities

Relevant Experience

❺ **Lewis County PUD; Cowlitz Falls Dam Engineering Services Including Gate Inspections and Upgrades, WA - Lead Control Engineer.** Matt researched and found a modern load cell with an embedded amplifier and a 4-20 mA output, easily integrated into the gate controls. The control modification included added protection by shutting down on overload condition during raising and slack rope condition while lowering. New position sensors were also necessary to replace unavailable replacement components. Matt also assisted with field installation and commissioning of the modified gate controls. As follow on work, Matt was requested by the PUD to assist in designing new manual transfer switch interfacing and purchasing a standby generator, which is used to power the gates in the event of an emergency. *($571k; 2017 - 2024)*

Southeast Alaska Power Agency; Swan Lake Dam, AK - Lead Electrical Engineer. To increase the lake storage by 15-feet, McMillen Jacobs designed modifications including an existing intake structure, new concrete structures at the dam crest and spillway, a new concrete pier on the spillway, an extension of existing piers to allow for the installation of a vertical lift gate and emergency flashboard gate guides, design of embedded metals for the gate guides, and selective demolition of the spillway crest to allow for the installation of the gate bottom sealing surfaces. Matt was responsible for electrical power and control design modifications, purchasing newly fabricated control panels, and providing on-site installation and commissioning support. Construction access to the spillway required a barge and crane floated in the reservoir with access only by helicopter and boat. The scope also included relocating mechanical and electrical equipment at the intake gatehouse. *($1M; 2015 - 2017)*

Mathew Lawson, PE

USACE; Dworshak Dam Gate Upgrades, ID - Lead Electrical Engineer. This project involved the replacement of 3 regulating outlet valves, including replacing the existing hydraulic system, including two 8-inch bore hydraulic cylinders and hydraulic power units for each valve. Matt was responsible for designing power and controls, including a new PLC and fiber network to link the controller to the SCADA powerhouse. Control design included a new Contrologix PLC, PanelView HML, HPU controls, and fiber network to link the controller to the existing powerhouse controls. *($407k; 2015 – 2016)*

Avista Utilities; Cabinet Gorge 273MW Hydro Intake Gate Replacement, ID – Electrical Support. This project required a design for four new headgates that replaced the existing 1950's vintage riveted steel intake gates located upstream from the spillway. Scope included the development of a finite element model for the replacement intake gates and a desktop study to calculate hydraulic down-pull gate forces that occur under a range of forebay and flowrate conditions. It included preparing the complete design, fabrication, and installation plans and specs for four 25-foot by 25-foot vertical roller gates to replace four intake roller gates. In addition to providing design support and overall project management, McMillen Jacobs developed bid documents and installation contract documents for Avista. We also provided technical inspections and reporting during manufacturing and on-site demolition and installation. Matt was involved in the site inspection and assisted in a preliminary report. (*$261k; 2017 - 2018)*

PacifiCorp; Naughton Steam Plant Cooling Water Treatment System Design-Build, WY - Lead Electrical. We were able to complete the project without interruption to the existing operations. Matt performed the electrical power distribution design for the new treatment building and the controls for automating the water treatment process and interfacing with the local Honeywell DCS. He prepared the HMI and PLC control applications, including the control network design, assisted with field installation, and commissioned the new treatment facility. All work was performed according to NFPA 70, NFPA 72, and PacifiCorp control and electrical standards. *($4.8M; 2017 –2018)*

Puget Sound Energy; Snoqualmie Falls Powerhouses, WA – Electrical Engineer/Construction Support. Matt provided quality control and inspection services and oversight for all electrical construction aspects of the project. His duties included interpreting engineer design drawings, preparation of installation details, and monitoring electrical subcontractor work and work processes, providing the main contractor with recommendations, and documentation demonstrating contract compliance. Systems upgraded included BOP systems, unit control and SCADA plant monitoring, relay protection for generating units, AC station service switchgear, DC station service distribution system, HVAC system controls, and a new unit 6 generator, including exciter and governor. *(2014 - 2016)*

Enduring Hydro (aka Cube Hydro); Mahoning Creek Hydro – Senior Electrical Design Engineer.* Matt was responsible for the electrical design, including control, generator and line relay protection, communications, control network, equipment purchasing, SCADA, and interconnection with the local utility. Major control features included operating a 25-foot diameter submerged intake gate, main butterfly valve, turbine shutdown valves, unit hydraulic controls, plant PLC, unit governor, and excitation system. The PLC design allowed remote control from the operator's office and data connections to 3 other entities for status and information. The design followed NERC CIP security standards. *($13.5M; 2011 - 2013)*

Seattle City Light; Boundary Dam (1,144 MW), Governor Replacement, WA – Lead Electrical Engineer.* Matt's responsibilities included control network design, procurement, installation, commissioning, unit controls development, test, and commission. He also was responsible for plant PLC and HMI development, test, and commission. The plant controls upgrade included refurbishing the intake gate operation and interfacing with the 230-kV breakers located in BPA's 230kV switchyard. Designs were all NERC and WECC compliant and underwent WECC governor testing and modeling. *(2004 - 2009)*

**Project completed while employed by previous firm.*

Jay Dallas, PE

Mechanical Support

Jay Dallas has 17 years of experience as a mechanical engineer. During his time in the industry, he has performed design and quality assurance reviews on multiple projects. These projects focused on gate hoists, hydraulic power systems, large-scale pumping plants, and redesigning or upgrading rawwater systems and cooling water systems.

As a mechanical, technical lead, he has developed scopes of work, budget estimates, and schedules for multiple powerhouse rehabilitation projects. He also has experience leading the mechanical design effort on various spillway gate rehabilitation projects involving detailed machine and hoist design.

Jay has performed calculations and used 3D modeling software to design electric hoists for spillway gates. He is proficient in Inventor, SolidWorks, SpecsIntact, MicroStation, EPANet, and MatchCAD.

Education

- BS, Mechanical Engineering, United States Military Academy, West Point, NY (2004)

Years of Experience

- 17 years

Registrations/Licenses/Certs

- PE: WA

Area of Specialty

- Designed 28,000-lb. vertical liftgate hoist
- Led mechanical design for multiple spillway gate rehabilitation projects
- QA/QC on mechanical designs
- Large scale civil works, dams, and hydropower projects
- Mechanical engineering
- 3D modeling design for spillway gates weighing up to 47-tons
- Led mechanical design for fish collection & handling facilities
- Software: Inventor, SolidWorks, SpecsIntact, MicroStation, EPANet, MatchCAD & MS Project

Relevant Experience

Lewis County PUD; Cowlitz Falls Dam Spill Gate Trunnion Friction Testing, WA – Task Order Project Manager/Mechanical Engineer. McMillen Jacobs adds strain gauges and other monitoring equipment to the Cowlitz Gate strut arms and trunnion hubs to test friction between the fixed steel pin on the concrete pier side and the rotating interior bushing material's rotating portion of the tainter gate. Recommendations may include strengthening the arms, replacing parts of the gate, or changing the bushing material to a more modern design that lowers friction. *($64k; 2022 - 2023)*

USACE; Blue River Spillway Gate and Hoist Rehab, OR – Mechanical Lead.* Jay performed calculations and utilized 3D modeling software to design new electric wire rope gate hoists for both spillway gates at Blue River Dam. Gates measured 35'W x 36'T and weighed 87,000-pounds. New hoist design included electric motors, brakes, couplings, gearboxes, line shafts, bearings, wire rope drums, wire rope, gate connections, staff gauges, encoders, limit switches, new trunnion pins, bushings, thrust washers, and secondary oil containment system. Jay developed contract drawings and specs for the new design and oversaw hoist fabrication during construction and on-site commissioning. *($3.9M; 2014 – 2018)*

USACE; Detroit Spillway Gate and Hoist Rehab, OR – Mechanical Lead.* Jay performed calculations and utilized 3D modeling software to design new electric wire rope gate hoists for six spillway gates at Detroit Dam. Gates measured (42'W x 32.6'T) and weighed 94,000-pounds. New hoist design included electric motors, brakes, couplings, gearboxes, line shafts, bearings, wire rope drums, wire rope, gate connections, staff gauges, encoders, limit switches, new trunnion pins, bushings, thrust washers, and secondary oil containment system. Jay developed contract drawings and specifications for the new design. *(2017 – 2018)*

Jay Dallas, PE

USACE; Bonneville Second Powerhouse Corner Collector Gate Hoist, WA – Mechanical Designer.* Jay performed calculations to design an electric wire rope gate hoist for a 28,000-pound vertical liftgate at the powerhouse. He determined motor horsepower requirements, gear reduction needed, open-gear sizing, shaft sizing, wire rope drum design, and gate connection design. Jay utilized 3D modeling software to model hoist components and develop contract drawings. He also oversaw the fabrication, shop testing, and on-site commissioning. *($1.7M; 2009 – 2012)*

USACE; John Day Top Spillway Weir, OR – Mechanical Designer.* Jay performed calculations and utilized 3D modeling software to design a pneumatically actuated pin system to pin two halves of a (47' x 18') vertical closure gate together. He also designed a pneumatically actuated pin connection for a 49-ton lifting beam, new vertical liftgate roller wheels, and a pneumatic control station. Jay developed contract drawings and specifications for the systems and oversaw construction and installation to ensure that new systems worked as intended and met customer needs. *($3.6M; 2012 – 2014)*

USACE; Fall Creek Adult Fish Facility, OR – Mechanical Lead.* Jay led a team of three mechanical engineers to complete the mechanical design of the facility, which included custom fish handling equipment, water supply, distribution piping, and compressed air systems. He also designed a water-based hydraulic power unit to operate flow control valves for the facility's water supply. Recognizing the environmentally sensitive application where control valves were submerged directly in the reservoir, Jay selected and designed this innovative solution that has been operating successfully since the facility was placed into operation. *($14.3M; 2014 – 2018)*

USACE; Lost Creek Penstock Butterfly Valve Replacement, OR – Mechanical Technical Oversight.* Project elements included the replacement of two 126" diameter penstock butterfly valves, valve actuators, hydraulic power unit, and accumulator bank. Jay led the design team through quality control reviews of contract documents, the source selection process and contract award, and the construction phase. He ensured that government submittal reviews were conducted promptly. He assisted with on-site commissioning and identified defects on one of the newly installed valves. The project culminated with both valves successfully installed and the powerhouse placed online. *($3.7M; 2012 – 2018)*

USACE; The Dalles Attraction Water Supply Backup, OR – Mechanical Designer.* The scope included a new 10' diameter bifurcated conduit that conveyed water from the forebay to the attraction water diffusion chamber of the east fish ladder. Jay selected and specified one new 120" and two new 84" diameter triple offset valves and actuators that served as isolation valves. He also designed a system that equalized pressure across the 120" valve before opening. Jay witnessed functional and pressure tests of the valves in the factory and during on-site commissioning. *($30.4M; 2014 – 2018)*

USACE; Chief Joseph Intake and Tailrace Crane Replacements, WA – Mechanical Design Lead/Technical Oversight.* Jay led a multi-disciplinary team in writing the technical scope of work for an AE task order to develop plans and specifications for the procurement of two new cranes at Chief Joseph Dam. He performed quality assurance reviews of AE-developed plans and specifications for the new 50-ton intake crane and the new 18-ton tailrace crane. Jay reviewed contractor proposals for technical compliance during source selection. During the construction phase, he responded to Contractor requests for information and reviewed Contractor submittals for compliance. *($19.2M; 2019 – 2022)*

USACE; Green Peter Bridge Crane Replacement, OR – Design Lead.* Jay developed plans and specifications for a new 180-ton powerhouse bridge crane at Green Peter Dam. He led a multi-disciplinary team to ensure the new crane's structural, mechanical, and electrical aspects were integrated. Jay coordinated architectural support for new crane access stairs and doors. Utilized 3D modeling software to ensure adequate crane coverage and access. *(2021)*

**Project completed while employed by the previous firm.*

Taylor Bowen, SE, PE

Structural Support

Taylor Bowen is a Registered Professional Structural Engineer in Oregon with over 12 years of technical design experience. He brings expertise in designing reinforced concrete structures and concrete spillway rehabilitations. Taylor has also provided structural evaluations and engineering support for numerous hydraulic steel structures, including vertical lift gates.

In addition to design, Taylor has performed construction support tasks, including on-site project representation and observations, preparation of observation reports, review of inspection reports, review of submittals and shop drawings, responding to RFIs, developing retrofit strategies to address non-conforming construction, and performing studies to support contractor means, methods, and sequencing of construction.

He is experienced with seismic modeling and analysis. He is proficient with structural analysis, design, and finite-element modeling software programs, including SAP2000, LS-DYNA, CADAM 2D, ETABS, RISA, Revit, AutoCAD, spColumn, RAM Structural Systems, RAM Concept, SAFE, MATLAB, and Visual Basic (VBA).

Education

- MS, Civil and Environmental Engineering, Stanford University (2010)
- BS, Civil and Environmental Engineering, Utah State University (2009)

Years of Experience

- 12 years

Registrations/Licenses/Certs

- SE: HI, WA
- **PE: Oregon (#95473PE)**
- PE: CA, ID, WA

Relevant Experience

- Gates (up to 60' x 40') and hoists (up to 40 tons) at dam/hydro facilities
- Structural steel and concrete design
- Structural lead for hydraulic structures in rivers and reservoirs
- Retrofit strategies and seismic rehabilitation
- Structural steel composite floor framing, long-span trusses
- Analysis and calculations to determine loads from debris and/or ice

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Lead Structural Engineer.** Taylor's responsibilities include establishing design criteria; design of new spillway bridge deck, spillway piers, revised ogee crest block, gate storage, and maintenance pit structures; developing plans and specifications; design of spillway gates/bulkheads; coordinating review of previous project studies; and finite-element analysis. *($2.8M; 2018 – 2023)*

❷ **NorthWestern Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Structural Support.** Taylor's responsibilities included initial concept-level design development, QA/QC, and assistance with the FERC review and approval process *($29M; 2020 – Design 100%; Construction est. 2023)*

❸ **Idaho Power Company; Upper Salmon Spillway, Vertical Lift Reject Gate Replacement, ID – Structural Engineering Support.** Taylor provided structural engineering support. *($680k; 2019 – 2021)*

❹ **Stanford University; Searsville Dam Modifications and Watershed Restoration Design-Build, CA – Structural Engineer.** Taylor is providing the stability analysis. It is situated less than 1-km from the San Andreas fault in California and consequently has a significant seismic hazard. He is using a progressive approach to perform the evaluation and investigating multiple loading scenarios starting with hand calculations for a representative 2-dimensional cross-section to more advanced 3-dimensional analysis via the finite-element method with LS-DYNA software to capture both linear and non-linear behavior. *(2020 – 2023)*

Taylor Bowen, SE, PE

❺ **Lewis County PUD; Cowlitz Dam Radial Gates Seismic Analysis and Appendix L Physical Inspection – QA/QC.** Taylor contributed technical support to developing the seismic analysis report and calculations and QA/QC. *($126k; 2018 – 2019 & 2021)*

Central Rivers Power; Dietrich Drop Hydroelectric Gate Improvement Design-Build Project, ID – Lead Structural Engineer. Improvements included an emergency repair to the 5,000-pound bypass tainter gate system (17' x 18') with new hoists and controls. Additional work included concrete repairs to the bypass channel. We were responsible for the design, fabrication, and installation of a new fixed-wheel type vertical lift intake gate (24' x 13') weighing 12 tons, a new stainless-steel tilt-up tailrace gate (25' x 9') to span the turbine draft tube opening, and all associated guide frame, hoists, and controls. James was the mechanical lead for the project and designed the mechanical component for the new vertical liftgate and a new gate operator for the existing bypass tainter gates. Taylor's responsibilities included performing site observations and as-built inspections of existing concrete diversion structures, the concrete powerhouse, and hydraulic steel gates; establishing design criteria for and deriving environmental load requirements on in-river hydraulic structures; performing detailed structural analysis; and developing plans and specifications detailing concrete and steel hydraulic retrofit and replacement strategies. He also provided technical support during construction (SDC), including reviewing contractor requests for information, substitution requests, assessment of field conditions, and shop drawing review. *($1.9M; 2018 – 2020)*

Merced Irrigation District; Merced Falls Dam Gate Improvements, CA – Structural Support. Our team provided alternative analysis and cost estimates to identify the preferred path forward for upgrading spillway gates, hoists, and controls to allow for automation. The selected option resulted in development of plans, specifications, and construction support for procuring and installing new gearboxes and motors on the spillway deck; upgrading plant instrumentation and controls, including the installation of new gate travel sensors, inclinometers, and a new stilling well for monitoring and reporting water surface within the reservoir. The new design is more efficient, resulting in reduced motor capacities and electrical loads. Taylor provided structural support for the new 20-ton hoists. *($254k; 2018 – Ongoing)*

Sacramento Metropolitan Utility District; South Fork Powerhouse Design-Build, CA – Structural Engineer. Scope of work included designing and constructing a slide gate (14' x 11'). The site footprint was so small the construction activities needed to be intricately staged and sequenced. Taylor performed a global stability analysis and design of the powerhouse. He also designed the penstock trust block and provided engineering support during construction. *($16M; 2016 – 2021)*

Monterey County Water Resources Agency; San Antonio Spillway Modification, Salinas, CA – Structural Support. The modified spillway will provide up to a 7-foot (2-meter) increase in the maximum reservoir elevation, increasing the reservoir's storage capacity by approximately 45,000 acre-feet (1,372-acre-meters). *($4.6M Design Fee; 2018 – 2020)*

Merced Irrigation District; Merced Falls Dam Needle Beam Spillway Improvements, CA – Structural Support. The 1930s vintage needle beam spillway is a unique emergency device to raise the upstream reservoir above a fixed concrete crest. The structure is approximately 536-feet long and 9.5-feet tall and has 838 individual needle beams distributed over 44 bays of the 34-foot-tall concrete dam. McMillen Jacobs was retained to review past structural analysis work and perform supplemental structural analyses of all the needle beam structure components, including the beams, the beam supports, and the walkway structure, as needed. A detailed structural analysis of the existing elements was conducted using information from the inspection that verified the capacities of elements and allowed for rehabilitation recommendations to be made. Taylor provided technical support for the structural inspection, including developing the fall protection program. *($52k; 2019)*

**Project completed while employed by the previous firm.*

Mitch Skelton, PE

Electrical Support

Mitch Skelton is a Registered Professional Engineer in four states and has ten years of experience in the industry. His experience focuses on designing I&C and electrical distribution systems for hydropower, dam upgrades, and other water resource projects.

He has designed electrical distribution to the new gate equipment, specification of gate instrumentation, and developed utility-quality control and schematic diagrams for the gate controls, including detailed coordination with clients on a point-to-point basis. He has developed one-line diagrams, site electrical plans, PLC panel control diagrams, and SCADA systems.

During testing and commissioning, he has participated in preparing the commissioning reports detailing daily commissioning activities, preparing a punch list of items requiring adjudication before the final acceptance, and preparing redlines of field drawings for the final record.

Education

- BS, Electrical Engineering. Washington State University (2011)

Years of Experience

- 10 years

Registrations/Licenses/Certs

- PE: ID, MT, WA, WV

Areas of Speciality

- Electrical engineering
- Dam upgrades and rehabilitation
- Gate & gate hoist instrumentation and controls (PLC and SCADA)
- Experience with a variety of gate types
- Performed engineering services during construction and testing and commissioning phases
- Electrical distribution design
- Utility coordination
- Design diagrams, plans, and specifications

Relevant Experience

❶ **Puget Sound Energy; Lower Baker Dam Crest Improvements & Vertical Gate, WA – Electrical Engineer.** Mitch is responsible for the electrical and controls the design of the new spillway gates as well as power distribution and lighting on the new spillway deck *($2.8M; 2018 – 2023)*

❷ **North Western Energy; Morony Dam Vertical Lift Spillway Gate Design-Build, MT – Electrical Engineer.** Mitch is designing the electrical distribution system and control systems for the new gate hoists and hoist building, including hoist motor controls, gate heating systems, HVAC electrical support, one-line diagrams, power and lighting plans, cable tray design, grounding systems, and electrical calculations and details. *($29M; 2020 – Design 100%; Construction est. 2023)*

❸ **Idaho Power; Upper Salmon Spillway, Vertical Lift Gate Replacement – Lead Electrical Engineer.** Mitch was responsible for the specification of gate instrumentation designing electrical distribution to the new gate equipment. He also developed Power Utility Owner O&M level of detail final as-built control and schematic diagrams for the gate controls, including detailed coordination with Idaho Power's engineering team on a wiring point-to-point basis. *($680k; 2019 – 2021)*

❹ **Stanford University; Searsville Dam Modifications and Watershed Restoration Design-Build, CA – Electrical Engineer.** Mitch is designing the electrical distribution system and control systems for the new hydraulic gate hoist, flushing pump skid, and deck lighting. He also designs one-line diagrams, power and lighting plans, and electrical calculations and details. *(2020 – 2023)*

Central Rivers Powers; Dietrich Drop Hydroelectric Gate Improvement Design-Build, ID – Electrical Engineering Support. This facility experienced successive failures to gates and also needed

Mitch Skelton, PE

concrete repair work. Our design-build contract included improvements to several elements at this hydro project, including an emergency repair to the 5,000-pound bypass tainter gate system with new hoists and controls. Additional work included concrete repairs to the bypass channel. McMillen Jacobs also was responsible for the design, fabrication, and installation of a new fixed-wheel type vertical lift intake gate (24'W x 13'H) weighing 12 tons, a new stainless-steel tilt-up tailrace gate (25'W x 9'H) to span the turbine draft tube opening, and all associated guide frame, hoists, and controls. Elements of work included site survey; dewatering with the use of pumps; demolition and removal of deteriorated materials; placement of concrete and grouting; fabrication inspections; application of epoxy coatings on the intake gate; and installation of guardrails near the hoist system. The team was able to deliver this project without a single safety incident. Mitch filled in for the lead electrical engineer when needed. He prepared the commissioning reports detailing daily commissioning activities, prepared a punch list of items requiring adjudication before the final acceptance, and prepared redlines of field drawings for the final record. *($1.9M; 2018 - 2020)*

Merced Irrigation District; Merced Falls Dam, Tainter Gate Improvements, CA – Electrical/I&C Engineer. We provided alternative analysis to automate three tainter gates and reviewed existing conditions related to installing reconfigured hoist assemblies for the spillway gates. This included removing the existing machinery and replacing it with modern gearboxes, motors, and controls. Mitch assisted in designing electrical and instrumentation & control provisions for the gate improvements. All work was performed according to NFPA 70 and FERC requirements. *($79k; 2019)*

Monterey County Water Resources Agency; San Antonio Spillway Modification, CA – Electrical/I&C Engineer. We produced the 30% level designs for the San Antonio Spillway Modifications updated the Probable Maximum Flood estimate and routing for the San Antonio spillway. Once water rights issues are rectified, we will provide the final design. Mitch had a cooperative design role for electrical and instrumentation and control provisions, including intake gate and traveling screen control, site and facility electrical, valve structure electrical and control, one-line diagrams and load calculations, SCADA systems, and fiber optic tunnel line tunnel, and electrical cost estimation. *($4.6M Design Fee; 2018 – 2020)*

USACE; Ice Harbor Dam Navigation Lock Machinery Replacement, WA – Electrical/I&C Engineer.* Mitch acted in a cooperative design role for the electrical and controls portion of a complete upgrade of the navigation lock machinery for the roughly 650-ton downstream gate. The design includes shop drawing level detailed design of all motor drive and PLC control systems with safety interlocks and fiber optic backbone to interconnect multiple PLCs and Adjustable Frequency Drives. Mitch assessed existing conditions of 50-year-old systems and provided construction support through field inspections, RFI responses, and submittals review and performed work according to NFPA 70, UFC 3-50101, UFC 3-520-01, and UFC 3-580-01. *(2014 - 2017)*

Sacramento Metropolitan Utility District; South Fork Powerhouse Design-Build, CA – Electrical Engineer. Scope of work included designing and constructing a slide gate (14' x 11'). The site footprint was so small the construction activities needed to be intricately staged and sequenced. Mitch provided engineering services during construction and witnessed commissioning activities to facilitate the final acceptance of facility electrical distribution, powerhouse control systems, and the turbine-generator unit. This included reviewing operation and maintenance manuals and monitoring turbine-generator instrumentation during startup. *($16M; 2020 – 2021)*

Central Utah Water Conservancy District; Mapleton Phase II, UT – Electrical/I&C Engineer.* Cooperative design role for electrical and instrumentation & control provisions for new water conveyance system. This included turnout vaults with actuated valves, SCADA systems, and multiple power utility services. Perform work according to NFPA 70. *(2013 - 2015)*

**Project completed while employed by the previous firm.*

Yuxin (Wolfe) Lang, PE, GE

Seismic Support

Wolfe Lang is a Registered Professional Civil and Geotechnical Engineer in Oregon. He has more than 27 years of geotechnical experience, focusing on water, wastewater, and conveyance projects. He has a strong background in analyzing and designing various foundations, ground improvement systems, and soil retaining structures.

Wolfe has expertise in seismic ground motion characterization analysis, liquefaction analyses, post-liquefaction settlement analyses, post-liquefaction soil residual-strength evaluations, and seismic soil-structure design. His water, wastewater, and conveyance projects include new treatment facilities and reservoirs, seismic rehab of existing facilities, deep pump stations, pipelines, and trenchless crossings. Wolfe has provided a senior geotechnical review for field exploration, subsurface condition interpretation, seismic hazards evaluation, dewatering, and pipe/trench construction considerations.

Education

- MS, Civil Engineering, University of Waterloo, Ontario, 2002
- BS, Geological Engineering, Hebei Institute of Civil Engineering, China, 1993

Years of Experience

- 27 years

Registrations/Licenses/Certs

- **PE & GE: Oregon (#78866PE)**
- PE: WA

Areas of Specialty

- Seismic hazard evaluations
- Geotechnial engineering
- Water quality
- Foundations
- Soil retaining structures
- Shoring design
- Groundwater control
- Slope stabilization
- Landslide remediation
- Soil improvement
- Construction consultation

Relevant Experience

City of Portland Water Bureau; Bull Run Filtration Facility, OR – Geotechnical Design Lead. McMillen Jacobs' services involve geotechnical engineering and seismic mitigation design for a new water treatment plant project with a capacity of 150 MGD. *(2019 - Ongoing)*

City of Portland Water Bureau; Willamette River Crossing, OR – Lead Geotechnical Engineer. When employed with a previous employer, Wolfe was the project manager for the geotechnical engineering portion of the preliminary study. After joining McMillen Jacobs', Wolfe became the lead geotechnical engineer for the preliminary feasibility study and the current design-build owners engineering service of a new 1,372 m long, 1,065 mm steel water line crossing using HDD. The primary geotechnical challenges include soil liquefaction, lateral spreading on the riverbanks, soft alluvium at the bottom, open-graded flood gravel with boulders. After extensive geotechnical database review, eight deep borings were advanced to target the critical seismic hazard issues and HDD construction risks. Advanced soil liquefaction, ground deformation models, and soil-pipe interaction models optimized HDD alignment and depth. Additionally, a geotechnical baseline report was developed identifying and baselining underground conditions as an essential part of risk mitigation approaches. *(2013 - 2014*; 2015 – Ongoing)*

City of Portland; BES Resiliency Master Plan, OR – Seismic Hazard Evaluator/Geotechnical Engineer. Wolfe was the geotechnical and seismic hazard lead in the BES's system resiliency study. Specific tasks include seismic hazard study and hazard map development, pump stations, and treatment facilities seismic condition assessment for the City of Portland's wastewater and stormwater system. In consistence with Oregon Resilience Plan, the seismic hazard study was conducted for the earthquake scenario of the M=9 Cascadia Subduction Zone event. The seismic hazard evaluations include strong ground shaking, soil liquefaction, lateral spreading, landslide hazards, associated effects on the backbone pipelines, critical pump stations, and treatment plant structures. *(2017 - 2018)*

Yuxin (Wolfe) Lang, PE, GE

City of Portland Bureau; Insley Diversion Structure, OR – Project Manager/Geotechnical Engineer. Wolfe was the project manager for the geotechnical engineering and design support portion. Because of the construction of the Portland Milwaukie Light Rail embankment, 130-feet of the City of Portland Bureau of Environmental Service's 96-inch-diameter, the 35-foot-deep pipeline had to be realigned, a new 42-foot-deep Insley Diversion structure constructed. Geotechnical design services included performing two deep geotechnical borings with groundwater monitoring wells, diversion structure foundation design, shoring/dewatering assessment, and preparing a geotechnical data report and design recommendations memorandum. Wolfe supported BES in shoring and dewatering submittal review and construction. *(2012)*

Tualatin Valley Water District and City of Hillsboro; Transmission Pipeline Seismic Hazard Evaluation and Design, OR – Lead Seismic Evaluator. Wolfe was the task lead for the seismic hazard evaluation along the new 36-mile-long, large-diameter (48-inch and 66-inch) transmission pipelines. Wolfe is also the lead geotechnical engineer for multiple pipe sections in the detailed design stage, including PLM_1.0, PLM_4.0, MPE_1.0 & PLW_2.0. Wolfe oversaw evaluating the subsurface conditions, seismic liquefaction hazards, lateral spreading displacements at the major river/creek crossing locations, seismic hazard mitigation approaches, and pipeline geohazard mitigation approaches. He also led multiple pipeline seismic analyses and modeling to assess the induced strains in the steel pipe from differential ground deformation. Numerical modeling includes FLAC free-field ground deformation analyses and Abaqus non-linear soil/pipe analyses for the steel pipe under large ground deformations. *(2014 – 2023)*

Metro Vancouver; Golden Ears Forcemain and River Crossing, Langley, BC – Geotechnical/Seismic Lead. His responsibilities include leading geotechnical explorations, analyses, and developing geotechnical reports. He also leads the seismic ground deformation analysis and seismic soil pipe modeling for steel and HDPE pipes. Our team provided the HDD design and permitting for twin sanitary sewer force main crossing of Fraser River at Langley, BC. McMillen Jacobs is responsible for geotechnical analysis, civil and HDD design, permitting, tender support, and construction management for twin 914 mm diameter, 1,500 m long sanitary sewer force mains crossing the Fraser River at Langley, BC. *(2018 - Ongoing)*

City of Corvallis; Corvallis Water System Seismic Resiliency Study, Corvallis, OR – Lead Geotechnical Engineer. Wolfe researched and developed the seismic liquefaction, lateral spreading, and seismic landslide maps for the backbone and critical facilities of the water system. The objective of this study was to assess the existing system's vulnerability and develop a plan to strengthen the system which includes two water treatment plants, 3.5-mile-long raw water pipelines, 8.5-mile-long finish water pipes, and multiple intakes. In addition to evaluating the seismic hazard, specific evaluations are conducted for the vulnerability of the raw water and finished water pipelines for landslide and liquefaction hazards. *(2019)*

Gresham Water & Wastewater Systems Seismic Resilience Studies, OR – Seismic Hazard/Geotechnical Lead. Wolfe was the geotechnical and seismic hazard lead in the Gresham water system seismic resiliency study in 2016 and the wastewater system resiliency study in 2017 & 2018. Specific tasks include seismic hazard study and hazard map development for backbone systems, seismic performance assessment for critical pump stations, flyovers, treatment facilities, and outfall pipe. In consistence with Oregon Resilience Plan, the seismic hazard study was conducted for the earthquake scenario of M=9 Cascadia Subduction Zone event. The seismic hazard evaluations include strong ground shaking, soil liquefaction, lateral spreading, landslide hazards, and associated effects on the backbone pipelines, pump stations, and treatment plant structures. *(2016 & 2018)*

City of Central Point; Central Point Water System Seismic Resilience Evaluation, OR – Seismic Hazards/Geotechnical Design Lead. Scope of work included evaluating seismic hazards and developing mapping for the City of Central Point water system area. Services include evaluating and developing seismic mapping for ground shaking, liquefaction, lateral spreading, landslide for water transmission lines, pump stations, reservoirs, and pipeline vulnerability assessment. *(2020)*

**Project completed while employed by the previous firm.*

SLATE GEOTECHNICAL CONSULTANTS

MARC J. RYAN, PE, GE

Principal Engineer

Mr. Ryan's geotechnical engineering experience has specialized in earthquake engineering for dams, nuclear power plants, and hospitals. He has managed and conducted geotechnical investigations and engineering studies for structures and dams around the world. He specializes in the characterization of site-specific design ground motions using probabilistic and deterministic approaches, assessments of geotechnical and geologic hazards for dams and levees (e.g., surface fault rupture, liquefaction and related phenomena, and slope instability and landsliding), and hazard mitigation for new and existing facilities. His practice is geographically diverse and his experience extends throughout California, the United States, as well as worldwide. He has managed studies under the jurisdiction of the OSHPD, California Department of Water Resources – Division of Safety of Dams (DSOD), the Federal Energy Regulatory Commission (FERC), the Nuclear Regulatory Commission, and Swiss Federal Nuclear Safety Inspectorate (ENSI).

Mr. Ryan has managed geotechnical design and construction projects, field testing services, and peer review. He is also the lead author on the upcoming revision to the USSD publication "*Selection of Design Ground Motions for Dams*".

REGISTRATIONS

Geotechnical Engineer
CA | No. GE2732

Professional Engineer
CA | No. C 59200
NV | No. CE 21969
ID | No. CE 20675

EDUCATION

M.S. | Geotechnical Engineering | 1997
University of California, Berkeley

B.S. | Civil Engineering | 1995
Purdue University

ASSOCIATIONS

United States Society on Dams (USSD)

Association of State Dam Safety Officials (ASDSO)

Geotechnical Extreme Event Reconnaissance (GEER) Association

RELEVANT PROJECT EXPERIENCE

SEARSVILLEA DAM SEISMIC RETROFIT PROJECT

Stanford University | Palo Alto, CA

Project Manager for development of design ground motions for the seismic stability analysis of Searsville Dam project, located less than 1 km from the San Andreas fault . The work included a site-specific deterministic seismic hazard analysis to estimate horizontal ground motions and developing site-specific vertical-to-horizontal ratios to estimate vertical ground motions.

LOWER BLUE LAKE DAM SEEPAGE MITIGATION DESIGN

Confidential Utility Client | Sierra Nevada Foothills, CA

Engineer of Record (EOR) for the design of a seepage mitigation project for the 40-ft tall earth dam. The project included performing a detailed alternatives analysis to select the preferred mitigation measure. Current work includes the development of Approved for Construction (AFC) plans and specification for a new seepage berm and collection system to collect and monitor seepage through the embankment, foundation and from the left abutment foundation.

CLEAR BRANCH DAM BOARD OF CONSULTANTS

Middle Fork Irrigation District | Parkdale, OR

Member of FERC Board of Consultants (BOC) review the seismic and seepage mitigation project at Clear Branch Dam. The project includes review of the seismic design criteria, input ground motions, and seismic slope stability and deformation analysis for the potentially liquefiable foundation soils. Initial review of the project documents showed that the design consultant has not properly considered several local seismic sources, including the Blue Ridge fault zone and the Twin Lakes fault. On-going work includes characterization of these faults, as well as the Cascadia Subduction Zone, and the development of design ground motions in accordance with FERC Chapter 13 guidelines.

MAGALIA DAM SEISMIC RETROFIT PROJECT

Paradise Irrigation District | Paradise, CA

Engineer of Record (EOR) for the design of the seismic retrofit and new spillway for the 90-ft tall hydraulic fill dam. The project included performing a detailed alternatives analysis to select the preferred mitigation measure for the liquefiable embankment. Current work includes the development of plans and specification for the new buttresses and a new spillway in the right abutment.

MARC J. RYAN, PE, GE

Principal Engineer

FERC PART 12D INDEPENDENT CONSULTANT FOR PIT 3, PIT 4, PIT 5, MACUMBER, AND NORTH BATTLE CREEK DAMS

Confidential Utility Client | Sierra Nevada Foothills, CA

FERC Approved Part 12D Independent Consultant (IC) for Part 12D Safety Inspection and facilitator for Potential Failure Modes Analysis for three earthfill and masonry dams and two concrete dams located in the Sierra Nevada Mountains of California. Responsibilities included review of previous reports regarding earthquake ground motion, spillway evaluation, slope stability, and inspection of the embankment, outlet tunnel, and spillway. The project includes updating the existing PFMs to include a clear description of the initiators and failure progressions, as well as developing new potential failure modes based on recent evaluations at the sites.

FERC PART 12D INDEPENDENT CONSULTANT FOR INDIAN VALLEY DAM

Yolo County Flood Control & Water Conservation District | Yolo County, CA

FERC Approved Part 12D Independent Consultant (IC) for Part 12D Safety Inspection and facilitator for Potential Failure Modes Analysis (PFMA) for a 207-foot high zoned earthfill embankment dam. The key aspects of the project were the interpretation of data from aging instruments, the evaluation of the surface fault rupture potential, and deficiencies in the spillway slabs. The PFMA session included a detailed discussion of any potential failure modes within the spillway. Also participating in the Table Top Emergency Action Plan (EAP) exercise. The exercise included discussion of the potential failure scenarios and coordination among all of the local emergency responders.

DIRECTORS SAFETY REVIEW BOARD FOR CASTAIC, CRAFTON HILLS, PERRIS DAMS

CA Dept. of Water Resources | Los Angeles and San Bernardino Counties, CA

Member of Directors Safety Review Board (DSRB) for the state-mandated periodic safety review of three large earth dams. Castaic Dam is a 340-ft high earth and rockfill dam that is the terminus for the West Branch of the California Aqueduct. Crafton Hills Dam is a 95-ft high zoned earthfill dam that is part of the East Branch extension of the California Aqueduct. As a Board Member of the DSRB, the scope of work includes reviewing the background information for the dams, participating in the inspection of the facilities, participating in the DSRB meetings, and reviewing the draft DSRB summary reports. The inspections include the dams, outlet works, penstocks, tunnels, and spillways, including the spillway drainage gallery at Castaic Dam. Also participated in the core team as a risk estimator for the Periodic Level 2 Risk Assessment (PL2RA) for Castaic and Perris Dams.

CALERO DAM SEISMIC RETROFIT PROJECT

Owner: Santa Clara Valley Water District | Prime: HDR | San Jose, CA

Principal in charge for the geotechnical and geologic tasks for the design of the seismic retrofit for Calero Dam. The project includes the construction of a downstream stability buttress, raising the crest of the main and auxiliary dams, and the construction of a new sloping intake and outlet tunnel. Coordinated and oversaw the drilling and rock coring program for the entire project. The investigation included both land-based and over-water drilling using mud rotary and rock coring methods. Extensive downhole geophysics was performed to characterize the rock mass for the design of the new outlet tunnel, buttress foundation excavation, and on-site borrow areas. Oversaw the preparation of the geotechnical data report that will serve as the basis of the design for the project.

SEISMIC SAFETY STABILITY EVALUATION AND PFMA FOR ANDERSON DAM

Santa Clara Valley Water District | Santa Clara County, CA

Project manager for a study to evaluate the seismic stability of the 240-ft high rockfill dam using updated ground motions anticipated for the site and current state-of-practice procedures accepted by the State of California Division of Safety of Dams (DSOD). Analysis indicated that the both the upstream and downstream slopes of the dam would become unstable and would likely experience significant deformations during and after earthquake shaking. Also developed conceptual designs for measures intended to improve the performance of the dam, including performing a three-dimensional stability analysis to optimize the size of the potential remedial designs. Two-dimensional effective-stress finite-difference analyses (FLAC) were also performed to evaluate the potential for seismically induced deformation of the embankment in order to negotiate a restricted reservoir operating elevation.

EDUCATION

Tuskegee University
B.S. Environmental Science

Troy University
Master's in
Public Administration

20 YEARS OF EXPERIENCE

PROFESSIONAL AFFILIATIONS

Friends of the Columbia Gorge – Land Trust Advisor

Portland BackPack
Executive Board Member

SENIOR ENVIRONMENTAL PERMITTING SPECIALIST

Natalie Edwards

As an experienced environmental scientist, Natalie brings a vast knowledge of US Army Corps of Engineers, US Fish & Wildlife Services, National Marine Fisheries Services, and US Environmental Protection Agency regulations. She is experienced preparing and preparing permit applications for final authorization, reviewing mitigation banks designs, submitting final mitigation banks proposals for final authorization, and providing guidance to public entities and private landowners through the federal regulatory compliance process in Oregon.

Prior to joining Wolf Water Resources, Natalie was a Regulatory Project Manager with the US Army Corps of Engineers where she managed natural resources and regulatory compliance to restoration projects and mitigation banks. In this role she performed numerous wetland delineations and jurisdictional waters determinations, provided Section 404 and Section 10 permitting documentation and review, and wrote NEPA documents, such as Environmental Assessments and Letters of Permissions.

OR 140: Atlantic Ave Intersection Improvements & Foothills (Corey Road to Atlantic Ave), Oregon Department of Transportation, Oregon. *Regulatory Project Manager.* As a project manager for this project, Natalie persuaded the client to go with a Regional General Permit to reduce the time it would take for an Environmental Assessment. This provided a cost savings in time and money for the client. She also worked closely with a USFWS representative on a Biological Assessment for Informal Consultation. Through constant communication with all involved the Informal Consultation was completed before the time expired.

Ellis Reserve Sand and Gravel Mine Permitting, Cadman Materials, Inc. Scappoose, OR. *Permitting Specialist.* Natalie is assisting with the approvals of a sand and gravel mining operation though the USACE Section 408 multi-phase review process. She is leading the coordination with the USACE Portland Sediment Evaluation Team (PSET) to meet water quality requirements. This includes reviewing the Sediment Evaluation Framework Technical Memorandum developed in house and designing the Level 2a sampling plan. The proposed operation is located within the Scappoose Drainage and Improvement Company (SDIC) levee system. Natalie is assisting with the required documentation to demonstrate to the USACE and SDIC that the mining operation will not negatively impact the purpose or function of the levee system.

Georgia Department of Transportation -State Route 20 Cherokee/Forsyth Counties, Georgia. *Regulatory Project Manager.* Natalie worked with closely with the client's environmental consultant on the timeline and due outs for jurisdiction determinations, coordination of permits, endangered species consultation, and SHPO determinations Created small work teams to work through each of the processes and streamline to reach milestone the in accordance with the client's timeline.

Siletz Tribe River Restoration Project, Siletz River, Lincoln County, Oregon. *Regulatory Project Manager.* Natalie worked closely with the Siletz Tribe representative on a fish habitat restoration project on the Siletz River. The project consisted of 20 engineered log

jams and rock structures on 1500 linear feet along the river. She reviewed their project proposal under the Nationwide Permit 27 and provided feedback. Natalie assisted and provided guidance to the Siletz Tribe consultant on the permit process and other permits they would require.

Seal Rock Water District, Beaver Creek, Lincoln County, Oregon. *Regulatory Project Manager.* Natalie collaborated with the US Department of Agriculture on the upgrading of raw sewer lines and outfall structures for the Seal Rock Water District. She reviewed the client's application under Nationwide 12 and provided feedback on items that were missing or needed additional information.

Soque River Mitigation Bank, North Georgia. *Regulatory Project Manager.* Natalie worked closely with federal agency staff and private landowners on the proposed mitigation plans, to remove a berm and reconnect the floodplain back to the Soque River. The project would re-establish wetlands on the former turf farm and would require an offsite wetland monitoring wells to make sure the developing wetlands onsite were on par with USACE Engineering Research Design Center (ERDC) Technical Note 05-2. Reviewed and discussed tree planting and seeding plans with the client's consultant and federal agency counterparts. Natalie worked closely with USACE Office of Counsel on providing guidance to the client's legal counsel on conservation easements requirements and other legal documents.

South Fulton County Municipal Water Supply, Fulton County, Georgia. *Regulatory Project Manager*. Natalie worked as the team lead on this proposed water supply project. The project proposal consisted of an intake pipe structure in the Chattahoochee River to supply a water reservoir in South Fulton County, three permittee-responsible mitigation sites, tribal consultation with the Seminole Tribe, and consulting with the Hydrology Section of the USACE Mobile District over the three dam release schedules on the Chattahoochee River. She diligently worked with her federal agency counterparts on the proposed three permittee-responsible mitigation sites and the standard permit application by reviewing plans and conducting site visits. Natalie communicated efficiently with senior management and the District Commander on the status of the project. She used effectively used the NEPA process as a guide to document project progress such as comments/feedback from the public and the City of Atlanta.

State Route 20 Realignment, Georgia Department of Transportation, Georgia. *Regulatory Project Manager.* Natalie created small teams outside of the larger group to concentrate to tackle technical issues within in the project. A team was created for impacts to endangered species, such as the Cherokee darter (spp). The small group technical group worked closely with the Georgia Department of Transportation's agent, USFWS, and USACE. The group reached consensus on the implementation of a culvert design. The culvert design would allow for daylighting in the roadway. Furthermore, it was encouraged to provide a monetary award to the contractor for quickly and safely installing this culvert as it is a stream reach where the Cherokee darter resides.

HISTORICAL RESEARCH ASSOCIATES, INC.

Natalie K. Perrin

Principal Architectural Historian

Since joining HRA in 2008, Natalie has served as principal investigator on numerous cultural resources management (CRM) projects, including Historic Structures Reports (HSRs) for significant properties listed in the National Register of Historic Places (NRHP); NRHP nominations, including individual, district, and multiple property documentations; Historic American Building Survey/Historic American Engineering Reports (HABS/HAER) at both the federal and state level; Historic Structures Plans; Maintenance and Operations Guidelines for historic resources; Historic Property Management Plans (HPMPs); Survey and Inventory; Design Review; Restoration and Rehabilitation Consulting; and Section 106 Evaluation. With specialized training in building conservation technology, Natalie is particularly adept at assessing the built environment and evaluating historic resources from the ground up. Natalie's project management experience ranges in scope and scale, from municipal surveys to $0.5 million archaeological surveys and prehistoric rock art evaluation. Regardless of monetary value, Natalie's project management style includes open communication with clients and staff early in the project, to ensure expectations are established, deadlines are met, and deliverables are of the highest quality. Natalie manages HRA's Eugene office.

Selected Experience

Rock Island Elementary School Inventory

Senior Architectural Historian and Technical Reviewer for a cultural resources inventory for the Rock Island Elementary School Project, City of Rock Island, Douglas County, Washington. Eastmont School District contracted HRA to conduct a cultural resources inventory for a project involving construction of additional facilities at an elementary school located 0.3 miles west of the city of Rock Island and 0.6 miles north of the Columbia River. HRA completed a study in compliance with the Governor's Executive Order 05-05 and consisted of archival and literature review, assisting with tribal and agency consultation, field reconnaissance, and production of a technical report summarizing the results of the work that reflects professional standards for format and content as expressed in the Washington Department of Archaeology and Historic Preservation (DAHP) guidelines.

Selected Experience: FERC and HPMPs

Scoggins Dam Safety Survey

Principal Architectural Historian for Archaeological Survey for the Scoggins Safety of Dams Modification EA, Oregon. Historical Research Associates, Inc. (HRA), is assisting Environmental Management and Planning Solutions, Inc. (EMPSi), in support of the Scoggins Safety of Dams Modification Environmental Assessment (Project). HRA provided a draft and final methodology report, conducted an archaeological survey, prepared a technical report, provided analysis and reporting of HRA's findings of effects for identified historic properties or findings of no historic properties affected, and conducted project and data management.

Education

MS, Historic Preservation, 2008, University of Oregon

BA., Theatre, 1999, University of Georgia

Qualifications

Meets the Secretary of the Interior's Professional Qualification Standards in Architectural History

Specialized Training

2018, Historic Bridges: Management, Regulations, and Rehabilitation, National Preservation Institute (NPI)

2016, Cultural Resources Qualified Consultant Training, OR DOT

2015, Landscape Preservation: Advanced Tools for Managing Change, NPI

March 2013, NEPA Compliance and Cultural Resources, NPI

May 2012, The Recent Past: A Review of Mid-20th-Century Resources, NPI

2012, National Historic Landmarks Qualified Consultant Training, National Parks Service

2009, Section 106: A Review for the Experienced Practitioner, NPI

2008, Large Format Photography

Beaver Falls Relicensing	Principal Architectural Historian for Beaver Falls Relicensing Project, Ketchickan, Ak. HRA, under contract with Kleinschmidt Associates, provided third-party review for Ketchikan Public Utilities' (KPU) Beaver Falls Relicensing Project. The project required assessment of built (architectural) resources and a cultural resources survey. HRA reviewed the resulting Built Resources Assessment and Cultural Resources Survey documents prepared by TRC Solutions, Inc. HRA provided recommended edits and comments on both documents, to ensure compliance with relicensing and other requirements of the Federal Energy Regulatory Committee (FERC), Alaska Office of History and Archaeology (AK-OHA), and the United States Forest Service (USFS).
Bishop Creek 2019 Fisheries Tasks	Principal Architectural Historian for Bishop Creek Relicensing, Bishop Creek, Inyo County, CA. HRA, with the help of teammates Far Western Anthropological Group (FW) and Davis King Associates (DKA), assisted Kleinschmidt with the preparation of a pre-application document (PAD) and Study Plan for the Bishop Creek Hydroelectric Project on behalf of Southern California Edison. These were concurred upon by the Federal Energy Regulatory Commission (FERC), the California State Historic Preservation Office (SHPO), and the affected Tribes in June 2019. The cultural resources team conducted archaeological and built environment surveys in 2020 and prepared the Cultural Resources Technical Reports for the surveys and built environment evaluations in 2020 and 2021. Archaeological evaluations are slated to begin in the fall of 2021 and will culminate in preparation of an addendum report and Historic Properties Management Plan.
Kern 3 Relicensing (2019–2021)	Principal Architectural Historian for the Kern River No. 3 Hydroelectric Project Relicensing, Phases I and Phase II. As a subconsultant to ERM, HRA conducted background research and prepared a pre-application document (PAD) and a technical study plan for the Kern River No. 3 Hydroelectric Project Relicensing.
Klamath Cultural Resources Support (2018–2021)	Principal Architectural Historian for the Klamath Hydroelectric Project Cultural Resources Support, Klamath County, Oregon, and Siskiyou County, California. Since 2018, HRA has provided support to PacifiCorp's Senior Environmental Analyst for cultural resource related tasks for the Klamath Hydroelectric Project on the Klamath River. HRA has conducted online archaeological research, reviewed original archaeological field notes and forms, and assisted with curation of artifacts collected during the 1990s by Dr. Joanne Mack.
Leaburg-Walterville CRMP (2016–2020)	Project Manager, Senior Architectural Historian, and Technical Reviewer for a series of investigations for implementation of the Leaburg-Walterville cultural resources management plan (CRMP) for the Eugene Water and Electric Board (EWEB). HRA conducted various cultural resource investigations, which included a resurvey of the built environment, condition assessments of archaeological sites, and drafting an employee cultural resources training plan. These investigations helped EWEB fulfill their obligations to manage cultural resources as required by their license from the Federal Energy Regulatory Commission (FERC).
Carmen-Smith Hydro HPMP	Project Manager for cultural resources studies and technical support for Carmen-Smith Hydroelectric Project, Linn and Lane Counties, Oregon. Cultural resources consulting services for various capital improvement projects and resource management programs at the Carmen-Smith Hydroelectric Project, Oregon.
Avista Spokane River FERC Relicensing and HPMP Implementation – Washington and Idaho (2010–2021)	Principal Architectural Historian for FERC license implementation of cultural resources requirements for Avista's Spokane River Project. Since 2010, HRA has assisted Avista Corporation in implementing their FERC license required HPMP for hydroelectric developments on the Spokane River in Washington and Idaho. This work included architectural survey, inventory, and evaluation; site monitoring and archaeological site evaluation; curation of existing and new material collections; assisting Avista in consultation with the stakeholder tribes, federal and state agencies, and SHPOs participating in the Cultural Resource Work Group (CRWG); and general assistance to Avista staff on cultural resources issues throughout the Spokane River Project area.

Drew Clark Sr. *Cost Estimator and Scheduler*

CONTACT

Drew@kmccostandrisk.com
(509) 670-4166

REFERENCES

William Campbell
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(617) 890-0600

Jon Koller
Advanced American Construction, Inc.
jkoller@advanced-american.com
(503) 546-3031

Carter Masterson
Malcolm International
cmasterson@malcolmintl.com
(306) 980-2974

EDUCATION

Bachelor of Science / Construction Management

Central Washington University
2002 – 2007

Bachelor of Arts / Spanish

Central Washington University
2002 – 2007

RECOGNITION

USACE Quality Management Certification

www.KMCcostandrisk.com

Drew has over 19 years of experience in the construction industry. He has managed operations for marine, heavy civil and industrial projects for clients such as the U.S. Navy, Washington State Department of Transportation, New York State Department of Transportation, U.S. Army Corps of Engineers, and BNSF Railways. As a senior estimator, he has been responsible for managing all estimating activities for numerous large and small heavy civil and marine projects. This includes working through means and methods of construction, pre-construction scheduling, and project risk analysis. The result is accurate estimated construction costs and schedule of work.

Drew has been a part of many successful projects and pursuits including the Replacement of BNSF Bridge 66.4 Bridge Replacement, Woods Hole Terminal Reconstruction, Raising of the Bayonne Bridge and SR 520 Pontoon Casting. Drew has led several estimates involving redevelopment and structural improvements of marine facilities on both the East and West coasts.

His approach to developing the estimate detail is key to the development of not only the project cost, but also developing a detailed schedule the reflects the resources required to build the projects.

Kelly McNutt Consulting, LLC

Sr. Cost Estimator and Schedule | 2021 to Present

Wiley Dike Repair |Schedule Expert| 03/2022 – Present | $4 million | Skagit County, WA | Client: Washington Department of Fish and Wildlife Drew provided scheduling analysis improvements to an existing dike. This project will raise the existing dike to keep farmlands from annual flood events that damage the crops. This is an environmentally sensitive area so work will occur during specific windows as well as being weather dependent for embankment operations.

Lower Dungeness River Floodplain |Senior Cost Estimator | 02/2022 – 03/2022 | $12 million | Clallam County, WA
Client: Clallam County Drew provided cost estimating support for the realignment of an existing levee to improve and restore river and floodplain natural processes and function, encourage riparian vegetation growth, and improve fish and wildlife habitat and continue to provide flood protection to the surrounding community.

Poseidon Intake Structure |Senior Cost Estimator & Permit Support | 07/2021 – Present | $60 million | Carlsbad, CA
Client: Poseidon Resources LP This project is upgrading the intake structure for a desalination plant due to environmental requirements. The project involved development of conceptual plans, constructability analysis, permit development support, and completion of cost estimates for negotiation with the progressive design build contractor.

Broadway Corridor NW Johnson & Kearney |Senior Cost Estimator | 01/2022 – Present | $15 million | Portland, OR
Client: Portland Bureau of Transportation As a subconsultant, KMC is tasked with providing an independent cost estimate, schedule, constructability, means and methods, and risk analysis. In addition, KMC has been asked to assist with the RFP and GC development for the project prior to brining the CM/GC firm onboard. Drew is leading KMC's estimate and development of the RFP and GC documents.

Hood River Bridge 5% Cost Estimate |Senior Cost Estimator | 10/2021 thru 11/2021 | $300 million | Hood River, OR
Client: Port of Hood River WSP is leading the engineering component for Port of Hood River. As a subconsultant, Drew was the construction cost estimator developing the cost associated with the substructure and superstructure cost estimate for the new segmental structure. His work also included phasing and sequencing of the CIP segmental construction to develop the full schedule to complete the new structure.

West Seattle Bridge Rehab CM/GC | Senior Cost Estimator & Scheduler | 08/2021 - Present | $40 million | Seattle, WA
Client: Seattle DOT As a subconsultant, KMC completed the independent cost estimate. Drew assisted with the CM/GC cost estimate to negotiate a Maximum Allowable Construction and reviewing project. He is also providing schedule reviews as work progresses with the contract.

Gerald Desmond Bridge Demolition | Schedule Expert | 10/2021 - Present | $30 million | Long Beach, CA
Client: Port of Long Beach WSP is providing the Construction Management Services for the Port of Long Beach. As a subconsultant, KMC is providing scheduling services. Drew is the schedule expert and is completing schedule reviews and input from contractor submittals for the duration of the project.

I-205 Phase 1A Abernethy Bridge 90% Cost Estimate | Senior Cost Estimator and Scheduler | 07/2021 – 11/2021 | $500 million | West Linn, OR | Client: Oregon DOT KMC estimated the cost to complete for a rehab structure that includes a bridge slide, marine system, trestle, 10' and 12' diameter shafts up to 220' deep. Drew's knowledge and experience was fundamental to putting an estimate together that owners can rely on for legislative budget.

Houston Ship Channel Bridge Engineers Estimate | Senior Cost Estimator and Scheduler | 07/2021 – 09/2021 | $500 million | Houston, TX | Client: HCTRA Drew was the lead estimator and scheduler Completing a cost to complete for the completion of the new main span cable stay bridge with precast segmental elements, removal of the existing cast-in-place segmental bridge. His knowledge and experience were key to providing the client with an estimate that they can rely on for final contract negotiations with the contractor.

Advanced American Construction

Sr. Estimator and Scheduler | 2019 - 2021 | $40 Million Annually | Various Contract Types | West Coast

Drew estimated up to $40 million dollars annually on work in the Pacific Northwest and led the estimating department from project targeting through project execution. In Drew's role as Sr. Estimator, he worked closely with project teams and managers to get projects started, establish contract administration, and manage project scheduling.

Cashman Dredging and Marine Contracting Company, LLC

Project Engineer/Estimator/Superintendent/Company Scheduler | 2015 - 2019 | $100 Million Annually | Various Contract Types | East Coast

Drew estimated up to $100 million dollars annually on heavy civil, marine, and dredging projects on the East Coast. Drew was responsible for quantity takeoff, vendor outreach, and means and methods reviews. Additionally, he was responsible for project startup and establishment of contract administration and all project scheduling needs for the company.

Kiewit Infrastructure West Co.

Project Engineer/Superintendent/Lead Estimator | 2006 – 2015| $6 Billion Annually | Various Contract Types | Nationally

In Drew's role as Lead Estimator, he worked closely with project teams and managers to provide direction to the estimating team and establish assignments and objectives to put together a successful estimate. In his role as Project Engineer, Drew carried over the estimating responsibilities with establishment of contract administration, building of project budgets, and additional engineering functions.

Robb Swenson

Sr. Construction Specialist/Cost Expert

CONTACT

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REFERENCES

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Don Oates, PE
KPFF Consulting Engineers
doates@kpffspd.com
(206) 382-0600

EDUCATION

Bachelor of Science / Industrial Technology

Minnesota State University - Moorhead

RECOGNITION

Formerly Certified as a Non-Destructive Test Technician in the US Air Force

6 Years US Air Force and Air National Guard

2002 President's Award – General Construction Co.

2010 Estimating Leadership Award – Kiewit Bridge & Marine

www.KMCcostandrisk.com

Robb has over 40 years of experience in the construction industry. He has managed operations on a variety of marine, heavy civil, and industrial construction projects for clients such as the U.S. Navy, Washington State Department of Transportation, Local Port Authorities up and down the West Coast and the US Army Corps of Engineers. As a chief estimator, he has been responsible for managing all estimating activities for numerous large, complex, heavy civil and marine projects. This process included the evaluation of projects to define innovative means and methods of construction, identification of resources and availability, and assessment of all potential project risks. The result is accurately estimated construction costs and well-defined management plans.

Robb has led teams to award-winning technical projects, like San Francisco-Oakland Bay Bridge, Tacoma Narrows, Hood Canal, and SR 520 Floating Bridge and Landings. Robb has also led estimates on projects involving redevelopment and new terminal construction with Port Authorities. These projects started with developing competent quantities, thoughtful means and methods, a thorough understanding of contract and bid documents, and risk assessment.

His hands-on approach demonstrates that cost estimating is more than just direct work. He focuses as much attention on the indirect costs of getting the work complete. Robb has been able to calculate indirect costs by developing project schedules and resource loading with people and equipment required to support the direct work.

Kelly McNutt Consulting, LLC

Sr. Construction Specialist/Cost Expert | 2020 to Present

Port of Portland On-Call |Senior Cost Estimator and Scheduler| 10/2021 thru Present| $Varies | Portland, OR | Client: Port of Portland As a subconsultant, KMC is tasked with providing cost estimates for the marine facilities for the Port of Portland as necessary. Robb is responsible for providing the full contractor style cost estimates for maintenance work on several port facilities.

Hood River Bridge 5% Cost Estimate |Senior Cost Estimator and Scheduler| 10/2021 thru 12/2021 | $300 million | Hood River, OR | Client: Port of Hood River As the lead construction specialists and cost estimator, Robb developed a construction plan, and from that plan, a complete cost estimate for the construction of a new Columbia River Crossing and the demolition of the existing Hood River Bridge.

Houston Ship Channel Bridge Engineers Estimate | Senior Cost Estimator | 07/2021 – 09/2021 | $500 million | Houston, TX | Client: HCTRA KMC provided an estimate for the main span cable stay bridge with precast segmental elements and removal of the existing cast-in-place segmental bridge. Robb provided constructability reviews, marine access cost estimates, and the indirect cost and schedule for the project.

Houston Ship Channel Bridge Engineers Estimate | Senior Cost Estimator | 07/2021 – 09/2021 | $500 million | Houston, TX | Client: HCTRA KMC provided an estimate for the main span cable stay bridge with precast segmental elements, removal of the existing cast-in-place segmental bridge. Robb provided constructability reviews, marine access cost estimates, and the indirect cost and schedule for the project.

US97 Design-Build Independent Cost Estimate | Senior Cost Estimator| 08/2021| $110 million | Bend, OR Client: Oregon DOT The US 97 D/B project is to widen 2 miles of US97 and 1 mile of US20 including 2 roundabouts. Robb was the lead estimator for KMC on this project, estimating the bridge structures developing the indirect cost estimates and schedule.

US97/OR58 Independent Cost Estimate | Senior Cost Estimator | 03/2021 – 04/2021 | $40 million | Oregon/California Border | Client: Oregon DOT This project will address seven bridges with Phase II Seismic Retrofits on US97 from the intersection with OR58 south to the California border. Robb developed the cost estimates for all 7 bridges.

I-205 Phase 1A Abernethy Bridge 90% Cost Estimate | Subject Matter Expert | 07/2021 – 11/2021 | $500 million | West Linn, OR | Client: Oregon DOT KMC estimated the cost to complete for a rehab structure that includes a bridge slide, marine system, trestle, 10' and 12' diameter shafts up to 220' deep. Robb evaluated and advised on all of the marine and project access cost associated with the project.

Poseidon Intake Structure |Senior Cost Estimator & Permit Support | 09/2020 – Present | $60 million | Carlsbad, CA Client: Poseidon Resources LP This project is upgrading the intake structure for a desalination plant due to environmental requirements. The project involved development of conceptual plans, constructability analysis, permit development support, and completion of cost estimates for negotiation with the progressive design build contractor. Robb performed the constructability reviews for the early design work.

Marine and Heavy Civil Construction Consultant

Consultant | 2017 to 2020

Robb's continuous passion for the construction and marine industry led him to consult on various projects for Kiewit. His background on several great projects, knowledge of cost estimating, and continued discipline have proven valuable to his success as a consultant.

Kiewit Infrastructure West Co.

Chief Estimator | 2003 to 2017| $1.5 Billion Annually | Various Contract Types | Nationally

Responsible for heavy construction bidding, estimating and request for proposals. Most notable achievements include: • Tesoro Avon Wharf Project, Vallejo, CA $90M • SR 520 Floating Bridge and Landings, WA $630M • SR 520 Pontoon Casting in Aberdeen, WA $375M • Hood Canal Bridge East Span, Port Gamble, WA $125M • LAPSC, Bangor, WA $350M

San Francisco-Oakland Bay Bridge (SFOBB) Project

Assistant Project Manager | 2002 to 2003 | 1.2 billion | Bid-Build | Oakland, CA | Client: Caltrans

Robb was the lead marine estimator for foundation work on the SFOBB Project. He spent two years as an assistant project manager onsite managing fabrication and delivery of foundation boxes from the Gulf Coast. SFOBB was the biggest and highest risk project that Kiewit had taken on.

PUBLICATION "Installation of Marine Pile Foundations at the Skyway Project for SFOBB" by Robb Swenson, Marine Foundation, DFI Specialty Seminar Article #1326, publication #75, 2005

General Construction Company

Operations/Lead Estimator | 1983- 2002 | $300 million annually | Various Contract Types| West Coast and Alaska

Introduction to estimating, construction, and project management while working on the following projects: • Port of Seattle Terminal 91 Berths K,L&M • Pier D Replacement, Bremerton, WA $53.7M • John Day Flow Deflector Project, Goldendale, WA $10.7M • Elwha Dam Salmon Fry Bypass, Port Angeles, WA $900K

S&F Land Services

John Blaikie, PLS, CFedS

John has over 24 years of experience managing large scale land surveying projects which include multiple Ports, right of way acquisitions, boundary and right-of-way determinations, GPS control networks, master planning projects, utility corridor surveys, electrical sub-stations, railroad and highway infrastructure as well as, topographic surveys, route surveying, construction staking, ALTA land title surveys, short plats and subdivisions.

John has developed a strong reputation for providing thorough land surveying services with cost effective solutions using the latest technology for survey applications. His knowledge and expertise working with various software makes him a valuable asset to our clients. J

Education: - A.S. Geomatics, British Columbia Institute of Technology
Professional - Registered Professional Land Surveyor in OR, WA.
- Certified Federal Surveyor (CFedS)

Affiliations: - Land Surveyors Association of Washington (LSAW)
- National Society of Professional Surveyors (NSPS)
  - Chapter Treasurer 2002-2006, 2012
- Professional Land Surveyors of Oregon (PLSO)

Experience:

- **Dalles Locks Miter Gate Repair. US Army Corps Engineers. Dalles, OR.**
  Role: Survey Project Manger
  Survey and mapping of the existing conditions of the damaged Miter Gate and associated components. Observations and documentation throughout repair process. Final as-built and survey report of repaired infrastructure.

- **Terminal 3 to Terminal 5. Port of Vancouver. Vancouver, WA.**
  Role: Survey Project Manager
  S&F Land Services is currently the on-call Land Surveyor for the Port of Vancouver. John Blaikie, PLS and Survey Project Manager completed land surveying and coordination of an approx. 250 acre area over the Port's Terminal 3 to Terminal 5 operations for the design of new Port facilities and infrastructure upgrades.

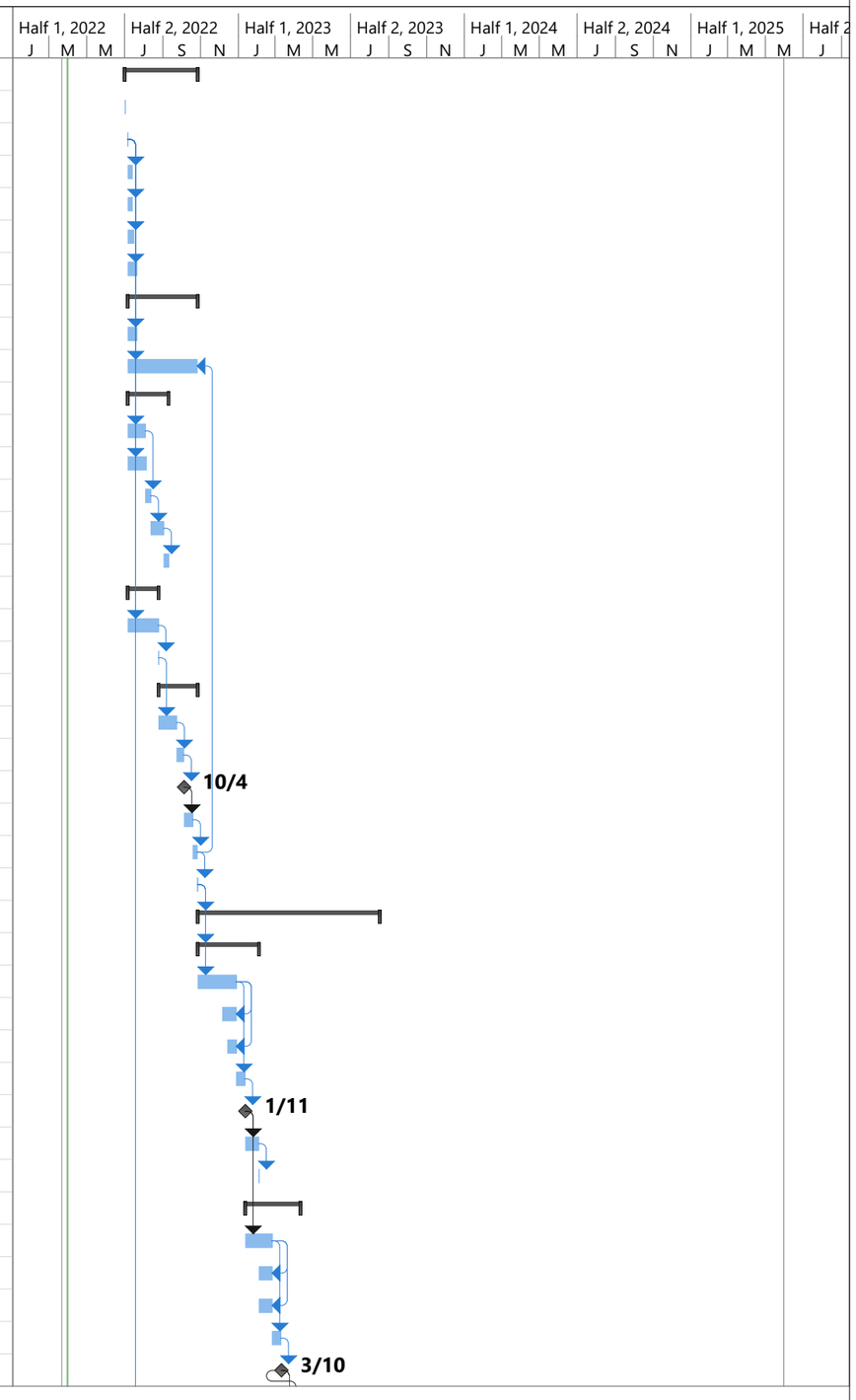
- **Port Management Agreement. Port of Longview. Longview, WA.**
  Role: Survey Project Manger
  While at another firm, John Blaikie, PLS completed a Record of Survey for Port Management Agreement (PMA) expansions for the Port of Longview at their Willow Grove, Barlow Point, Berth 1 and Berth 9 properties. This was a complex project involving four separate areas which are located approximately 10 miles apart from end to end.

- **Columbia Waterfront Development. Private Client. Vancouver, WA.**
  Role: Survey Project Manager
  Survey support to assist in development along the Columbia River Waterfront in Vancouver, WA. Boundary calculations & Mapping, legal descriptions, exhibit maps and sketches.

Detailed Project Schedule

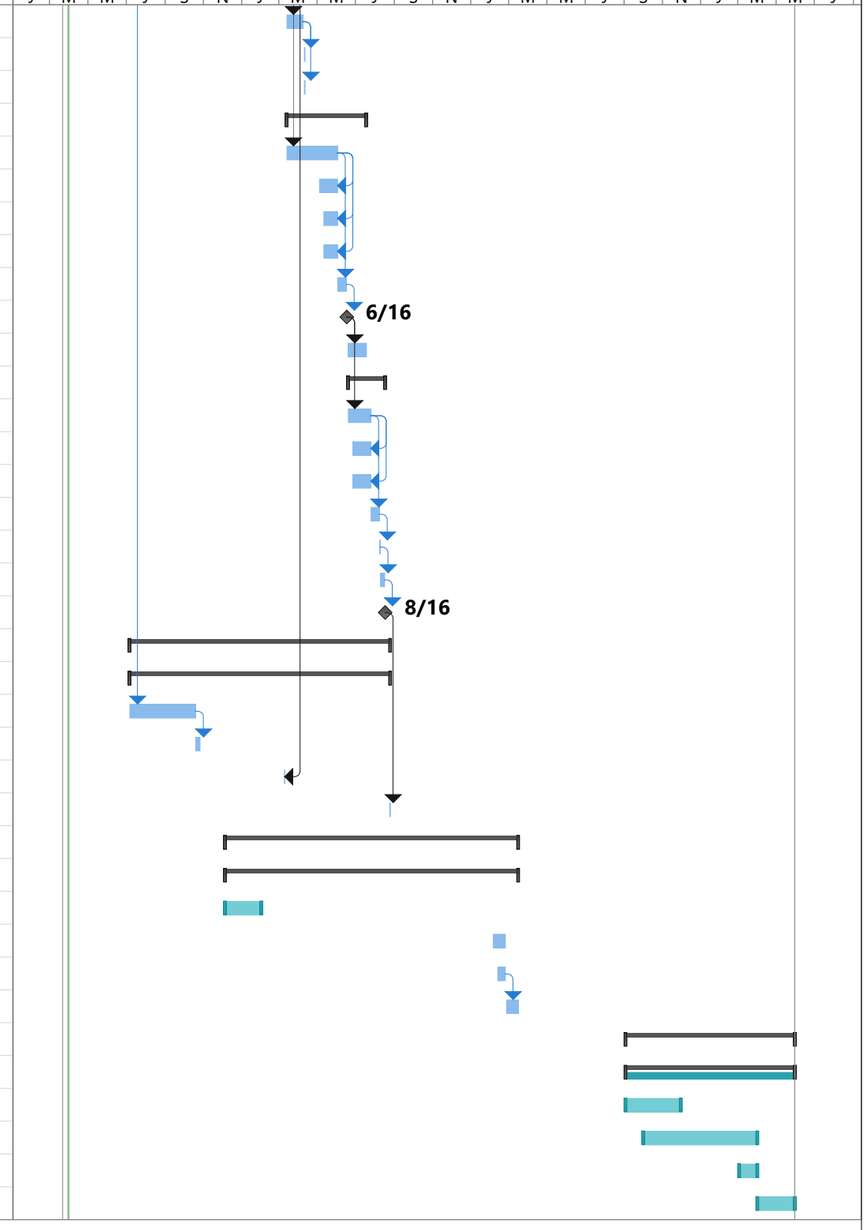
Bull Run Dam 1 Spillway Gates Replacement Project

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Dam 1 Spillway Gates Replacement Project**	**82 days**	**Fri 7/1/22**	**Wed 10/26/22**	
2		Notice To Proceed	1 day	Fri 7/1/22	Fri 7/1/22	
3		Kickoff Meeting	1 day	Tue 7/5/22	Tue 7/5/22	
4		Develop and Submit Project Management Plan	5 days	Wed 7/6/22	Tue 7/12/22	3
5		Develop and Submit Project Communication Plan	5 days	Wed 7/6/22	Tue 7/12/22	3
6		Develop and Submit QA/QC Plan	7 days	Wed 7/6/22	Thu 7/14/22	3
7		Develop and Submit Project Schedule	10 days	Wed 7/6/22	Tue 7/19/22	3
8		**Phase 1 - Conceptual Design Refinement and Consensus (Basis of Design)**	**80 days**	**Wed 7/6/22**	**Wed 10/26/22**	
9		Develop Design Criteria & Create Criteria Memo	10 days	Wed 7/6/22	Tue 7/19/22	3
10		Develop Technical Memorandums	79 days	Wed 7/6/22	Tue 10/25/22	3,25FF
11		**Seismic Analysis**	**47 days**	**Wed 7/6/22**	**Fri 9/9/22**	
12		Seismic Hazard Analysis (SHA) & Report	20 days	Wed 7/6/22	Tue 8/2/22	3
13		Create Linear Response Analysis Model	21 days	Wed 7/6/22	Wed 8/3/22	3
14		Run Linear Response Analysis	7 days	Wed 8/3/22	Thu 8/11/22	12
15		Linear Response Analysis Report	15 days	Fri 8/12/22	Thu 9/1/22	14
16		Seismic Analysis - Principal Review / ITR	5 days	Fri 9/2/22	Fri 9/9/22	15
17		**Alternative Analysis**	**36 days**	**Wed 7/6/22**	**Wed 8/24/22**	
18		Develop & Evaluate Alternatives / Create Alternatives Matrix	35 days	Wed 7/6/22	Tue 8/23/22	3
19		Alternative Analysis Workshop with PWB & Stakeholders	1 day	Wed 8/24/22	Wed 8/24/22	18
20		**Basis of Design (BoD)**	**44 days**	**Thu 8/25/22**	**Wed 10/26/22**	
21		Develop BoD Report	20 days	Thu 8/25/22	Thu 9/22/22	19
22		BoD Report - Principal Review / ITR	7 days	Fri 9/23/22	Mon 10/3/22	21
23		Package and Submit Draft BoD Report	1 day	Tue 10/4/22	Tue 10/4/22	22
24		Draft BoD Report PWB & Stakeholder Review	10 days	Wed 10/5/22	Tue 10/18/22	23
25		Final BoD Report / Incorporate Review Comments	5 days	Wed 10/19/22	Tue 10/25/22	24
26		Basis of Design Presentation Meeting (PWB & Stakeholders)	1 day	Wed 10/26/22	Wed 10/26/22	25
27		**Design Phase**	**207 days**	**Thu 10/27/22**	**Wed 8/16/23**	**26**
28		**Task 3.0 - 30% Plans and Specs**	**70 days**	**Thu 10/27/22**	**Thu 2/2/23**	**26**
29		Develop 30% Plans, Specs, & Other Design Documents	43 days	Thu 10/27/22	Tue 12/27/22	26
30		Develop Class 5 Cost Estimate	16 days	Tue 12/6/22	Tue 12/27/22	29FF
31		Develop Proposed Helicopter Flight Path	10 days	Wed 12/14/22	Tue 12/27/22	29FF
32		Principal Review / ITR	10 days	Wed 12/28/22	Tue 1/10/23	29
33		Package & Submit 30% Design Documents	1 day	Wed 1/11/23	Wed 1/11/23	32
34		30% Design PWB & Stakeholder Review	15 days	Thu 1/12/23	Wed 2/1/23	33
35		30% Design PWB & Stakeholder Review Meeting	1 day	Thu 2/2/23	Thu 2/2/23	34
36		**Task 4.0 - 60% Plans and Specs**	**63 days**	**Thu 1/12/23**	**Mon 4/10/23**	
37		Develop 60% Plans, Specs, & Other Design Documents	31 days	Thu 1/12/23	Thu 2/23/23	33
38		Develop Class 4 Cost Estimate	15 days	Fri 2/3/23	Thu 2/23/23	37FF
39		Develop Schedule of Values	15 days	Fri 2/3/23	Thu 2/23/23	37FF
40		Principal Review / ITR	10 days	Fri 2/24/23	Thu 3/9/23	37
41		Package & Submit 60% Design Documents	1 day	Fri 3/10/23	Fri 3/10/23	40



Bull Run Dam 1 Spillway Gates Replacement Project

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
42		60% Design PWB & Stakeholder Review	20 days	Mon 3/13/23	Fri 4/7/23	41
43		60% Design Stakeholder & FERC Review Meeting	1 day	Mon 4/10/23	Mon 4/10/23	42
44		Pre-Construction PFMA	1 day	Mon 4/10/23	Mon 4/10/23	42
45		**Task 5.0 - 90% Plans and Specs**	**89 days**	**Mon 3/13/23**	**Mon 7/17/23**	
46		Develop 90% Plans, Specs, & Other Design Documents	58 days	Mon 3/13/23	Thu 6/1/23	41
47		Develop Draft O&M Manual	20 days	Thu 5/4/23	Thu 6/1/23	46FF
48		Develop Class 3 Cost Estimate	15 days	Thu 5/11/23	Thu 6/1/23	46FF
49		Update Schedule of Values	15 days	Thu 5/11/23	Thu 6/1/23	46FF
50		Principal Review / ITR	10 days	Fri 6/2/23	Thu 6/15/23	46
51		Package & Submit 90% Design Documents	1 day	Fri 6/16/23	Fri 6/16/23	50
52		90% Design PWB & Stakeholder Review	20 days	Mon 6/19/23	Mon 7/17/23	51
53		**Task 6.0 - 100% Design**	**42 days**	**Mon 6/19/23**	**Wed 8/16/23**	
54		Develop 100% Plans, Specs, & Other Design Documents	25 days	Mon 6/19/23	Mon 7/24/23	51
55		Develop Class 2 Cost Estimate	20 days	Mon 6/26/23	Mon 7/24/23	54FF
56		Update Schedule of Values	20 days	Mon 6/26/23	Mon 7/24/23	54FF
57		Principal Review / ITR	10 days	Tue 7/25/23	Mon 8/7/23	54
58		Package and Submit 100% Unsigned Package	1 day	Tue 8/8/23	Tue 8/8/23	57
59		PWB & Stakeholder Final Review of 100% Unsigned Package	5 days	Wed 8/9/23	Tue 8/15/23	58
60		Package and Submit 100% Signed/Stamped Package	1 day	Wed 8/16/23	Wed 8/16/23	59
61		**Permitting Phase**	**293 days**	**Wed 7/6/22**	**Thu 8/24/23**	
62		**Task 7.0 - Permitting Services**	**293 days**	**Wed 7/6/22**	**Thu 8/24/23**	
63		Evaluate Permitting Requirements	74 days	Wed 7/6/22	Tue 10/18/22	3
64		Identify Required Permits and Schedule - Develop Strategy Memo	5 days	Wed 10/19/22	Tue 10/25/22	63
65		Apply For All Required Permits (PWB led)	1 day	Thu 3/9/23	Fri 3/10/23	41SF
66		Submit Signed Drawings to Permitting Agencies	1 day	Thu 8/24/23	Thu 8/24/23	60FS+5 days
67		**CM/GC Support Phase**	**329 days**	**Mon 12/5/22**	**Fri 3/15/24**	
68		**Task 8.0 - CM/GC Bid Support Services**	**329 days**	**Mon 12/5/22**	**Fri 3/15/24**	
69		CM/GC Proposal Evaluation & Support	42 days	Mon 12/5/22	Tue 1/31/23	
70		Final Construction Cost Estimate	15 days	Mon 2/5/24	Fri 2/23/24	
71		CM/GC Construction Proposal Evaluation Memorandum	10 days	Mon 2/12/24	Fri 2/23/24	
72		CM/GC GMP Evaluation Memorandum	15 days	Mon 2/26/24	Fri 3/15/24	71
73		**Construction Support Phase**	**190 days**	**Tue 9/3/24**	**Fri 5/30/25**	
74		**Task 9.0 - Construction Support Services**	**190 days**	**Tue 9/3/24**	**Fri 5/30/25**	
75		Pre-Construction Submittal Review	63 days	Tue 9/3/24	Fri 11/29/24	
76		Construction Support, Shop Inspections, Site Visits	127 days	Tue 10/1/24	Mon 3/31/25	
77		Commissioning Support	21 days	Mon 3/3/25	Mon 3/31/25	
78		Closeout Submittals	43 days	Tue 4/1/25	Fri 5/30/25	



7 PTE PARTICIPATION DISCLOSURE FORM 1

CITY OF PORTLAND
PTE PARTICIPATION DISCLOSURE FORM 1

This QBS Request for Proposals (RFP) requires the Proposer to submit this PTE Participation Disclosure Form 1. **Failure to submit this form with the proposal may result in the proposal being found non-responsive and rejected.** Proposers must disclose the following information:

Please print all information clearly.

Project Name: Dam 1 Spillway Gates Replacement Project **RFP Number:** 00001831

Proposer Name: McMillen Jacobs Associates **Proposer's EIN #:** 20-1241619

Contact Name: James Boag **Phone:** (971) 272-2121 **Email:** boag@mcmjac.com

Proposers Total Percentage: 75.5 **%**

Percentage of total contract amount allocated to State of Oregon certified D/M/W/ESB participation (*Subconsultants* only):	20.2 **%**

SUBCONSULTANT INFORMATION (please print)[1]	**D/M/W/ESB Cert.[2]**	**Subconsultant Scope/Type of Work**	**Subcontract %**
Firm Legal Name: Kelly McNutt Consulting, LLC (KMC) Email: kelly@kmccostandrisk.com Phone #: (360) 772-0954 **EIN #[4]:** 84-4243479	D/WBE 12663	Constuctability, Construction Cost Estimating, CM/ GC Support	11.6%
Firm Legal Name: Wolf Water Resources, Inc. Email: mwolfe@wolfwaterresources.com Phone #: (503) 207-6688 **EIN #:** 47-2519585	D/W/ESB 9615	Environmental Permitting	4.3%
Firm Legal Name: S&F Land Services, LLC Email: chris.sherby@sflands.com Phone #: (503) 345-0328 **EIN #:** 81-4411481	ESB 10690	Land surveying	2.7%
Firm Legal Name: Historical Research Associates, Inc. Email: nperrin@hrassoc.com Phone #: (971) 386-2047 **EIN #:** 810373761	WBE 11632	Permitting (SHPO)	1.6%

NOTE:

1. If the Proposer will not be using any Subconsultants, the Proposer is required to indicate "NONE" in the Subconsultant Information section of this form and submit this form with their proposal.
2. The Proposer and ALL Subconsultants must be listed on this form. Leave D/M/W/ESB column blank if firm is not currently certified through the State of Oregon Office of Disadvantaged, Minority, Women, and Emerging Small Business: https://oregon4biz.diversitysoftware.com/FrontEnd/VendorSearchPublic.asp.
3. Using 'TBD', 'N/A', or similar acronyms is not acceptable.
4. Do not enter Social Security Numbers (SSN) on this form.

SUBCONSULTANT INFORMATION (please print)	D/M/W/ESB Cert.	Subconsultant Scope/Type of Work	Subcontract %
Firm Legal Name: Slate Geotechnical Consultants, Inc. Email: mryan@slategeotech.com Phone #: (510) 277-3325 x705 **EIN #:** 11-6857266	In progress	Dam safety, geotechnical engineering, seismic hazard, and earthquake-induced geologic hazards consulting	4.3%
Firm Legal Name: Email: Phone #: **EIN #:**			
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RFP NUMBER 00001831

PROFESSIONAL, TECHNICAL, AND EXPERT SERVICES

City of Portland, Oregon
February 22, 2022

REQUEST FOR PROPOSALS
For A
QUALIFICATIONS BASED SELECTION

Dam 1 Spillway Gates Replacement Project

PROPOSALS DUE: March 24, 2022 by 4:00 p.m.

SUBMITTAL INFORMATION: Refer to PART II, SECTION B.3 (PROPOSAL SUBMISSION)

Submit the Proposal to:
City's Online Procurement Center
https://procure.portlandoregon.gov

Refer questions to:
Jin Huang
Email: jin.huang@portlandoregon.gov

A pre-submittal meeting and/or site visit is scheduled for this Request for Proposal on March 3, 2022 at 1:00 pm at Sandy River Station, 10975 SE Lusted Road, Sandy Oregon 97055

This is a **mandatory** meeting; therefore all Proposers are required to attend if they intend to submit a proposal. Proposals received from Proposers who do not attend will not be considered and will be returned to the Proposers. **Proposers wishing to attend the mandatory pre-bid must RSVP with Kevin Larson at: kevin.larson@portlandoregon.gov**

GENERAL INSTRUCTIONS AND CONDITIONS

CORPORATE RESPONSIBILITY AND SOCIAL EQUITY CONTRACTING REQUIREMENTS – The City of Portland seeks to extend contracting opportunities to Disadvantaged Business Enterprises, Minority Owned Business Enterprises, Women Owned Business Enterprises, and Emerging Small Businesses (D/M/W/ESBs) in order to promote their economic growth and to provide additional competition for City contracts. Therefore, the City has established an overall 20% utilization goal in awarding PTE contracts to Oregon State certified D/M/W/ESBs on all City PTE contracts.

CITY SUSTAINABILITY OBJECTIVES – The City has a history of striving to be more sustainable in its operations and planning. Starting with the City's Sustainable City Principles (1994) the City has established a variety of policies to guide its work on sustainability, including: the Sustainable Procurement Policy, Green Building Policy, Climate Action Plan, and the Stormwater Management Manual (to view these and related City policies, go to the Portland Policy Documents Website: https://www.portlandoregon.gov/citycode/index.cfm?&c=26818). As applicable to City procurement, these policies guide the City to buy products and services that reduce the City's negative environmental, human health, and social impacts, while maintaining fiscal health in the short and long term. As such, the City seeks to do business with firms that will actively contribute to the City's sustainability objectives.

ENVIRONMENTAL CLAIMS – Upon request, the vendor must provide and make publicly available verifiable evidence supporting every environmental claim made about the products or services provided to the City. Environmental claims for which verifiable evidence must be provided include any claim provided on products, product packaging, product or service sales literature and websites, and information provided to respond to this solicitation.

INVESTIGATION – The Proposer shall make all investigations necessary to be informed regarding the service(s) to be performed under this request for proposal.

SPECIAL CONDITIONS – Where special conditions are written in the Request for Proposal ("QBS-RFP"), these special conditions shall take precedence over any conditions listed under the Professional, Technical, and Expert Service "General Instructions and Conditions".

CLARIFICATION OF REQUEST FOR PROPOSAL – Proposers who request a clarification of the QBS-RFP requirements must submit questions in writing to the person(s) shown in the REFER QUESTIONS TO section on the cover of this QBS-RFP, or present them verbally at a scheduled pre-submittal meeting, if one has been scheduled. The City must receive written questions no later than the date stated herein. The City will issue a response in the form of an addendum to the QBS-RFP if a substantive clarification is in order.

Oral instructions or information concerning the Request for Proposal given out by City bureaus, employees, or agents to prospective Proposers shall not bind the City.

ADDENDUM – Any change to this QBS-RFP shall be made by written addendum issued no later than 72 hours prior to the proposal due date. The City is not responsible for any explanation, clarification, or approval made or given in any manner except by addendum.

COST OF PROPOSAL – This Request for Proposal does not commit the City to pay any costs incurred by any Proposer in the submission of a proposal or in making necessary studies or designs for the preparation thereof, or for procuring or contracting for the services to be furnished under the Request for Proposal.

CANCELLATION – The City reserves the right to modify, revise, or cancel this QBS-RFP. Receipt and evaluation of proposals or the completion of interviews do not obligate the City to award a contract.

LATE PROPOSALS – Proposals received after the scheduled closing time for filing will be rejected as non-responsive and returned to the Proposer unopened.

REJECTION OF PROPOSALS – The City reserves the right to reject any or all responses to the Request for Proposal if found in the City's best interest to do so. In the City's discretion, litigation between the City and a Proposer may be cause for proposal rejection, regardless of when that litigation comes to the City's attention and regardless how the Proposer's proposal may have been scored. Proposals may also be rejected if they use subconsultants who are involved in litigation with the City. Proposers who are concerned about possible rejection on this basis should contact the City before submission of a proposal for a preliminary determination of whether its proposal will be rejected.

CITY OF PORTLAND TAX REGISTRATION NUMBER – Successful Proposer shall obtain a current City of Portland Tax Registration Number prior to initiation of contract and commencement of the work.

WORKERS' COMPENSATION INSURANCE – Successful Proposer shall be covered by Workers' Compensation Insurance or shall provide evidence that State law does not require such coverage.

CERTIFICATION AS AN EEO AFFIRMATIVE ACTION EMPLOYER – Successful Proposers must be certified prior to contract execution, as Equal Employment Opportunity Affirmative Action Employers as prescribed by Chapter 5.33.076 of the Code of the City of Portland.

EQUAL BENEFITS PROGRAM – Successful Proposers must certify prior to contract execution, that they provide benefits to their employees with domestic partners equivalent to those provided to employees with spouses as prescribed by Chapter 5.33.077 of the Code of the City of Portland.

LOCAL CONTRACTING – If the final evaluation scores are otherwise equal, the City prefers goods or services that have been manufactured or produced by a Local Business. The City desires to employ local businesses in the purchase, lease, or sale of any personal property, public improvements, or services. The City wants the residents of the State of Oregon and SW Washington to benefit from optimizing local commerce and services, and the local employment opportunities they generate. [City of Portland Resolution #36260]

CONFLICT OF INTEREST - A Proposer filing a proposal hereby certifies that the proposal is made in good faith without fraud, collusion or connection of any kind with any other Proposer of the same request for proposals, that the Proposer is competing solely on its own behalf without connection or obligation to, any undisclosed person or firm, that Proposer is not a City official/employee or a business with which a City official/employee is associated, and that to the best of its knowledge, Proposer, its employee(s), its officer(s) or its director(s) is not a City official/employee or a relative of any City official/employee who: i) has responsibility in making decisions or ability to influence decision-making on the contract or project to which this proposal pertains; ii) has or will participate in evaluation, award or management of the contract related to this proposal; or iii) has or will have financial benefits in the contract to which this proposal pertains. Proposer understands that should it elect to employ any former City official/employee during the solicitation period or the term of the contract then that the former City official/Consultant employee must comply with applicable government ethics and conflicts of interest provisions in ORS Chapter 244, including but not limited to ORS 244.040(5) and/or ORS 244.047, and the City's Charter, Codes and administrative rules, including but not limited to lobbying prohibitions under Portland City Code Section 2.12.080.

PUBLIC RECORDS – Any information provided to the City pursuant to this QBS-RFP shall be public record and subject to public disclosure pursuant to Oregon public records laws (ORS 192.410 to 192.505). Any portion of a proposal that the proposer claims as exempt from disclosure must meet the requirements of ORS 192.501(2) and ORS 192.502(4) and/or ORS 646.461 et seq. The fact that a proposer marks and segregates certain information as exempt from disclosure does not mean that the information is necessarily exempt. The City will make an independent determination regarding exemptions applicable to information that has been properly marked and redacted. Information that has not been properly marked and redacted may be disclosed in response to a public records request. When exempt information is mixed with nonexempt information, the nonexempt information must be disclosed.

If the City refuses to release the records, the proposer agrees to provide information sufficient to sustain its position to the District Attorney of Multnomah County, who currently considers such appeals. If the District Attorney orders that the records be disclosed, the City will notify the proposer in order for the proposer to take all appropriate legal action. The proposer further agrees to hold harmless, defend, and indemnify the City for all costs, expenses, and attorney fees that may be imposed on the City as a result of appealing any decision regarding the proposer's records.

The Chief Procurement Officer has the authority to waive minor irregularities and discrepancies that will not affect the competitiveness or fairness of the solicitation and selection process.

These Professional, Technical and Expert Services Request for Proposal "General Instructions and Conditions" are not to be construed as exclusive remedies or as a limitation upon rights or remedies that may be or may become available under ORS Chapter 279.

PART I SOLICITATION REQUIREMENTS

SECTION A GENERAL INFORMATION

1. INTRODUCTION

The City of Portland Water Bureau (Water Bureau or PWB) provides high quality drinking water, customer service, and stewardship of the critical infrastructure, fiscal, and natural resources entrusted to its care. The PWB is seeking professionals from qualified consultants or consultant teams to provide professional, technical, and expert services as may be required to replace three (3) spillway gates at Dam No #1 (Dam 1) in the Bull Run Watershed. This contract is anticipated to be awarded in July 2022 and will cover a three to four year period. The design phase is planned to be July 2022 to January 2024. The construction phase is planned for January 2024 to March 2025. Proposers are required to submit a proposal addressing the areas of engineering services and permitting services which would include conceptual design refinement, bid document development (specifications, plans, design, reports for the various phases, cost estimate, etc.), documentation for permit acquisition, hydraulic modeling, and construction services as it relates to Dam 1 Spillway Gates Replacement Project (Project) elements outlined below. There shall be no guarantee that a contract will be awarded if proposals received do not meet PWB's needs.

Attention is called to the State of Oregon requirements for consultants engaged in the public practice of geology, hydrogeology, and engineering to have staff in responsible charge who hold licenses in their respective professions. Work on this Project may require individuals who hold an Oregon registered geologist (RG) or certified engineering geologist (CEG) license and will require individuals completing the engineering analysis and design to hold a current Oregon professional engineers license (PE).

2. BACKGROUND

The primary source of water supply for the City of Portland is the Bull Run watershed, approximately 25 miles east of Portland near Mt. Hood. The 65,000 acre watershed supplies adequate quantities of high-quality surface water. The PWB owns and maintains two dams and associated reservoirs on the Bull Run River that provide the primary means by which watershed runoff is stored for later use. This Project focuses on Dam 1. which is a concrete arc dam constructed in 1924. This dam has a central spillway with three vertical lift gates. The gates are lowered every spring to raise the level of the reservoir.

The spillway at Bull Run Dam No. 1 is controlled by the three steel vertical lift gates that were originally constructed in 1954. The gates are numbered 1 through 3 right to left looking downstream. All gates are 8 feet high by 40 feet wide.

On August 9, 2017, the Federal Energy Regulatory Commission (FERC) performed a dam safety inspection on Dam 1. The inspection noted that "the spillway lift gates and operating mechanisms need to be cleaned of rust and repainted" and shall be completed by November 1, 2023.

As a result of the FERC inspection, the PWB completed an alternatives analysis to determine the most cost-effective way to restore the spillway gates on Dam 1. On December 23, 2020, West Yost Consultants provided a technical memorandum that recommended the gates be replaced with new gates based upon the age, existing condition of the gates, constructability, cost, and schedule.

3. SCOPE OF WORK

The PWB is seeking proposals from individuals, firms, teams, or consultants for the work described below, hereafter called "Proposer(s)" with demonstrated experience in engineering services and environmental permitting services. The engineering services could include general civil, structural, mechanical, geotechnical, electrical engineering, and hydraulic modeling. The permitting services will include coordination with PWB Resource Protection staff, United States Forest Service (USFS), Oregon State Historical Preservation Office (SHPO), and the FERC. PWB proposes to engage the successful Proposer in the following engineering services: conceptual design refinement, bid document preparation (30%, 60%, 90% and Final Design), and

construction support services. The successful Proposer will also influence the conceptual designs based on information gathered regarding needed permits.

The PWB anticipates that the overall Project will be divided into five major work activities:
1) Conceptual design refinement and consensus
2) Construction drawing development and preparation (30%, 60%, 90%, and Final Design)
3) Environmental permitting including the FERC, US Forest Service, and SHPO
4) Selection of Construction Manager / General Contractor (CM/GC) contractor
5) Construction support services

4. PROJECT FUNDING

The Proposer's are required to include in their proposal a true estimated cost to perform the work irrespective of the City's budgeted funds for this work. This Project is estimated at $5,000,000 for design and construction.

5. TIMELINE FOR SELECTION

The following dates are proposed as a timeline for this Project:

Proposal Advertisement	February 22, 2022
Mandatory Pre-submittal meeting on-site at Dam 1	March 3, 2022
Written proposals due at 4:00 p.m.	March 24, 2022
Interviews or additional review, if deemed necessary	April 18-29, 2022
Selection committee recommendation	May 2022
Notice to proceed – work begins	July 1, 2022

The City reserves the right to make adjustments to the above noted schedule as necessary.

SECTION B WORK REQUIREMENTS

1. TECHNICAL OR REQUIRED SERVICES

The successful Proposer will be required to perform the tasks listed below for the Project and be expected to work closely with designated City personnel to accomplish these goals.

Conceptual Design Refinement and Consensus - Basis of Design

Significant preliminary engineering has been completed for this Project. These reports are listed in the "Work by Other" section. The main objectives of this task are to review existing information, identify the outstanding questions/issues, develop a plan to refine and address these issues, prepare an alternative analysis, provide design recommendations, and develop consensus within the stakeholder group for the design direction. The following activities are anticipated during this phase.

1) Review previous studies, reports, inspections, engineering documentation and record information.
2) Identify the global parameters for the gate design.
3) Identify and evaluate permitting requirements. The PWB permitting lead will work with successful Proposer's staff to determine the permitting requirements for this Project and the PWB permitting lead will maintain all communications with the permitting agencies.
4) Develop a list of existing and forthcoming regulatory issues and permits associated with the spillway gates.
5) Coordinate such work with other consulting firms, contractors, interest groups, city, FERC, and other parties interested in or associated with water system activities in the Bull Run Watershed.
6) Perform an alternative analysis on the proposed improvements. Design concepts shall be refined to a level where 10% conceptual plans can be developed. The alternative analysis will consider and study the following issues below when evaluating the proposed improvements.

a) Permits and regulations: Identify which permits are needed for proposed modifications. Successful Proposer's permitting staff, in conjunction with the PWB permitting lead, will influence conceptual designs based on the Project issues. Proposer will work with PWB personnel to prepare a list and schedule for all regulatory permits and documentation that will be required and the anticipated difficulty of getting sign-off.
b) Seismic Analysis: Seismic stability analysis will be a criterion for the spillway gates that meet the FERC requirements.
c) Operation and Maintenance: Identify the operational constraints of the improvements and assess the long-term maintenance viability.
d) Construction Issues: Identify key construction issues that will impact the Project.
e) Construction Sequencing: Develop a construction sequence for all the proposed modifications or improvements based on access to the site, water quality issues, biological and environmental considerations, operating constraints, regulatory requirements, constructability, vulnerability, geotechnical concerns, seismic concerns, physical constraints, cost, permitting issues, etc.
f) Budget and Schedule: Prepare a cost estimate and a schedule for proposed modification.

7) Conduct a workshop with Bureau stakeholders. Workshop outcome is anticipated to describe the alternative analysis, outline design elements, provide recommendations and develop consensus.
8) Technical Memorandum(s): Prepare Technical Memorandum(s) documenting specific design elements or studies. These are anticipated to be relatively short (1-5 pages) memos discussing a specific item or question. It is anticipated that a minimum of 3 will be necessary.
9) Basis of Design Report: Present all the above information in draft and final reports with 10% conceptual level plans of identified modifications or improvements. Include an executive summary, list of design criteria (including assumptions, alternatives evaluated, and methodology used), conclusions and recommendations, outstanding issues, cost estimates, list of research documents, notes from workshop, photographs, meeting minutes, technical memoranda, and all calculations. The successful Proposer will conduct a meeting to present Basis of Design with plans of major design concepts to the stakeholders. The meeting will have the intent of confirming the major design issues for the Project. From the direction given by PWB at the meeting the successful Proposer will proceed with design.

<u>Design Services</u>

The successful Proposer will prepare and acquire the documents necessary for construction, such as bidding documents, plans, special specifications, construction quantities, and estimates. The successful Proposer will also be responsible for completing all the necessary documentation for the appropriate environmental permits, and the PWB will submit the permit packages to the regulatory agencies.

<u>Design expertise and efforts are expected to include the following:</u>

1) Site civil design will include layout, utilities, construction staging plan, drainage, and waterway protection.
2) Concrete restoration to the existing spillway bridge access stairs on the north and south sides along with the walkway decking.
3) Structural Design will include new spillway gates and seismic response evaluations as required by the FERC.
4) All elements of the new gates, lifting equipment, and platform shall be analyzed and assessed for adequacy and function.
5) Determine appropriate water surface elevation to be combined with the seismic load case.
6) Determine an appropriate debris loading magnitude based on debris that may affect all three gates.
7) Calculate seismic accelerations at the gate locations based on a dynamic seismic analysis of the dam rather than the simplified amplification calculations used in the 2021 HDR Inspection report to be provided at Pre-Proposal meeting. A June 15, 2020 Seismic Hazard Analysis by Cornforth Consultants (2020 SHA) is provided as Existing Project Documents, Item d. The 2020 SHA must be updated, and the findings incorporated into the design ofthe proposed replacement gates. This will require updating the 2020 SHA based on comments contained in a Federal Energy Regulatory Commission (FERC) May 19, 2021, letter provided as Exhibit E, updated Pacific Earthquake Engineering Research center (PEER) NGA-Sub models, and the following recommendations.

a. The 2020 SHA indicates the parameters for the Sandy River fault were developed from data contained in the U.S. Geological Survey (USGS) Quaternary Fault and Fold Database and it was assigned a Magnitude (M) 6.5 and M6.8. This discrepancy should be resolved. If there is not enough information available in the open literature, it is recommended that the larger size earthquake be assigned to this fault until further information becomes available.
b. The “R” term was referred to as rupture distance as well as range in the 2020 SHA. Because there are many definitions of distances from the fault to the site, the choice of the single distance that is selected should be clearly explained and must be consistent with the ground motion model used. Consequently, this discrepancy should be reconciled. It is recommended that the definitions regarding seismicity at FERC regulated projects provided in the FERC Guidelines, Chapter 13 - Evaluation of Earthquake Ground Motions, May 30, 2018, be followed. There are several other discrepancies in the 2020 SHA regarding magnitudes and distances that need to be corrected.
c. The 2020 Next Generation Attenuation Subduction Ground Motion Models should be incorporated into the Cascadia Subduction Zone (CSZ) ground motion prediction analyses as these ground motion models (GMM) provide the latest prediction models and are calibrated with larger sets of recorded data.
d. Develop and provide a table with documentation consistent with FERC Guidelines Chapter 13, Table D1.
e. The note provided in Figure 14 indicates the CSZ interface source is assigned a M7.0. This appears to contradict the heading that states the CSZ interface event is assigned a M9.0.
f. Figures 15, 17, 19, 21, and 24 indicate the CSZ interface event is assigned M7.2 which contradicts the M9.0 assigned in the SHA.
g. The magnitude assigned to the crustal faults was reportedly developed using parameters indicated by the USGS Quaternary Fault and Fold Database. In some cases, fault parameters such as length were provided but it appears that no fault length/magnitude relationship was used to develop or verify the magnitude assigned to a particular fault. The Guidelines provide methods for estimating earthquake magnitude considering fault length and recommend they be used to estimate the size of an earthquake assigned to a particular fault. An explanation and discussion should be provided.
h. The Gate Creek fault, which is reportedly part of the Mt Hood fault zone, is assigned a M6.0 to M7.0. Based on information available in the open literature regarding the estimated displacement and dating of last movement, an estimated slip rate of 1.52 millimeters/year was estimated for this fault. Subsequently, based on the estimated date of rupture and calculated slip rate, the Guidelines recommend 84th percentile ground motions would be appropriate for this fault. Considering that this fault is part of the Mt Hood fault zone, this information can be used to estimate the maximum magnitude that can occur within the zone, and the recurrence pertinent to the zone. Look at the impact of the Gate Creek fault on the SHA and either include or discuss why it is not included. The Blue Ridge fault which is part of the Mt. Hood fault zone should be included.
i. The source for the maximum credible earthquake (MCE) should be revised based on the findings contained in the 2020 SHA and the above recommendations. Further, based on information contained in the open literature, the Lacamas Creek fault has changed to be listed as active.

8) Follow the welding recommendations for the welded connections from the 2021 HDR Inspection Report.
9) Appurtenances shall include security, cathodic protection, gate controllers, access ports.
10) Electrical design will include gate controllers, lighting, power, and telemetry to instruments.
11) Controls and SCADA interface will be developed and coordinated with PWB to assure that controls are integrated into the overall system. Consultant will be responsible for assuring that new equipment integrates into the existing PWB system.
12) Cost estimates necessary to provide the industry level estimates at different levels of design completion.
13) Consultant Principal Engineer review. At the 30%, 60%, and 90% completion levels a principal engineer with similar project experience, but not responsible for the Project, shall review the construction documents. Confirmation of these reviews shall be provided with the 60% and 90% construction documents.

A. Contract Documents

The main objective of this phase is to prepare construction documents for the proposed design. The PWB will review and provide review comments to the successful Proposer. The successful Proposer is expected to review and discuss the comments provided in scheduled meetings and incorporate the review applicable comments into the design documents. The construction documents shall be prepared in a manner suitable to meet the City of Portland purchasing requirements. The design process will create the following list of submittals:

1) Basis of Design Report
2) 30% complete drawings, specifications outline
3) 60% complete drawings, specifications, Schedule of Values, construction cost estimates, and design calculations for the 60% FERC permit meeting (i.e. mechanical, electrical, structural, etc.)
4) 90% complete drawings, specifications, Schedule of Values, construction cost estimates, and design calculations for the 90% FERC permit meeting (i.e. mechanical, electrical, structural, etc.)
5) 100% complete drawings, specifications (signature ready documents), final construction cost estimates, and final design calculations (i.e. mechanical, electrical, structural, etc.)
6) Constructability technical memorandum at the 60% design level.
7) QA/QC processes technical memorandums

B. Design Review Meetings

The following reviews will be completed by the successful Proposer for each of the described stages of the design process.

Initial Design – 30% Review– The successful Proposer will submit 30% plans, specifications, and cost estimates. PWB requires a minimum of 3 weeks to review, after which the Consultant will hold a review meeting with Portland Water Bureau stakeholders. The successful Proposer will develop a preliminary helicopter flight path including staging areas for the 30% design submittal. The PWB will be required to conduct an owl survey along this flight path to make sure nesting birds are not impacted by the proposed construction activities.

Intermediate Design - 60% review – The successful Proposer will submit 60% plans, specifications, Schedule of Values, and cost estimates. The PWB requires a minimum of 4 weeks to review, after which the successful Proposer will hold a review meeting with the PWB stakeholders and the FERC. The review meeting will include a pre-construction potential failure mode analysis (PFMA), in accordance with FERC Engineering Guidelines Chapter 14. The majority of the design decisions must be finalized at this time. A tabulated comment log with responses to the 30% comments will beincluded with this review.

Second Intermediate Design - 90% review – The successful Proposer will submit 90% plans, specifications, Schedule of Values, and cost estimate. The successful Proposer will be required to evaluate the CM/GC Guaranteed Maximum Price for completeness, risk allocation, and market conditions. Assist in preparing the document describing the findings. The plans will be in a ready to be stamped and signed completion level. PWB will require a minimum of 4 weeks for the final review. A tabulated comment log with responses to the 60% comments will be included with this review. The FERC will require this submittal for permit review as well.

Final Design – 100% Submittal review – The successful Proposer will submit an unsigned set of 100% plans, specifications, and a cost estimate. PWB will review these documents to assure all applicable comments have been incorporated. Upon PWB approval of the contract documents, the successful Proposer will provide the complete signed set of contract documents (electronically or paper) to the PWB for team signatures. The signed drawings will be submitted to all permitting agencies at this stage for review and final approval. A tabulated comment log with responses to the 90% comments will be included with this review. This final design package will be submitted to the FERC for final permit approval.

PERMITS

A. Permits and Approval

The PWB will be responsible for all communications with the permitting agencies and submitting all

environmental permit applications. These permits could include, but are not limited to, USFS, SHPO and the FERC review. The successful Proposer will be responsible for advising the PWB about needed permits and preparing all applications and supporting documentation for PWB submittal prior to bidding.

By the 60% submittal, the City will apply for all permits that will be required for the Project. The successful Proposer will provide all information including calculations, site plans, and other drawings as requested in this process. The FERC permit process will require a 60% submittal, a 90% submittal, and a final 100% signed plan set submittal.

CM/GC Consultant Support

The main objective of this phase is to obtain competitive bids for the proposed improvements through the CM/GC GMP negotiation process and to review the Guaranteed Maximum Price received from the CM/GC contractor. The successful Proposer will perform the following services during the CM/GC selection support:

1) Attend and assist with negotiation meetings, answer, and document questions, and prepare meeting minutes.
2) Work with PWB to pre-qualify contractors, if necessary.
3) Attend a minimum of three (3) site visits.
4) Respond to the PWB Contractors' and Suppliers' inquiries regarding the drawings and specifications. Issue addenda, as necessary, to clarify or expand the bidding documents.
5) Consult with the PWB concerning the acceptability of substitute materials and equipment proposed by the CM/GC Contractor, if such substitution is allowed by the bidding documents.
6) Support the CM/GC selection process.
7) Evaluate proposals and make recommendations on how well they match the construction documents.

Construction Support Services

The successful Proposer will be required to perform the following services during the Construction Phase:

1) Attend the pre-construction conference and prepare written responses for questions posed.
2) Provide technical assistance to the PWB representative as needed to clarify the design intent and recommendations.
3) Make periodic site visits when requested by the PWB to observe, as an experienced and qualified design professional, the progress and quality of the various aspects of the contractor's work. Provide written reports to the PWB representative on observations.
4) Issue necessary interpretations and clarifications of the contract documents and prepare field orders and change orders as required.
5) Review shop drawings and other data submitted, as outlined in the contract documents.
6) Evaluate and determine the acceptability of substitute materials and equipment proposed.
7) Review operating and maintenance instructions, schedules, warranties, bonds, certificates of inspection, test and approvals which are to be assembled by the contractor in accordance with the contract documents and transmit them to the PWB with written comments.
8) Conduct an inspection to determine if the work is substantially complete and prepare a punch list of items to be completed, as requested by the PWB Representative.
9) Be available as necessary for consultation to resolve conflicts and provide interpretations.
10) Special Inspections will be performed by the City Bureau of Materials Testing Lab.
11) Provide assistance in preparation of responses to claims by the Contractor as requested by the PWB representative.
12) Complete a review and provide comments on the final Operations and Maintenance Manual for the spillway gates and associated equipment provided by the Contractor

Assistance during Commissioning – The successful Proposer may be requested to provide assistance during commissioning to ensure that the Project is fully operational and meets PWB's operating standards. This is anticipated to include the commissioning of gates and testing. The successful Proposer needs to include a separate line item with the project budget estimate to account for these services.

The successful Proposer must include Sustainable Procurement best practices as they apply to the Project. For information about, or assistance with, including sustainability in the technical requirements, deliverables, or evaluation criteria, please visit the Sustainable Procurement Program website at: https://www.portlandoregon.gov/brfs/37732.]

2. WORK PERFORMED BY THE CITY / OTHERS

The PWB has assigned a project manager and an environmental permitting task manager to oversee the successful Proposer's work and provide support as needed. Specific duties the PWB will perform include:

- Provide the selected Proposer access to pertinent water facilities in the Bull Run Watershed that may assist the consultant with required work.
- Attend site visits with the consultant as applicable.
- Provide a location for and facilitate workshops throughout the Project timeline.
- Review documents prepared by Consultant and route to PWB project stakeholders.
- Assist consultant with general City documentation requirements.
- Assist in obtaining environmental permits

The PWB will provide the successful Proposer with the following materials:

- As-built plans for the existing Dam 1 spillway gates.
- Electronic copies of past analysis, reports, and dam inspections relating to the existing Dam 1 spillway gates.
    - MWH Bull Run Dam 1 Outlet Works Preliminary Engineering Report – November 2003
    - West Yost Spillway Gates Inspection Report – December 2020
    - HDR Dam 1 Spillway Inspection Report -January 2021
- Existing control data for survey work previously performed in the vicinity of the Dam 1.
- Existing operation and maintenance plan for the Dam 1 outlet works.
- Latest probable maximum flood elevation analysis information for Dam 1.
- Latest seismic stability analysis information of Bull Run Dam 1

3. PROJECT REVIEWS

The progress of the work will be managed by the successful Proposer's Design Project Manager and the PWB Project Manager in collaboration with the PWB Program Manager. The successful Proposer will be expected and required to provide assistance in managing the review of deliverables from the construction contractor as part of Project progress. In order to provide timely resolution of conflicts, the Project also has an Executive Committee to provide oversight made up of senior PWB management members. The successful Proposer will be required to support the City personnel with information, data, and presentations as required during committee meetings or as needed in similar venues.

4. DELIVERABLES AND SCHEDULE

Deliverables shall be considered those tangible resulting work products that are to be delivered to the City such as reports, draft documents, data, interim findings, drawings, schematics, training, meeting presentations, final drawings, and reports. Unless otherwise specified by the City, the successful Proposer shall prioritize submitting applicable deliverables electronically, and any paper-based deliverables shall be printed double-sided and in bindings or report covers that are fully recyclable, preferably using materials containing post-consumer waste (PCW) recycled content.

Deliverables and schedule for this Project include:

<u>Project Management</u>

1) Monthly summary reports highlighting work progress during the previous month and listing unresolved outstanding issues. One copy of each monthly report should be submitted to PWB's design manager.

Progress reports need to be broken down by task and should compare percentage complete with percentage of budget spent.
2) Copies of subconsultant contracts.
3) Copies of the Project management plan, the Project communication plan, and the quality control/quality assurance plan.
4) Prepare the minutes for all meetings that occur throughout the Project.
5) Schedule updates must occur at the noted Project milestones:
    - Completion of the Basis of Design Report.
    - 30% design review submittal
    - 60% design review submittal
    - 90% design review submittal
    - 100% design review submittal
6) Submit monthly subconsultant payment and utilization reporting electronically by the 15th of each month with invoice (reference Part II, Section C.5 of the QBS-RFP).

Basis of Design Report

Draft and Final Basis of Design Reports:

Report must contain information noted in Basis of Design Refinement, Section i. Submission of 15 copies of the draft and final basis of design engineering reports will be required. The reports will be required to be written in Microsoft Word and provided on a CD-ROM. Conceptual plans must be ½ size (11" x17" black line) format, with one copy in electronic format on CD-ROM. Consultant to include Basis of Design Cost Estimate.

Design

The successful Proposer will perform the Design and Construction activities, and the following deliverables will be anticipated.

1) 30% Design Submittal: Submit 2 copies of full size (22" x 34" black line) format drawings, specifications, unit price construction cost estimates and an Engineer's narrative detailing progress and process, design assumptions, calculations, design criteria, unresolved issues and listing next steps. Also, include 15 copies in ½ size (11" x 17" black line) format. The successful Proposer to include 30% Cost Estimate.
2) 60% Design Submittal: Submit 2 copies of full size (22" x 34" black line) format drawings, specifications, unit price construction cost estimates and an Engineer's narrative detailing progress and process, design assumptions, calculations, design criteria, unresolved issues and listing next steps. Also, include 15 copies in ½ size (11" x 17" black line) format. 60% design must show all major components with at least 60% of details. The successful Proposer to include 60% Engineering Cost Estimate.
3) 90% Design Submittal: Submittal must include all the above (as shown in 60% Design Submittal). Submittal must also include a draft Operation and Maintenance Manual for the spillway gates and associated equipment. Consultant to include 90% Engineering Cost Estimate.
4) Stakeholder Review Comments: Table outlining comments made by stakeholder during review of the document packages and actions taken to address the issues. A table must be prepared after the 60% and 90% reviews are complete.
5) 100% Design Submittal: Submittal must include one set of sealed and signed, camera ready, final construction documents; such documents must include technical specifications on bond paper along with full and ½ size format drawings on Mylar. All drawings prepared by the successful Proposer will be turned over to the City on CD-ROM conforming to PWB standards, using MicroStation. This is in addition to the record drawings required at the close of the Project. Specifications and construction documents must be written in Microsoft Word and turned over on a CD.

-CM/GC Procurement Process

1) Prepare a final construction cost estimate prior to GMP negotiations.
2) Prepare a memorandum describing how well the CM/GC proposals match the RFP.
3) Prepare memorandum describing the how well the GMP addresses market conditions, risk allocation, completeness, comparison to estimate and description of the differences.

Construction

1) Prepare meeting minutes for pre-construction meeting. Minutes shall be prepared in Microsoft Word.

2) Prepare reports when site visits are made outlining progress and quality of construction work. Reports will be prepared in Microsoft Word.
3) Conduct an inspection to determine if the work is substantially complete and prepare a punch list of items to be completed. Conduct a final inspection to determine if the completed work is acceptable for final payment. Work with PWB to get as-constructed drawings from the PWB Contractor. Give written notice to the PWB and the PWB Contractor that the work is acceptable.
4) Submit complete final Operations and Maintenance Manual for the spillway gates and associated equipment.

SCHEDULE

The City anticipates on having the successful Proposer begin work in July 2022. The anticipated timeline for Project milestones in calendar days is as follows:

Notice to proceed	July 2022
Conceptual Design/Basis of Design	October 2022
30% Design	January 2023
60% Design	March 2023
90% Design	June 2023
100% Design	August 2023
Permitting of final plans	January 2024
GMP Negotiation	March 2024
Start of construction	August 2024
End of construction	March 2025

The schedule for completion of Conceptual Design work is based on the “Notice to Proceed” from PWB. Proposals containing earlier completion of the consultant’s works are acceptable and encouraged.

All deliverables and resulting work products from this contract will become the property of the City of Portland. As such, the successful Proposer and any of their subconsultants grant the City the right to copy and distribute (in any and all media and formats) Project deliverables for regulatory, Project certification/recognition, program development, public education, and/or for any purposes at the sole discretion of the City of Portland.

5. PLACE OF PERFORMANCE

Contract performance will take place primarily at the successful Proposer’s facility. On occasion and as appropriate, work will be performed at City facilities, a third-party location, or any combination thereof.

6. PERIOD OF PERFORMANCE

The City anticipates having the successful Proposer begin work immediately upon contract execution. Submittal of Final 100% design deliverables to the City would occur no later than August 2023 and substantial completion of construction phase not later than March 2025. Some design phasing or earlier work packages may be needed in advance of these dates to accommodate potentially lengthy permitting timelines.

7. ACH PAYMENTS

It is the City’s policy to pay its vendor invoices via electronic funds transfers through the automated clearing house (ACH) network. To initiate payment of invoices, vendors shall execute the City’s standard ACH Vendor Payment Authorization Agreement which is available on the City’s website at: https://www.portlandoregon.gov/brfs/45475. Upon verification of the data provided, the Payment Authorization Agreement will authorize the City to deposit payment for services rendered directly into vendor accounts with financial institutions. All payments shall be in United States currency.

8. PUBLIC SAFETY

Public safety may require limiting access to public work sites, public facilities, and public offices, sometimes without advance notice. The Proposer shall anticipate delays in such places and include the cost of delay in the proposed cost. The successful Proposer’s employees and agents shall carry sufficient identification to show by whom they are employed and display it upon request to security personnel. City project managers

have discretion to require the successful Proposer's employees and agents to be escorted to and from any public office, facility, or work site if national or local security appears to require it.

9. BUSINESS COMPLIANCE

The successful Proposer(s) must be in compliance with the laws regarding conducting business in the City of Portland before an award may be made. The Proposer shall be responsible for the following:

Certification as an Equal Employment Opportunity (EEO) Affirmative Action Employer
The successful Proposer(s) must be certified as Equal Employment Opportunity Employers as prescribed by Chapter 5.33.076 of the Code of the City of Portland prior to contract award. To certify go to the website at: https://procure.portlandoregon.gov.

Non-Discrimination in Employee Benefits (EB)
The successful Proposer(s) must be in compliance with the City's Equal Benefits Program as prescribed by Chapter 5.33.077 of the Code of the City of Portland prior to contract award. To certify go to the website at: https://procure.portlandoregon.gov.

Business Tax Registration
The successful Proposer(s) must be in compliance with the City of Portland Business Tax registration requirements as prescribed by Chapter 7.02 of the Code of the City of Portland prior to contract award. Details of compliance requirements are available from the Revenue Bureau Tax Division, 111 SW Columbia Street, Suite 600, Portland, Oregon 97201, (503) 823-5157, website: http://www.portlandoregon.gov/revenue/29320.

10. COVID-19 REQUIREMENTS

The City of Portland has a responsibility to use all the tools available to protect both community and employee health and safety during the pandemic to ensure the continued provision of core services to those who live and work in Portland. One of those tools is to require vaccinations for those that interact with City of Portland employees, and the public, at City facilities.

Any resulting Contract may be executed and performed during the COVID-19 pandemic. While Oregon is under a declaration of emergency associated with the COVID-19 pandemic, successful Proposer shall comply with all applicable requirements and guidance issued by federal, state and local authorities pertaining to COVID-19 (including but not limited to CDC, OHSA, Governor Brown, Oregon Health Authority, and Multnomah County Health Department). The applicable guidance and requirements include, but are not limited to, those pertaining to Oregon phased reopening and sector activities, reduction in gathering sizes appropriate to the type of location and activity, complying and implementing health protocols, maintaining social distancing, and wearing face coverings. Successful Proposer shall have a satisfactory safety plan and protocols addressing COVID-19 precautions related to successful Proposer's activities under the resulting Contract. Successful Proposer shall monitor for updated guidance and requirements and update its plan and protocols accordingly. Successful Proposer shall provide a copy of successful Proposer's safety plan and protocols to City upon City's request. Successful Proposer is solely responsible for implementing a COVID safety plan and protocols and addressing any COVID-19 related claims pertaining to its activities and provision of services under a resulting Contract. In the event that a successful Proposer's employees or its subconsultant's/subcontractor's employees exhibit symptoms of COVID infection, successful Proposer shall follow City's contact tracing and response protocols available at (TBD).

The City of Portland COVID-19 Vaccination Policy requires, as of January 3, 2022, that successful Proposer's employees be vaccinated or have an approved exception through their employer when work is performed inside a City worksite for longer than 15 minutes.

Between November 8, 2021 and January 3, 2022, all successful Proposer's employees who are inside City worksites for longer than 15 minutes are required to wear an enhanced filtration face covering regardless of vaccination status, such as a KN95 or N95 mask.

All vendors, consultants, and contractors awarded contracts need to complete attestation questions related to the requirement in their BuySpeed vendor profile by January 3, 2022. The questions document

if a vendor, consultant, or contractor has workers subject to this requirement; and if so, that all workers subject to this requirement after January 3, 2022 are fully vaccinated or have a medical or religious exception verified by the vendor, consultant, or contractor vendors, consultants, and contractors with active contracts who do not complete the questions by January 3, 2022 at a minimum may be denied access to City facilities.

If you need technical assistance in completing the Attestation Questions in BuySpeed, please contact Buyspeedvendorhelp@portlandoregon.gov.

The Policy requirements and Frequently Asked Questions can be found at:
https://www.portland.gov/omf/brfs/procurement/vendor-vaccine-requirement
https://www.portland.gov/sites/default/files/2021/vccvg-vaccination-requirement.pdf

11. INSURANCE
The successful Proposer(s) shall obtain and maintain in full force, and at its own expense, throughout the duration of the contract and any warranty or extension periods, the required insurances identified below. The City reserves the right to require additional insurance coverage as required by statutory or legal changes to the maximum liability that may be imposed on Oregon cities during the term of the contract. Successful Proposer shall be able to provide evidence that any or all subconsultants performing work or providing goods or services under the contract have the same types and amounts of insurance coverage as required herein or that the subconsultant is included under the Successful Proposers policy.

Workers' Compensation Insurance: Successful Proposer shall comply with the workers' compensation law, ORS Chapter 656 and as it may be amended. Unless exempt under ORS Chapter 656, The Successful Proposer and any/all subconsultants shall maintain coverage for all subject workers for the entire term of the contract including any contract extensions.

Commercial General Liability Insurance: Successful Proposer shall have Commercial General Liability (CGL) insurance covering bodily injury, personal injury, property damage, including coverage for independent successful Proposer's protection (required if any work will be subcontracted), premises/operations, contractual liability, products and completed operations, in per occurrence limit of not less than $1,000,000, and aggregate limit of not less than $2,000,000.

Automobile Liability Insurance: Successful Proposer shall have automobile liability insurance with coverage of not less than $1,000,000 each accident, and an umbrella or excess liability coverage of $2,000,000. The insurance shall include coverage for any auto or all owned, scheduled, hired and non-owned auto. This coverage may be combined with the commercial general liability insurance policy.

Professional Liability & Errors & Omissions Insurance: Successful Proposer shall have Professional Liability and/or Errors & Omissions insurance to cover damages caused by negligent acts, errors or omissions related to the professional services, and performance of duties and responsibilities of the Successful Proposer under this contract in an amount with a combined single limit of not less than $1,000,000 per occurrence and aggregate of $3,000,000 for all claims per occurrence. In lieu of an occurrence based policy, Successful Proposer may have claims-made policy in an amount not less than $1,000,000 per claim and $3,000,000 annual aggregate, if the Successful Proposer obtains an extended reporting period or tail coverage for not less than three (3) years following the termination or expiration of the Contract.

Additional Insurance: Any insurance required by Federal Law or State Statute or City Code; such as Bailees Insurance, Maritime Coverage, or other coverage(s).

Additional Insured Endorsement: The liability insurance coverage, except Professional Liability, Errors and Omissions, or Workers' Compensation, shall be without prejudice to coverage otherwise existing, and shall name the City of Portland and its bureaus/divisions, officers, agents and employees as Additional Insureds, with respect to the Successful Proposer's activities to be performed, or products or services to be provided. Coverage shall be primary and non-contributory with any other insurance and self-insurance. Notwithstanding the naming of additional insureds, the insurance shall protect each additional insured in the same manner as though a separate policy had been issued to each, but nothing herein shall operate to increase the insurer's

liability as set forth elsewhere in the policy beyond the amount or amounts for which the insurer would have been liable if only one person or interest had been named as insured.

Continuous Coverage & Notice of Cancellation: The Successful Proposer agrees to maintain continuous, uninterrupted coverage for the duration of the Contract. There shall be no termination, cancellation, material change, potential exhaustion of aggregate limits, or non-renewal of coverage without thirty (30) days written notice from Successful Proposer to the City. If the insurance is canceled or terminated prior to completion of the Contract, Successful Proposer shall immediately notify the City and provide a new policy with the same terms. Any failure to comply with this clause shall constitute a material breach of Contract and shall be grounds for immediate termination of this Contract.

Certificate(s) of Insurance: Successful Proposer shall provide proof of insurance through acceptable certificate(s) of insurance and additional insured endorsement forms(s) to the City prior to the award of the Contract if required by the procurement documents (e.g., request for proposal), or at execution of Contract and prior to any commencement of work or delivery of goods or services under the Contract. The Certificate(s) will specify all of the parties who are endorsed on the policy as Additional Insureds (or Loss Payees). The insurance coverage required under this Contract shall be obtained from insurance companies acceptable to the City of Portland. The Successful Proposer shall pay for all deductibles and premium. The City reserves the right to require, at any time, complete, certified copies of required insurance policies, including endorsements evidencing the coverage required.

SECTION C PROJECT PROVISIONS

1. SAMPLE CONTRACT

The Professional, Technical, and Expert Services Contract is the City's standard contract and will be used as a result of this selection process. Attachment B

2. PROJECT DATA

The following documents are available to all Proposers until the final mandatory submission date of this RFP. **The documents will be in PDF format on a jump drive and will only be distributed at the MANDATORY pre-submittal meeting**.

A. Draft Project Schedule
B. Existing Project Documents:
    a. MWH Bull Run Dam 1 Outlet Works Preliminary Engineering Report – November 2003
    b. West Yost Spillway Gates Inspection Report – December 2020
    c. HDR Dam 1 Spillway Inspection Report -January 2021
    d. 2020 Seismic Hazard Analysis by Cornforth Consultants (2020 SHA)

The Proposer's designated representative obtaining a copy of the above documents will be required to sign and submit the **Confidentiality Statement, attached as Exhibit D, in order to release the copy**. The signed Confidentiality Statement must be submitted to the PWB's Project Manager, Kevin Larson. Under no circumstances will the jump drive be distributed without a potential Proposer first signing a confidentiality form. All jump drive's must be returned to PWB by the proposal due date whether a Proposer is submitting a bid or not. Jump drives must be returned by mail to Kevin Larson at the following address:

Mailing and Physical Address
Portland Water Bureau
Attn: Kevin Larson
1120 SW 5th Avenue, Suite 450
Portland, OR 97204

3. ATTACHMENTS

Exhibit A PTE Participation Disclosure Form 1
Exhibit B Sample Contract
Exhibit C Federal Energy Regulatory Commission (FERC) Letter

Exhibit D Confidentiality Statement

PART II PROPOSAL PREPARATION AND SUBMITTAL

SECTION A PRE-SUBMITTAL MEETING/CLARIFICATION

1. PRE-SUBMITTAL MEETING

A **mandatory** pre-submittal meeting and/or site visit is scheduled for this Request for Proposal on March 3, 2022 at 1:00 pm at Sandy River Station, 10975 SE Lusted Road, Sandy Oregon 97055

This is a **mandatory** meeting; therefore all Proposers are required to attend if they intend to submit a proposal. Proposals received from Proposers who do not attend will not be considered and will be returned to the Proposers. **Proposers wishing to attend the mandatory pre-bid must RSVP with Kevin Larson at: kevin.larson@portlandoregon.gov**

2. QBS-RFP CLARIFICATION

Questions and requests for clarification regarding this Request for Proposal must be directed in writing via email to the person listed below. **The deadline for submitting such questions/clarifications is seven (7) days prior to the proposal due date**. An addendum will be issued no later than 72 hours prior to the proposal due date to all recorded holders of the QBS-RFP if a substantive clarification is in order.

Jin Huang
E-mail: jin.huang@portlandoregon.gov

Phone: (503) 823-5371

SECTION B PROPOSAL SUBMISSION

1. PROPOSALS DUE

Proposals must be received no later than the date and time specified on the cover of this solicitation. It is the Proposer's responsibility to ensure that proposals are received prior to the specified closing date and time. Proposals received after the specified closing date and/or time shall not be considered and will be returned to the Proposer unopened. The City shall not be responsible for the proper identification and handling of any proposals submitted incorrectly.

2. PROPOSAL

Proposals must be clear, succinct and not exceed forty (40) pages. **Proposal pages must be formatted for 8-1/2" x 11" with a minimum font size of eleven (11), however, spreadsheets, pictures, diagrams and organization charts may be placed on 11" x 17" sheets and will be considered one page each in the overall page count.** Section dividers, title page, table of contents, cover letter, resumes (individual resumes must not exceed two (2) pages), sample project status reporting, proposed cost information and the PTE Participation Disclosure Form 1 do not count in the overall page count of the proposal. Proposers who submit more than the pages indicated will not have the additional pages of the proposal read or considered.

All submittals will be evaluated on the completeness and quality of the content. Only those Proposers providing complete information as required will be considered for evaluation. The ability to follow these instructions demonstrates attention to detail.

3. PROPOSAL SUBMISSION

For purposes of this proposal submission, the Proposer shall submit: **one (1) original copy of their proposal and all separately attached documents and responses in PDF, or MS Word format** through the City's Online Procurement Center (BuySpeed) at:

https://procure.portlandoregon.gov/

a. Online proposal submission procedure

Disclaimer: The following instructions are provided as a guideline to Proposers submitting proposals online through BuySpeed. These instructions are advice only and the City does not warrant that following these instructions will guarantee that a Proposer's proposal is submitted correctly. Proposers bear complete and total responsibility for ensuring their proposal is properly submitted and received on time.

Instructions:

1. If you haven't already, register or complete the registration process in BuySpeed.
2. Log in to BuySpeed, go to the "Bids" tab.
3. Find the "Bid" (RFPs and all Solicitations and Notices in BuySpeed are called "Bids") your firm wishes to propose on. See the "Open Bids" section.
4. Click the "Create Quote" link. (All proposals and bids are considered "Quotes" in BuySpeed)
5. Click Yes or No depending on if you want to be on the Bidder's List.
6. In the "General" Tab, click "Save & Continue" (You will see a validation Error, this is normal, and will be corrected later)
7. Go to the "Items" tab, **enter in a value of 1.00 dollar in the pricing box of the first line item. Make sure that "No Bid" box is unchecked for each line items**. **Do not enter any pricing or other data in the other item boxes, only enter 1.00 dollar in the first line item in the items tab.**
8. Click "Save & Continue"
9. Skip the "Questions", "Subcontractors", and "Notes" tabs
10. Go to the "Terms and Conditions" Tab. Check "Yes".
11. Click "Save & Continue"
12. Go to the "Attachments" tab. Click "Add File".
13. In the Add File screen click "Browse". Find the file you wish to attach and upload it to our system. **If your Proposal is confidential or contains confidential information check the "Confidential" box.**
14. Click "Save & Exit".
15. Repeat steps 12-14 to upload any additional documents
16. Go to the "Summary" tab. Review the summary information.
17. Click "Submit Quote", confirm submission by clicking "OK" when prompted.

The entire proposal must be attached and properly submitted through the City's Online Procurement Center **before** the time and date specified on the cover page of this RFP. Proposers are advised to allow extra time prior to the closing date and time to create a "Quote" and upload their proposal documents into BuySpeed.

b. Confidential Information: additional "redacted copy" of proposal required

If the Proposer requests redactions to their proposal in accordance with the language below, the Proposer shall also submit one (1) additional "non-confidential" copy of the proposal in unprotected MS Word format with the requested redactions. If no redactions are requested in a proposal, please state that clearly in the Cover Letter.

REDACTION FOR PUBLIC RECORDS: Any portion of a proposal that the proposer claims as exempt from disclosure must meet the requirements of ORS 192.501(2), ORS 192.502(4) and/or ORS 646.461 et seq. **Proposers are required to submit a redacted copy of their proposal and all attachments.** "Redaction" means the careful editing of a document to obscure confidential references; a revised or edited document thereby obscuring the exempt information but otherwise leaving the formatted document fully intact. **The redacted copy must be a complete copy of the submitted proposal, in which all information the Proposer deems to be exempt from public disclosure has been identified.**

When preparing a redaction of your proposal submission, a proposer must plainly mark the redactions by obscuring the specific areas your firm asserts are exempt from public disclosure. In addition, a summary page identifying the pages where redactions occur shall be included with the proposal submission (summary is not included in page limitations. **If a proposer fails to submit a redacted copy of their proposal as required,**

the City may release the proposer's original proposal without redaction. If the entire proposal is marked as constituting a "trade secret" or being "confidential", at the City's sole discretion, such a proposal may be rejected as non-responsive.

Unless expressly provided otherwise in this QBS-RFP or in a separate written communication, the City does not agree to withhold from public disclosure any information submitted in confidence by a proposer unless the information is otherwise exempt under Oregon law. The City agrees not to disclose proposals until the City has completed its evaluation of all proposals and publicly announces the results.

Please refer to the GENERAL INSTRUCTIONS AND CONDITIONS for more information about confidential information within public records.

4. PROPOSED COST INFORMATION

Proposers will submit, as a separate electronic file, one copy of the Proposer's proposed costs to complete services. The cost information requested WILL NOT be used as part of the evaluation process but is requested solely to enable a prompt beginning to the contract negotiation process. Information must be provided in Microsoft Word and/or Excel format and include the following:

1) **Billing Rate information.** Billing rate information must include the name, classification and hourly billing rate for each employee that may be used under the contract (including subconsultants).

2) **Cost Proposal Table**. The successful Proposer will provide a cost table that reflects the personnel classifications and types as well as the proposed hours to complete each Task (including subconsultants); and any reimbursable(s).

After the Notice of Intent to Negotiate and Award has been issued, Proposed Cost Information from the successful Proposer(s) will be opened and reviewed by the City. Proposed Cost Information from all unsuccessful Proposers will be returned at this time, unopened

The City has authorized an annual Cost of Living or Inflation adjustment to the proposed rates that may not exceed 2%, with no increases available in the first year of the contract. **The time at which rates increase shall be indicated on the schedule and budget detail provided by Proposers.**

Additional information. The main points with regard to budget management for the contract are: The overall contract will reflect a not-to exceed agreement amount.

Any changes to the contract shall be submitted in writing as a request to the City by the successful Proposer(s). All changes will require written approval through a formal amendment to the contract and must include the City's approving authority's signature(s) and the successful Proposer's approving authority's signature prior to any change.

Compensation for the successful Proposer's subconsultants will be limited to the same restrictions imposed on the successful Proposer. The maximum markup on subconsultant services will not exceed 5% for the total term of the contract.

Reimbursable(s). Proposers are required to include a separate reimbursable line item in their cost proposal, this includes any travel allowances required. There will be no increases to any reimbursable(s) during the term of the contract. The following are reimbursable to the successful Proposer at their cost (i.e. without markup): travel beyond a 100-mile radius of Portland when specifically required by the contract (which may also specify limits on travel costs and per diem charges), document reproduction costs, mileage costs directly attributable to the work, and approved reimbursable direct costs. Proposers are required to include any and all travel in their estimates, including any beyond a 100-mile radius of Portland and indicate why this travel would be necessary.

Payments. Compensation to the successful Proposer will be based on invoices, electronic monthly utilization reports and monthly progress reports completed for work and submitted to the City, which will document completion of task/subtask and provide detailed documentation of work task activity by the successful Proposer

(including subconsultants). The successful Proposer will be required to follow Generally Accepted Accounting Principles (GAAP). Personal expenditures or expenditures not related to the contract are not eligible for reimbursement.

5. COST OF RESPONDING

All costs incurred by the Proposer in preparation of proposals to this solicitation, including presentations to the City and/or for participation in an interview shall be borne solely by the Proposer; the City shall not be liable for any of these costs. At no time will the City provide reimbursement for submission of a proposal unless so stated herein.

6. ORGANIZATION OF PROPOSAL

Proposers must provide all information as requested in this Request for Proposal (QBS-RFP). Proposals must follow the format outlined in this QBS-RFP. Additional materials in other formats or pages beyond the stated page limit(s) may not be considered. The City may reject as non-responsive, at its sole discretion, any proposal or any part thereof, which is incomplete, inadequate in its response, or departs in any substantive way from the required format. Proposals shall be organized in the following manner:

1. Cover Letter
2. Project Team
3. Proposer's Capabilities
4. Project Approach and Understanding
5. Corporate Responsibility
6. Supporting Information
7. A completed PTE Participation Disclosure Form 1 (refer to Part II.C.5)

SECTION C EVALUATION CRITERIA

1. COVER LETTER

By Submitting a proposal, the Proposer is accepting the General Instructions and Conditions of this Request for Proposal (reference second page of the QBS-RFP), the stated insurance coverage and limitations, and the Standard Contract Provisions of the Professional, Technical, and Expert Services contract. Any exceptions to the requirements or requests for waivers MUST be included in the proposal Cover Letter or they will not be considered.

- The Cover Letter must include the following:
- QBS-RFP number and Project title
- Full legal name of proposing business entity
- Structure or type of business entity
- Name(s) of the person(s) authorized to represent the Proposer in any negotiations
- Name(s) of the person(s) authorized to sign any contract that may result
- Contact person's name, mailing or street addresses, phone and fax numbers and email address
- Statement that no redactions are requested, if applicable

A legal representative of the Proposer, authorized to bind the Proposer in contractual matters must sign the Cover Letter.

If your firm has a current City of Portland Business Tax registration, has completed the City's Equal Employment Opportunity (EEO) and Equal Benefits (EB) certifications online, include in the Cover Letter your firm's City of Portland Business Tax number and a statement that your firm's EEO and Equal Benefits certifications are complete.

2. PROJECT TEAM

Proposals must include and describe the project team, the team's capabilities, and how the team's qualifications and experience relate to this specific project. Proposers will introduce their Project Team including the project principal, project manager, key staff, and subconsultant staff. Proposers must have team

members that have collective expertise in dam facilities, hydraulics and modeling, cathodic protection systems, geologic hazards and geotechnical engineering, seismic design, cost estimating, construction staging, security features, water quality, project management, and other support services.

Please provide the following:

- Approximate number of people to be assigned to the Project.
- Extent of company's principal member's involvement.
- Names of key personnel who will be performing the work on this Project, and:
  - their roles and responsibilities on this Project
  - current assignments, location and expected duration
  - directly relevant experience on similar or related projects and their roles (e.g., design engineer, project manager, task manager)
  - unique qualifications
  - demonstrated performance record of key personnel
  - percentage of their time that will be devoted to this Project over the life of the Project

  Provide a professional resume for each key personnel, including key personnel of any Subconsultant(s) proposed to be assigned to the Project. Resumes shall include educational background, professional development, and demonstrate that the individual(s) meets the qualification and experience requirements for performing the work outlined in this QBS RFP.

- Proposals must identify a proposed project manager who would be responsible for the day-to-day management of Project tasks and would be the primary point of contact with your team. Describe the project manager's experience with similar projects and with managing and leading interdisciplinary teams. List other projects the proposed project manager is currently assigned to.
- Key team member qualifications and experience on similar or related projects:
  - Qualifications and relevant experience of key team members (prime consultant & sub-consultants if any) This should include previous experience working with other proposed team members (if any), and other information that would be helpful in characterizing the key personnel's contributions to a team environment.
  - Describe directly relevant experience on similar or related projects, of key personnel who will be performing the work on this Project. This should include area of expertise and years of experience in relevant roles, and other information that would be helpful in demonstrating depth of knowledge.

3. PROPOSER'S CAPABILITIES

The Proposer will describe their firm-wide capabilities. This section of the proposal will provide a basis for judging how well the Proposer's qualifications and experience relate to this Project. Please provide information on the following:

- Describe your firm's legal structure, areas of expertise, length of time in business, number of employees, and other information that would be helpful in characterizing the firm. Provide the same information for any subconsultants to be utilized on the Project.
- Provide the address of the firm's home office and the address of the office that will manage the Project, if applicable.
- Describe similar projects performed within the last fifteen (15) years, which best characterize firm's capabilities, key personnel's capabilities, work quality, cost control, and access to sufficient resources to successfully complete the Project on schedule.
- For each project mentioned, include the name, address and phone number of a person who can be contacted regarding your performance on the project. When submitting projects for which your firm worked in an auxiliary capacity or in a joint venture or partnership, include the name of the lead firm.
- Describe similar projects with other government agencies.
- Describe firm's resources available to perform the work for the duration of the project and other on-going projects.
- Describe how the firm works to ensure robust, long-term team commitment with low turnover.

- Describe firm's internal procedures and/or policies associated or related to work quality and cost control.
- Describe firm's management and organizational capabilities.
- Describe or provide a detailed description of firm's approach to overall management and integration of all activities required by the scope of work, including the management objectives and techniques that demonstrate how the work requirements will be met.
- Include organizational charts and a statement regarding lines of authority and responsibility.
- Describe steps the Proposer will take to respond promptly to changes to the scope and other challenges to ensure the PWB's Project schedule is met.

4. PROJECT APPROACH AND UNDERSTANDING

The Proposer's approach and understanding of the Project are important aspects of the RFP process. The Proposers must provide a clear and concise understanding of the Project by describing and clarifying any major issues based upon Project information provided in this RFP, including attachment materials identified in Part I, Section C.

For each phase of work, the Project approach should:

- Summarize your firm's overall solution to this Project.
- Describe the proposed work tasks and activities and provide a narrative description of how the firm proposes to execute the tasks during each phase of the Project.
- Describe the methods your firm will utilize to assess the seismic, landslide, and other potential hazard loading to the spillway gates, and how your firm plans on proving the spillway gate design that can resistant this hazard loading.
- Identify the team members who will work on each task, their roles, and responsibilities.
- Identify the time frame estimated to complete each task.
- Describe the proposed work products that will result from each task or activity.
- Identify points of input and review with City staff.
- Based on your firm's expertise and experience with similar projects, demonstrate how your firm will effectively complete the proposed Project in the time frames outlined.
- Describe how your firm will proactively respond to Project or staffing challenges before they put the schedule at risk, including demonstrating depth of experienced project management and design staff available to support the Project.
- Describe your firm's approach to ensuring consistent performance over a long duration project.

5. CORPORATE RESPONSIBILITY

Through the adoption of The Portland Plan, the Social Equity Contracting Strategy and Sustainable Procurement Policy, the Portland City Council has shown its commitment to contracting with socially and environmentally responsible businesses. The City values and supports diversity and is dedicated to advancing equity in public contracting by increasing opportunities for Oregon State certified Disadvantaged Business, Minority Owned, Women Owned, and Emerging Small Business enterprises (D/M/W/ESB).

The Social Equity Contracting Strategy promotes D/M/W/ESB economic growth and encourages partnering and mentoring between large and small D/M/W/ESB firms on City PTE contracts. Therefore, the City has established an overall aspirational goal of 20% in awarding PTE subconsultant contracts to State of Oregon certified D/M/W/ESB firms. Proposing firms are encouraged to use the State's Certification Office for Business Inclusion and Diversity (COBID) website (https://oregon4biz.diversitysoftware.com/FrontEnd/VendorSearchPublic.asp) for identifying potential D/M/W/ESB subconsultants.

All Proposers shall address the following in their proposals:

a. State of Oregon Certification

- Please indicate in your Cover Letter whether your firm is currently certified in the State of Oregon as a DBE, MBE, WBE, or ESB.

b. Disadvantaged, Minority, Women and Emerging Small Business Subcontracting

- A PTE Participation Disclosure Statement (Form 1) is a required submission for this Project. Please include in the Form all scopes of work being performed, the estimated percentage of the total contract amount, the firm name, and the State D/M/W/ESB certification of the firm performing the work.
- Points will be awarded based on estimated percentages of work listed which will be given to State certified D/M/W/ESB subconsultants. The listed percentages will be converted to dollar amounts during contract negotiations and those amounts along with the specific firms must flow through to the final contract.
- Meeting the aspirational goal of 20% will be awarded 50% of the available points for this criteria. Additional points will be awarded based on a mathematical calculation for utilization exceeding the goal or deducted based on the same formula for utilization not meeting the goal.
- DMWESB Subcontracting Evaluation Formula example:
  Utilization % ÷ 40% x 8 points = the Score
  Example: if the Utilization % = 20%, then the Score would be: (20% ÷ 40% x 8 points) = 4 points
  Note - Proposed Utilization % includes D/M/W/ESB utilization at only the Subconsultant level.

***Note: Failure to submit Form 1 with your proposal may result in the proposal being found non-responsive and may be rejected.**

c. Workforce Diversity and Community Involvement

- Describe your firm's workforce demographics and any measurable steps taken to ensure a diverse internal workforce (e.g., women and people of color).
- How do you approach internal on the job training, mentoring, technical training, and/or professional development opportunities for women and people of color?
- Describe your firm's employee compensation structure, (e.g., living wages, healthcare coverage, employee leaves, dependent care, etc.).
- Describe your firm's commitment to community service, (e.g., charitable programs, scholarships, economic development, etc.)

d. Sustainable Business Practices

- List the top three actions/ongoing practices your firm has implemented to reduce the environmental impacts of your operations (e.g., energy efficiency, use of recycled content or non-toxic products, use of public transit or alternative fuel vehicles, waste prevention and recycling, water conservation, green building practices, etc.). Reference implementation dates, timelines, and any performance metrics that characterize your achievements.
- Does your firm hold any third-party certifications related to sustainable business operations (e.g. Sustainability at Work, B-Corp certification, etc.)? If so, reference the name of the certification, a link to the certification requirements and who administers the certification.

The City expects thoughtful consideration of all of the above Corporate Responsibility criteria in the preparation of proposals. The City will enforce all D/M/W/ESB commitments submitted by the successful Proposer. The successful Proposer will be required to submit subconsultant payment and utilization information electronically to ensure that subconsultants are utilized to the extent proposed and submitted in the original proposal. The successful Proposer and their subconsultants will be required to utilize the City's automated compliance audit process for prime contractors and subcontractors. More information on this process may be viewed on the City Procurement website at: https://www.portlandoregon.gov/brfs/75932. The successful Proposer will not be permitted at any time to substitute, delete, or add a subconsultant without the prior written approval of the Chief Procurement Officer. This form may be obtained from the Procurement Services website at: https://www.portlandoregon.gov/brfs/article/536319.

6. SUPPORTING INFORMATION

Supporting material must include a minimum of **5** project references and may include other information pertinent to the project or work to be performed. References must include the contact person's name, agency, address, phone number, their role in the project (e.g., project manager, etc.), name of the project, and when the work was done.

Resumes: Provide a professional resume for each key person, including key personnel of any Subconsultant(s) proposed to be assigned to the Project. Resumes must include educational background, professional development, and demonstrate that the individual(s) meets the qualification and experience requirements for performing the work as outlined in this QBS-RFP.

PART III PROPOSAL EVALUATION

SECTION A PROPOSAL REVIEW AND SELECTION

1. EVALUATION CRITERIA

An Evaluation Committee (Committee) will be appointed to evaluate the proposals received. For the purpose of scoring proposals, each Committee member will evaluate each proposal in accordance with the criteria listed in Part II, Section C. The Committee may seek the assistance of outside expertise, including, but not limited to, technical advisors. The Committee will require a minimum of ten (10) working days to evaluate and score the proposals

The choice of how to proceed, decisions to begin or terminate negotiations, determination of a reasonable time, decisions to open negotiations with a lower scoring Proposer, and any decision that a solicitation should be cancelled are all within the sole discretion of the City.

The proposal evaluation process consists of a series of Evaluation Levels that will lead to the identification of a Successful Proposer. Each proposal response will be evaluated in accordance with the following evaluation criteria:

Evaluation Level #1 – Written Scoring: Responses meeting the mandatory and responsiveness requirements will be further evaluated as part of Evaluation Level #1. One hundred possible points are available at Level #1. This step consists of a detailed review and scoring by the Committee of the proposals as follows:

Level #1 Evaluation Criteria		
Criteria	**Maximum Level #1 Score**	**Point Distribution by Subsection**
1. Cover Letter		REQUIRED
2. Project Team	25	
3. Proposer's Capabilities	25	
4. Project Approach	27	
5. Corporate Responsibility	23	
State of Oregon Certification		4
DMWESB Subcontracting		11
Workforce Diversity & Community Involvement		3
Sustainable Business Practices		5
Total:	**100**	

Evaluation Level #2 – Interview Scoring: If oral interviews or presentations are determined to be necessary, this next step will consist of oral presentations to further clarify the Proposer's proposal(s). The number of proposals on the "short list" depends on whether the Committee believes such proposals have a reasonable chance of scoring well enough to be awarded a contract. Proposers invited to participate in Evaluation Level #2 (oral interviews) will be given additional information regarding the City's desired content a reasonable time

before the scheduled Evaluation Level #2 oral interviews/presentations are held. The scoring of the Level #2 will be as follows:

Level #2 Evaluation Criteria	
Criteria	**Maximum Level #2 Score**
Oral Interview	100

All communications shall be through the contact(s) referenced in Part II, Section A.2 of the QBS-RFP. At the City's sole discretion, communications with members of the evaluation committee, other City staff, or elected City officials for the purpose of unfairly influencing the outcome of this QBS-RFP may be cause for the Proposer's proposal to be rejected and disqualified from further consideration.

The City has the right to reject any or all proposals for good cause in the public interest, and the Chief Procurement Officer may waive any evaluation irregularities that have no material effect on upholding a fair and impartial evaluation and selection process.

NOTE: In the City's discretion, litigation between the City and a Proposer may be cause for proposal rejection, regardless of when that litigation comes to the City's attention and regardless how the Proposer's proposal may have been scored. Proposals may also be rejected if they use subconsultants or subconsultants who are involved in litigation with the City. Proposers who are concerned about possible rejection on this basis should contact the City before submission of a proposal for a preliminary determination of whether its proposal will be rejected.

2. SCORING PROCESS

For Evaluation Level #1, the sum of all points earned by a Proposer from all proposal evaluators will be the Overall Score for Level #1. The Evaluation Committee may choose to focus on only a limited number of proposals by developing a "short list" to move on to Evaluation Level #2 based on the scores from the written proposals. Or they may choose to proceed directly to contract negotiation and award.

If Proposers move to Evaluation Level #2, then the proposal scores from Level #1 will not be used during the oral interview/presentation process and they will be scored based on the Level #2 criteria alone. Following completion of the Evaluation Level #2 scoring, each Proposer's Evaluation Level #2 score will be added to their Evaluation Level #1 score to determine their Total Overall Score. The highest scoring proposal(s), based on their Total Overall Score, may be identified as the Successful Proposer(s).

3. CLARIFYING PROPOSAL DURING EVALUATION

At any point during the evaluation process, the City is permitted, but is not required, to seek clarification of a proposal. However, a request for clarification does not permit changes to a proposal.

SECTION B CONTRACT AWARD

1. CONSULTANT SELECTION

Following the Evaluation Committee's final determination of the highest scored Proposer, the City will issue a Notice of Intent to Negotiate and Award and begin contract negotiations. The City will attempt to reach a final agreement with the highest scoring Proposer. However, the City may, in its sole discretion, terminate negotiations and reject the proposal if it appears agreement cannot be reached. The City may then attempt to reach a final agreement with the second highest scoring Proposer and may continue on, in the same manner, with remaining proposers until an agreement is reached. A Consultant selection process will be carried out under Portland City Code Chapter 5.68.

The selection of the Successful Proposer shall be based on negotiated costs and conformance to the City's terms and conditions. Negotiations will follow with the Successful Proposer, and if successful, the consultant and City will enter into a service contract for the work. If agreement concerning the negotiated costs, schedule, and scope of work cannot be reached with the Successful Proposer within a time period deemed reasonable to

the City, the City may, at its sole discretion, terminate such negotiations and begin negotiations with the next highest scored proposer from the Short List.

2. CONTRACT DEVELOPMENT

The proposal and all responses provided by the successful Proposer may become a part of the final contract. Any information included as part of this contract shall be a public record and not exempt from disclosure, including items redacted from the proposal. The form of contract shall be the City's Contract for PTE Services.

For contracts over $500,000, the evaluation committee's recommendation for contract award will be submitted to the Portland City Council for approval.

3. REVIEW AND PROTESTS

REVIEW: Following the Notice of Intent to Negotiate and Award, the public may view proposal documents. However, any proprietary information so designated by the Proposer as a trade secret or confidential and meeting the requirements of ORS 192.501, 192.502 and/or ORS 646.461 et seq., will not be disclosed unless the Multnomah County District Attorney determines that disclosure is required. At this time, Proposers not awarded the contract may seek additional clarification or debriefing, request time to review the selection procedures or discuss the scoring methods utilized by the evaluation committee.

PROTESTS: Proposers who are eliminated at any stage of the evaluation process will be notified of their elimination. At that time, Proposers who wish to protest their elimination shall file a protest within seven (7) calendar days of the notice. Protests may be submitted to the Chief Procurement Officer for this formal solicitation only from those Proposers who would receive the contract if their protest was successful.

Protests must be in writing and received by the Chief Procurement Officer within seven (7) calendar days, unless otherwise noted, following the date the City's Notice of Intent to Negotiate and Award or Notice to Short List was issued. The protest must specifically state the reason for the protest and show how its proposal or the successful proposal was mis-scored, or show how the selection process deviated from that described in the solicitation document. No contract will be awarded until the protest has been resolved.

Protests must be timely and must include all legal and factual information regarding the protest, and a statement of the form of relief requested. Protests received later than specified or from other than the Proposer who would receive the contract if the protest was successful will not be considered. The exercise of judgment used by the evaluators in scoring the written proposals and interviews, including the use of outside expertise, is not grounds for appeal.

The Chief Procurement Officer may waive any procedural irregularities that had no material effect on the selection of the proposed consultant, invalidate the proposed award, amend the award decision, request the evaluation committee re-evaluate any proposal or require the Bureau to cancel the solicitation, and begin again to solicit new proposals. In the event the matter is returned to the evaluation committee, the Chief Procurement Officer shall issue a notice canceling the Notice of Intent to Negotiate and Award.

Decisions of the Chief Procurement Officer are final and conclude the administrative appeals process.

4. KICK-OFF MEETING

If requested by the City, the successful Proposer shall begin work by attending an orientation meeting to take place within 7 days following execution of the contract. The successful Proposer shall then develop and maintain a comprehensive schedule for all elements of the Project.

Exhibit A
CITY OF PORTLAND
PROFESSIONAL TECHNICAL & EXPERT (PTE) SERVICES
PARTICIPATION DISCLOSURE FORM 1

CITY PTE DISCLOSURE REQUIREMENTS

The City's disclosure program was adopted to document the utilization of State of Oregon certified Disadvantaged, Minority, Women and Emerging Small Businesses (D/M/W/ESBs) on City projects. This QBS Request for Proposal (RFP) requires submission by the Proposer of the PTE Participation Disclosure Form 1. The Proposer must disclose the following information:

1) Contact information and Employer Identification Number (EIN or FED ID#) for all contract participants
2) State of Oregon D/M/W/ESB designation
   (Verify current certification status with the Office of Disadvantaged, Minority, Women, and Emerging Small Business.
3) The percentage of proposed scope or category of work that the Proposer will be performing.
4) The percentage of proposed scope or category of work that any subconsultants will be performing
5) Percentage of total contract amount allocated to Oregon certified D/M/W/ESB subconsultants.

The use of 'TBD', 'N/A', or similar symbols is not acceptable. All requested information must be provided.

If the Proposer will not be using any subconsultants, the Proposer is still required to enter its own information in the appropriate section and to indicate **"NONE"** in the subconsultant section of the accompanying form and submit the form with its proposal.

FAILURE TO SUBMIT THE PTE PARTICIPATION DISCLOSURE FORM 1 WITH THE PROPOSAL MAY RESULT IN THE PROPOSAL BEING FOUND NON-RESPONSIVE AND REJECTED FROM CONSIDERATION.

CITY OF PORTLAND
PTE PARTICIPATION DISCLOSURE FORM 1

This QBS Request for Proposals (RFP) requires the Proposer to submit this PTE Participation Disclosure Form 1. **Failure to submit this form with the proposal may result in the proposal being found non-responsive and rejected.** Proposers must disclose the following information:

Please print all information clearly.

Project Name:_____ **RFP Number:** _____

Proposer Name:_____ **Proposer's EIN #:** _____

Contact Name:_____ **Phone:**_____ **Email:** _____

Proposers Total Percentage:_____**%**

Percentage of total contract amount allocated to State of Oregon certified D/M/W/ESB participation (*Subconsultants* only):	**%**

SUBCONSULTANT INFORMATION (please print)[1]	**D/M/W/ESB Cert.[2]**	**Subconsultant Scope/Type of Work**	**Subcontract %**
Firm Legal Name: Email: Phone #: **EIN #[4]:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			

NOTE:

1. If the Proposer will not be using any Subconsultants, the Proposer is required to indicate "NONE" in the Subconsultant Information section of this form and submit this form with their proposal.
2. The Proposer and ALL Subconsultants must be listed on this form. Leave D/M/W/ESB column blank if firm is not currently certified through the State of Oregon Office of Disadvantaged, Minority, Women, and Emerging Small Business: https://oregon4biz.diversitysoftware.com/FrontEnd/VendorSearchPublic.asp.
3. Using 'TBD', 'N/A', or similar acronyms is not acceptable.
4. Do not enter Social Security Numbers (SSN) on this form.

SUBCONSULTANT INFORMATION (please print)	D/M/W/ESB Cert.	Subconsultant Scope/Type of Work	Subcontract %
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
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Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			
Firm Legal Name: Email: Phone #: **EIN #:**			

RFP 00001826 EXHIBIT B
SAMPLE DESIGN SERVICES CONTRACT

CITY OF PORTLAND

CONTRACT NUMBER _____

Dam 1 Spillway Gates Replacement Project

As authorized by [Ordinance _____ and] Portland City Code 5.68.035, this Design Services Contract ("Contract") is entered into by and between the City of Portland ("City," or "Bureau") and _____, ("Consultant").

Effective Date and Term
This Contract shall commence on the Effective Date, _____[INSERT EFFECTIVE DATE] and shall continue in full force and effect until [INSERT END DATE] or such other date on the Contract is terminated or extended pursuant to the terms of this Contract ("Term").

Consideration

(a) City agrees to pay Consultant a sum not to exceed _____ Dollars ($_____) to complete the work in accordance with the Statement of Work (SOW), attached hereto as Exhibit A.

(b) Payments shall be made in accordance with the Compensation section, attached hereto as Exhibit B.

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CONSULTANT DATA AND CERTIFICATION

Name (print full legal name): _____
Address: _____

Business Designation (check one):
☐ Individual ☐ Sole Proprietorship ☐ Partnership ☐ Corporation
☐ Limited Liability Co (LLC) ☐ Public Service Corp. ☐ Government/Nonprofit

Payment information will be reported to the IRS under the name provided above. Information must be provided prior to contract approval.

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TERMS AND CONDITIONS

1) Standard of Care
In providing services under this Contract, the Consultant shall exercise that degree of skill and care ordinarily used by other reputable members of Consultant's profession, practicing in the same or similar locality and under similar circumstances (the "Standard of Care").

2) Effect of Expiration
Expiration of the Term shall not extinguish, prejudice, or limit either party's right to enforce this Contract with respect to any default or uncorrected defect in performance.

3) Order of Precedence
This Contract consists of these Terms and Conditions, the SOW, all Exhibits, and the City's RFP and Consultant's Proposal. Any apparent or alleged conflict between these items will be resolved by using the following order of precedence:
(a) Amendments executed by the parties after Contract award;
(b) This form Contract as executed by the Parties, including all Exhibits;
(c) RFP Requirements as set forth in City's RFP, including without limitations all Exhibits and any Addenda; and
(d) Consultant's Proposal in response to the RFP, including without limitation, to all supplementary materials.

4) Early Termination of Contract
(a) The City may terminate this Contract for convenience at any time for any reason deemed appropriate in its sole discretion. Termination shall be effective immediately upon City's delivery of a written notice of termination to Consultant.

(b) Either party may terminate this Contract in the event of a material breach by the other party that is not timely cured. Before termination is permitted, the party seeking termination shall give the other party written notice of the nature of the alleged breach, its intent to terminate, and provide fifteen (15) calendar days within which to cure the breach. If the breach is not cured within 15 days, the party seeking termination may terminate immediately by giving written notice that the Contract is terminated.

5) Remedies and Payment on Early Termination

(a) If the City terminates pursuant to 4(a) above, the City shall pay the Consultant for work performed in accordance with the Contract prior to the date of the termination notice. No other costs or loss of anticipated profits shall be due or payable.

(b) If the City terminates pursuant to 4(b) above, the City is entitled all remedies available at law or equity. In addition, Consultant shall pay the City for the costs to defend any claim, and all damages, costs, and sums incurred by the City as a result of the breach.

(c) If the Consultant terminates the Contract pursuant to subsection 4(b), the Consultant's sole remedy shall be payment for work completed prior to date of City's receipt of the termination notice. No other costs, loss of anticipated profits or consequential damages shall be paid.

(d) If the City's termination under Section 4(b) was wrongful, the termination shall be automatically converted to one for convenience and the Consultant shall be paid as if the Contract was terminated under Section 4(a).

(e) In the event of early termination, the Consultant's work product completed prior to the date of termination shall be deemed the property of the City and copies and/or data shall be immediately released to the City.

6) Assignment

Consultant shall not subcontract, assign, or transfer any of the work scheduled under this agreement without the prior written consent of the City. Notwithstanding City consent, the Consultant shall remain responsible for full performance hereunder. The Consultant agrees that if subcontractor(s) are employed in the performance of the SOW under this Contract, both Consultant and any subcontractors remain subject to the requirements of ORS Chapter 656, Workers' Compensation.

7) Compliance with Applicable Laws; Funding Requirements

Consultant shall perform all services in accordance with all applicable federal, state, and local laws and regulations, including without limitations tax laws and terms and conditions incident to receipt of any grant funds. Consultant represents and warrants that it is and will remain in compliance with all laws and expressly represents that it is and shall remain in compliance with Title VI of the Civil Rights Act of 1964 and its corresponding regulations during the Term of this Contract.

8) Respectful Workplace Behavior

The City is committed to a respectful work environment, free of harassment, discrimination and retaliation and other inappropriate conduct. Every individual has a right to work in a professional atmosphere where all individuals are treated with respect and dignity. The City's HR Rule 2.02 covers all employees of the City as well as consultants, vendors or contractors who provide services to the City. Consultant warrants its compliance with the terms and conditions of HR 2.02 as further described at: https://www.portlandoregon.gov/citycode/27929.

9) Indemnification for Property Damage and Personal Injury

Consultant shall indemnify, defend, and hold harmless the City, its officers, agents, and employees, from all claims, losses, damages, and costs (including reasonable attorney fees) for personal injury and property damage arising out of the intentional or negligent acts or omissions of the Consultant, its Subconsultants, suppliers, employees or agents in the performance of its services. Nothing in this paragraph requires the Consultant or its insurer to indemnify the City for claims of personal injury or property damage caused by the sole negligence or misconduct of the City. This duty shall survive the expiration or termination of this Contract or final payment hereunder.

The indemnity obligations of Consultant under this Contract will not in any way be affected or limited by the absence of insurance coverage or by the failure or refusal of any insurance carrier to perform any obligation under insurance policies affecting this Contract.

Consultant's indemnity obligations are in addition to any other rights or remedies available under this Contract, or in law or in equity to the City. In the event of any claim or demand made against any party entitled to indemnification hereunder, the City may in its sole discretion reserve, retain or apply any monies due to the Consultant under the Contract to resolve such claims; provided, however, that the City may release such funds if the Consultant provides the City with adequate assurance of the protection of the City's interests. The City shall determine in its sole discretion of the adequacy of such assurances.

10) Insurance

Consultant shall obtain and maintain in full force at Consultant's sole cost and expense, throughout the Term and any warranty or extension periods, the required insurance identified below. The City reserves the right to require additional insurance coverage as required by statutory or legal changes to the maximum liability that may be imposed on Oregon cities during the term of the Contract.

(a) Workers' compensation insurance as required by ORS Chapter 656 and as it may be amended. Unless exempt under ORS Chapter 656, the Consultant and all Subconsultants shall maintain applicable coverage for all subject workers.

☒ Required and attached // ☐ Certified statement of exemption (i.e., completion of Independent Contractor Certification Statement or similar)

(b) General commercial liability (CGL) insurance covering bodily injury, personal injury, property damage, including coverage for independent Consultant's protection (required if any work will be subcontracted), premises/operations, contractual liability, products and completed operations, in per occurrence limit of not less than $1,000,000, and aggregate limit of not less than $2,000,000.

☒ Required and attached // ☐ Waived by Bureau Director or designee // ☐ Reduce by Bureau Director or designee

(c) Automobile liability insurance with coverage of not less than $1,000,000 each accident, and an umbrella or excess liability coverage of $2,000,000. The insurance shall include coverage for any auto or all owned, scheduled, hired and non-owned auto. This coverage may be combined with the commercial general liability insurance policy.

☒ Required and attached // ☐ Waived by Bureau Director or designee // ☐ Reduce by Bureau Director or designee

(d) Professional Liability and/or Errors & Omissions insurance to cover damages caused by negligent acts, errors or omissions related to the professional services, and performance of duties and responsibilities of the Consultant under this Contract in an amount with a combined single limit of not less than $1,000,000 per occurrence and aggregate of $3,000,000 for all claims per occurrence. In lieu of an occurrence-based policy, Consultant may have claims-made policy in an amount not less than $1,000,000 per claim and $3,000,000 annual aggregate, if the Consultant obtains an extended reporting period or tail coverage for not less than three (3) years following the termination or expiration of the Contract.

☒ Required and attached // ☐ Waived by Bureau Director or designee // ☐ Reduce by Bureau Director or designee

Continuous Coverage; Notice of Cancellation: The Consultant agrees to maintain continuous, uninterrupted coverage for the duration of the Contract. There shall be no termination, cancellation, material change, potential exhaustion of aggregate limits or non-renewal of coverage without thirty (30) days written notice from Consultant to the City. If the insurance is canceled or terminated prior to completion of the Contract, Consultant shall immediately notify the City and provide a new policy with the same terms. Any failure to comply with this clause shall constitute a material breach of Contract and shall be grounds for immediate termination of this Contract.

Additional Insured: The liability insurance coverages, except Professional Liability, Errors and Omissions, or Workers' Compensation, shall be without prejudice to coverage otherwise existing, and shall name the City of Portland and its bureaus/divisions, officers, agents and employees as Additional Insureds, with respect to the Consultant's activities to be performed, or products or services to be provided. Coverage shall be primary and non-contributory with any other insurance and self-insurance. Notwithstanding the naming of additional insureds, the insurance shall protect each additional insured in the same manner as though a separate policy had been issued to each, but nothing herein shall operate to increase the insurer's liability as set forth elsewhere in the policy beyond the amount or amounts for which the insurer would have been liable if only one person or interest had been named as insured.

Certificate(s) of Insurance: Consultant shall provide proof of insurance through acceptable certificate(s) of insurance, including additional insured endorsement form(s) and all other relevant endorsements, to the City prior to the award of the Contract if required by the procurement documents (e.g., request for proposal), or at execution of Contract and prior to any commencement of work or delivery of goods or services under the Contract. The Certificate(s) will specify all of the parties who are endorsed on the policy as Additional Insureds (or Loss Payees). Insurance coverages required under this Contract shall be obtained from insurance companies acceptable to the City of Portland. The Consultant shall pay for all deductibles and premium. The City reserves the right to require, at any time, complete, certified copies of required insurance policies, including endorsements evidencing the coverage the required.

Subconsultant(s): Consultant shall contractually require its Subconsultants to acquire and maintain in effect until full performance of their Work under this Contract, insurance equal to the minimum coverage limits required above.

11) Ownership of Work Product

All work product produced by the Consultant under this Contract is the exclusive property of the City upon payment in full to Consultant as set forth in this Contract. "Work Product" includes, but is not limited to research, reports, computer programs, manuals, drawings, recordings, photographs, artwork and any data or information in any form. The Consultant and the City intend that such Work Product shall be deemed "work made for hire" of which the City shall be deemed the author. If for any reason a Work Product is deemed not to be a "work made for hire," the Consultant hereby irrevocably assigns and transfers to the City all right, title and interest in such work product, whether arising from copyright, patent, trademark, trade secret, or any other state or federal intellectual property law or doctrines. Consultant shall obtain such interests and execute all documents necessary to fully vest such rights in the City. Consultant waives all rights relating to work product, including any rights arising under 17 USC 106A, or any other rights of authorship, identification or approval, restriction or limitation on use or subsequent modifications. If the Consultant is an architect, the Work Product is the property of the Consultant-Architect, and by execution of

this Contract, the Consultant-Architect grants the City an exclusive and irrevocable license to use that Work Product. City's alteration of Consultant's Work Product or its use by City for any other purpose shall be at City's sole risk.

Notwithstanding the above, all pre-existing trademarks, services marks, patents, copyrights, trade secrets, and other proprietary rights of Consultant are and will remain the exclusive property of Consultant.

12) Business Tax Registration
The Consultant shall obtain a City of Portland business tax registration number as required by Portland City Code ("PCC") 7.02 prior to beginning work under this Contract.

13) Successors in Interest
The provisions of this Contract shall be binding upon and shall inure to the benefit of the parties hereto, and their respective successors and approved assigns.

14) Severability
The parties agree that if any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular term or provision held to be invalid.

15) Waiver
The failure of the City to enforce any provision of this Contract shall not constitute a waiver by the City of that or any other provision.

16) Errors
The Consultant shall, without cost to the City, promptly correct errors or omissions related to the services required by this Contract.

17) Governing Law/Venue
The provisions of this Contract shall be interpreted, construed and enforced in accordance with, and governed by, the laws of the State of Oregon without reference to its conflict of laws provisions that might otherwise require the application of the law of any other jurisdiction. Any action or suits involving any question arising under this Contract must be brought in the appropriate court in Multnomah County, Oregon.

18) Amendments; Minor Amendments
Any changes to the provisions of this Contract's dollar amount, must be made by written amendment and approved by the Chief Procurement Officer or City Council to be valid. Any other changes to the provisions of this Contract, including changes to the scope of work, key personnel, Subconsultants or other changes, must be made by written amendment and approved as pursuant to PCC 5.68 and the PTE Manual.

(a) Amendment of the Contract. Any material change(s) to the provisions of this Contract shall be in the form of an Amendment. A "material change" means a change that increases risk to the City, or that increases the cost of the Contract to exceed the Contract Price. Amendments must be in writing, must be approved as to form by the City Attorney, and must be executed in writing by authorized representatives of the Parties. Any proposed material amendment to this Contract that does not meet the requirements of this section will be deemed null, void, invalid, non-binding, and of no legal force or effect. "Material Amendment" does not mean a Minor Amendment as described in (b) below and does not mean an administrative change which the City may effect unilaterally. An administrative change means a written Contract change that does not affect the substantive rights of the Parties.
(b) Minor Amendments to Contract or Change Orders to a Statement of Work. The City and Consultant may make minor changes that do or do not impact the substantive rights or obligations of the Parties but that are not material amendments. Minor Amendments shall be made through the use of a Change Order that modifies a Statement of Work or Task Order. Following mutual approval of the Change Order, the parties will update the SOW to reflect changes to the description of services and any resulting changes to the timeframe of deliverables.

19) Prohibited Conduct
The Consultant shall not hire any City employee who evaluated the proposals or authorized the award of this Contract for two years after the date the Contract was authorized without the express written permission of the City and provided the hiring is permitted by state law.

20) Payment to Vendors and Subconsultants
The Consultant shall timely pay all Subconsultants and suppliers providing services or goods for this Contract. If the Consultant fails to make timely payments to its Subcontractors, Subconsultants, or suppliers, the City is entitled to take any action permitted by law, including, but not limited to, the following:
(a) Withhold all or part of any progress payment until Consultant makes payment;
(b) Find that the Consultant is not a qualified bidder for future projects per the City's consideration of the Consultant's record of past performance pursuant to ORS 279C.110(3);

(c) Directly make payment to the Subcontractor, Subconsultant, and supplier who has not received proper payment; and
(d) Terminate the Contract for and Event of Default as provided herein.

21) Access to Records and Audits

(a) The Consultant and its subconsultants and suppliers shall maintain all fiscal records relating to the Contract in accordance with generally accepted accounting principles. The Consultant and its subconsultants shall maintain all other records necessary to clearly document their performance of the work and any claims for additional compensation or requests for additional contract time arising from or relating to their performance under the Contract.
(b) The Consultant shall include in its subcontracts, purchase orders and all other written agreements a provision requiring all subconsultants, material suppliers, providers of rented operated equipment and persons submitting cost or pricing data according to the term of a contract, at all tiers, to comply with this section.
(c) The City and its authorized representatives shall have timely access to, and an opportunity to inspect, examine, copy and audit all books and records relating to the Contract, for any reason, upon reasonable notice.
    i) Such books and records shall be maintained by the Consultant and all subconsultants, suppliers and persons with cost or pricing data for a minimum period of six (6) years from the date of Final Payment under the Contract, or until the conclusion of any audit, controversy, litigation, dispute or claim arising out of, or related to, the Contract, whichever is longer.
    ii) The Consultant and all subconsultants, suppliers, and persons with cost or pricing data shall maintain all records in such a manner that providing a complete copy is neither unreasonably time consuming nor unreasonably burdensome for the Consultant or the City. Failure to maintain the records in this manner shall not be an excuse for not providing the records.
    iii) The Consultant and all subconsultants, suppliers, and persons with cost or pricing data shall produce all such books and records in Portland, Oregon, regardless of whether the records are produced pursuant to this provision of the Contract or as a result of a claim, litigation, arbitration or other proceeding. The Consultant or a subconsultant, supplier, or other person may produce the books and records elsewhere if it fully compensates the City for the reasonable costs of travel to and from the place where the records are produced and the reasonable cost of any employee's time in having to travel.
(d) If an audit discloses that payments to the Consultant were in excess of the amount to which the Consultant was entitled, the Consultant shall repay the amount of the excess to the City. Under no circumstances will the payment of previous invoices constitute an acceptance of the charges associated with those invoices.

22) Electronic Signatures

The City and Consultant may conduct this transaction, including any Contract amendments, by electronic means, including through the use of electronic signatures.

23) Merger Clause

This Contract, and the Contract Documents identified at Section 3 above shall be deemed to encompass the entire agreement of the parties and supersede all previous understandings and agreements between the parties, whether verbal or written.

24) Dispute Resolution/Work Regardless of Disputes

The parties shall participate in mediation to resolve disputes before conducting litigation. The mediation shall occur at a reasonable time after the conclusion of the Contract with a mediator jointly selected by the parties. For any claim or dispute that is subject to mediation under this section, the statute of limitations and statute of repose shall not begin to run until the time period set forth in Section 30 below or upon the conclusion of mediation, whichever is later. Notwithstanding any dispute under this Contract, the Consultant shall continue to perform its work pending resolution of a dispute, and the City shall make payments as required by the Contract for undisputed portions of the work. In the event of litigation, no attorney fees are recoverable. No different dispute resolution paragraph(s) in this Contract or any attachment hereto shall supersede or take precedence over this provision.

25) Progress Reports: /☒/ Applicable /☐/ Not Applicable

If applicable, the Consultant shall provide monthly progress reports to the Project Manager as described in the Statement of the Work and Payment Schedule.

26) Consultant's Key Personnel: /☒/ Applicable /☐/ Not Applicable

If applicable, the Consultant shall assign the Key Personnel listed in the Statement of the Work and Payment Schedule for the work required by the Contract and shall not change Key Personnel without the prior written consent of the City, which shall not be unreasonably withheld. Notwithstanding anything to the contrary herein, Consultant shall, within 30 (thirty) days of receipt a request from the City replace any Key Person who is not meeting City performance requirements.
The Consultant agrees that the primary personnel assigned to perform the services shall be listed in in the Statement of Work and Consultant shall not change such personnel without the prior written consent of the authorized representative of the City as designated in the SOW. The City will enforce all social equity contracting for Disadvantaged, Minority, Women, Emerging Small Business and Service-Disabled Veteran Business Enterprise (D/M/W/ESB/SDVBE) Subconsultant commitments submitted by the Consultant in its proposals. Failure to use the identified D/M/W/ESB/SDVBE Subconsultants without prior written consent is a material breach of contract.

27) Third Party Beneficiaries
There are no third-party beneficiaries to this Contract. Enforcement of this Contract is reserved to the parties.

28) Conflict of Interest
Consultant hereby certifies that, if applicable, its Contract proposal was made in good faith without fraud, collusion or connection of any kind with any other proposer of the same request for proposals or other City procurement solicitation(s), and that the Consultant as a proposer competed solely on its own behalf and without connection or obligation to any undisclosed person or firm. Consultant certifies that it is not a City official/employee or a business with which a City official/employee is associated, and that to the best of its knowledge, Consultant, its employee(s), its officer(s) or its director(s) are not City officials/employees or a relative of any City official/employee who:

(a) has responsibility in making decisions or ability to influence decision-making on the Contract or project to which this Contract pertains;
(b) has or will participate in evaluation or management of the Contract; or
(c) has or will have financial benefits in the Contract.

Consultant understands that should it elect to employ any former City official/employee during the term of the Contract then that the former City official/Consultant employee must comply with applicable government ethics and conflicts of interest provisions in ORS Chapter 244, including but not limited to ORS 244.040(5) and ORS 244.047, and the City's Charter, Codes and administrative rules, including lobbying prohibitions under Portland City Code Section 2.12.080.

29) Contractual Statute of Limitations/Statute of Repose for Design Services Claims
The statute of limitations applicable to Design Services provided pursuant to this Contract shall be 2 years from the date of final completion of the project. The statute of repose applicable to Design Services provided pursuant to this Contract shall be 10 years from Final Completion of the project. The statute of limitations and statute of repose set forth herein shall not begin to run until the project reaches Final Completion, regardless of discovery of any condition, act, error, or omission. This provision shall be included in any Subconsultant agreement executed by the Consultant for the performance of services.

30) Notices and Communications
All notices and other communications concerning this Contract shall bear the Contract number assigned by the City. Notices and other communications may be delivered personally, by facsimile, email, by regular, certified or registered mail or other commercial delivery service. A notice to the City will be effective only if it is delivered to that person designated in writing in either:

(a) the Notice of Award of this Contract,
(b) the Notice to Proceed under this Contract, or
(c) to another individual specifically designated by this Contract.

A notice to the Consultant shall be effective if it is delivered to the individual who signed this Contract on behalf of Consultant at the address shown with that signature, to a corporate officer if Consultant is a corporation, to a general partner if Consultant is a partnership, or to another individual designated in writing by the Consultant in the Contract or in a written notice to the City.

31) Safety
Consultant shall ensure that all Work is performed in a safe manner protective of workers and the environment. Accordingly, Consultant shall maintain in place a safety plan that provides for compliance with all safety laws and regulations in effect during the Term. **Consultant shall bear the cost of compliance with its safety plan. The City agrees to increase Consultant's compensation only in the event of a change of law that directly and actually results in an increase in Consultant's costs of compliance with the new law. The City reserves the right but not the obligation to issue a "halt work" order in the event of a potential life safety risk as determined at the City's discretion.**

32) Access to Facilities
Consultant agrees that Consultant's physical or remote access to City facilities shall be subject to the security interests and health controls necessary to protect public property, City employees and the public. The City shall not be liable for any delays necessary in granting Consultant access to any portion of the facilities or systems.

33) Force Majeure

(a) If a Force Majeure Event occurs, the Party that is prevented by that Force Majeure Event from performing any one or more obligations under this Contract (the "Nonperforming Party") will be excused from performing those obligations, on condition that (1) the Nonperforming Party used reasonable efforts to perform those obligations, (2) the Nonperforming Party's inability to perform those obligations is not due to its failure to take reasonable measures to protect itself against the event or circumstance giving rise to the Force Majeure Event, and (3) the Nonperforming Party complies with its obligations under section 33(c).
(b) For purposes of this Contract, "Force Majeure Event" means, with respect to a Party, any event or circumstance, regardless of whether it was foreseeable, that was not caused by that party and that prevents a party from complying with any of its obligations under this Contract, except that a Force Majeure Event will not include a strike or other labor unrest that affects only one Party, an increase in prices, or a change in law.
(c) Upon occurrence of a Force Majeure Event, the Nonperforming Party shall promptly notify the other party of occurrence of that Force Majeure Event, its effect on performance, and how long that Party expects it to last. Thereafter the Nonperforming Party shall update that information as reasonably necessary. During a Force Majeure Event, the

Nonperforming Party shall use reasonable efforts to limit damages to the other party and to resume its performance under this Contract.

34) COVID-19 Requirements

The Parties acknowledge and agree that this Contract will be executed and performed during the COVID-19 pandemic. While Oregon is under a declaration of emergency associated with the COVID-19 pandemic, Consultant shall comply with all applicable requirements and guidance issued by federal, state and local authorities pertaining to COVID-19 (including but not limited to CDC, OHSA, Governor Brown, Oregon Health Authority, and Multnomah County Health Department). The applicable guidance and requirements include, but are not limited to, those pertaining to Oregon phased reopening and sector activities, reduction in gathering sizes appropriate to the type of location and activity, complying and implementing health protocols, maintaining social distancing, and wearing face coverings. Consultant shall have a satisfactory safety plan and protocols addressing COVID-19 precautions related to Consultant's activities under this Contract. Consultant shall monitor for updated guidance and requirements and update its plan and protocols accordingly. Consultant shall provide a copy of Consultant's safety plan and protocols to City upon City's request. Consultant is solely responsible for implementing a COVID safety plan and protocols and addressing any COVID-19 related claims pertaining to its activities and provision of Services under this Contract. In the event that Consultant's employees or its subcontractor's employees exhibit symptoms of COVID infection, Consultant shall follow City's contact tracing and response protocols which shall be made available to the Consultant.

The City of Portland COVID-19 Vaccination Policy requires, as of January 3, 2022, that the Consultant and the Consultant's employees be vaccinated or have an approved exception through their employer when work is performed inside a City worksite for longer than 15 minutes.

Subconsultant(s): Consultant shall contractually require its subconsultants to follow the same guidance and requirements pertaining to the City of Portland COVID-19 Vaccination Policy.

The Policy requirements and Frequently Asked Questions can be found at:
https://www.portland.gov/omf/brfs/procurement/vendor-vaccine-requirement
https://www.portland.gov/sites/default/files/2021/vccvg-vaccination-requirement.pdf

35) Attachments

The following attachments are incorporated into this Contract.

(a) Exhibit A – Statement of Work
(b) Exhibit B – Compensation
(c) Exhibit C - _____

==========

CONSULTANT SIGNATURE:

Consultant represents that Consultant has had the opportunity to consult with its own independently selected attorney in the review of this Contract. Neither Party has relied upon any representations or statements made by the other Party that are not specifically set forth in this Contract.

This Contract constitutes the entire agreement between the City and Consultant and supersedes all prior and contemporaneous proposals and oral and written agreements, between the Parties on this subject, and any different or additional terms on a City purchase order or Consultant quotation or invoice.

The Parties agree that they may execute this Contract and any Amendments to this Contract, by electronic means, including the use of electronic signatures.

This Contract may be signed in two (2) or more counterparts, each of which shall be deemed an original, and which, when taken together, shall constitute one and the same agreement.

IN WITNESS WHEREOF, the Parties hereby cause this Contract to be executed.

I, the undersigned, agree to perform work outlined in this Contract in accordance to the Terms and Conditions and the Statement of Work (Exhibit A); hereby certify under penalty of perjury that I/my business am not/is not in violation of any Oregon tax laws; hereby certify that my business is certified as an Equal Employment Opportunity Affirmative Action Employer and is in compliance with the Equal Benefits Program as prescribed by Chapters 5.33.076 and 5.33.077 of Code of the City of Portland; and hereby certify I am an independent consultant as defined in ORS 670.600

(Consultant's Name)

BY:_____ Date:_____

Name:_____

Title:_____

CONTRACT NUMBER: 3000XXXX

CONTRACT TITLE: PROJECT TITLE

CITY OF PORTLAND SIGNATURES:

By: _____ Date: _____
Bureau Director

By: _____ Date: _____
Chief Procurement Officer

By: _____ Date: _____
Elected Official

Approved:

By: _____ Date: _____
Office of City Auditor

Approved as to Form:

By: _____ Date: _____
Office of City Attorney

Statement of Work

Consultant's and City's Project Manager for this Contract are:

For City of Portland:	For Consultant:
Name:	Name:
Title:	Title:
Address:	Address:
City, State:	City, State:
e-mail:	e-mail:
Copy to:	Copy to:

1. SCOPE OF WORK

Consultant agrees to provide all of the Design Services described below on an ongoing basis in support of, and in conformance with, the time frames described in the Request for Proposals.

1.1.

1.2.

1.3.

1.4.

2. DELIVERABLES AND SCHEDULE:

2.1.

2.2.

2.3.

2.4.

3. CONSULTANT KEY PERSONNEL

The Consultant shall assign the following Key Personnel to do the work in the capacities designated and agrees not to substitute these personnel while working on the Contract without the express approval of the City, which approval shall not unreasonably be withheld:

NAME	ROLE ON PROJECT

4. SUBCONSULTANTS

The Consultant shall assign the following Subconsultants to perform work in the capacities designated:

NAME	ROLE ON PROJECT	COBID CERTIFICATION	SUBCONTRACT AMOUNT

Total subcontracting to COBID certified firms on this contract is estimated at $_____ or XX.XX% of the Contract Amount.

The City will enforce all social equity Contracting and subcontracting commitments of COBID certified firms indicated in the table above. Consultant shall not add, eliminate, or replace any Subconsultant assignments without the prior written consent of the Chief Procurement Officer. Failure to use the identified COBID certified Subconsultants without prior written consent is a material breach of contract. Any changes must be reported and submitted to the PTE Contract Compliance Specialist. All changes to this Contract, including changes to the Subconsultant participation, must be made by written amendment and approved by the Chief Procurement Officer to be valid.

For Contracts valued $50,000 or more, the Consultant shall submit Subconsultant payment and utilization information electronically in the Contract Compliance Reporting System, reporting ALL Subconsultants employed in the performance of this agreement. More information on this process may be viewed on the City Procurement website at: https://www.portlandoregon.gov/brfs/75932.

COMPENSATION

The maximum that the Consultant will be paid for the work on this Contract is $XXX (hereafter the "not to exceed" amount).

The "not to exceed" amount includes all payments to be made pursuant to this Contract, including reimbursable expenses, and Contract Mitigation if any. Contract Mitigation can be used only with prior written approval of the City prior to any effort being accomplished on added tasks. Nothing in this Contract requires the City to pay for work that does not meet the Standard of Care or other requirements of the Contract. The actual amount to be paid to the Consultant may be less than that amount.

The Consultant shall be paid based on its hourly rates, plus any authorized expenses, in accordance with the tasks listed below. If a task is completed and accepted by the City, and the amount billed by the Consultant is less than the estimated budget for the task, the remaining amount may be used on the other tasks as authorized in writing by the Project Manager. In no event shall the Consultant bill for an amount greater than what is shown for each task.

Task/Phase	Description	Amount
1		
2		
3		
	Total Not to Exceed:	

The Consultant is entitled to receive progress payments for its work pursuant to the Contract as provided in more detail below. The City will pay Consultant based on invoices for acceptable work performed and approved until the "not to exceed" amount is reached. Thereafter, Consultant must complete work based on the Contract without additional compensation unless there is a change to the scope of work.

Any estimate of the hours necessary to perform the work is not binding on the City. The Consultant remains responsible if the estimate proves to be incorrect. Exceeding the number of estimated hours to complete the work does not impose any liability on the City for additional payment.

If the work is completed before the "not to exceed" amount is reached, the Consultant's compensation will be based on the Consultant's bills previously submitted for acceptable work performed and approved.

1. Payment Terms: Net 30 Days

The City shall pay the Consultant as follows upon the submission of invoices approved:

1.1. _____
1.2. _____

2. Standard Reimbursable Costs

The following costs will be reimbursed without cost-increase:

[ALTERNATIVE]

2.1. Reimbursement of travel costs is not anticipated in this Contract.

[ALTERNATIVE]

2.1. If pre-approved by the City, allowable costs of travel shall be determined in accordance with the General Services Administration (GSA) per diem rates in effect on the date of this Contract. Consultant's time spent traveling to the Portland area, however, will not be reimbursed. All costs incurred for local travel within the Portland metropolitan area, and a 100-mile radius, including but not limited to, vehicle mileage and parking fees are considered as included in the overhead rate, and shall not be reimbursed separately.

2.2. _____
2.3. _____
2.4. Personal expenditures or expenditures not related to the Contract are not eligible for reimbursement.

3. Hourly Rates

3.1. The Consultant shall be compensated in accordance with the hourly rates set forth in attached Exhibit C, Hourly Billing Rate Table. In no way shall the cost of hours billed by the Consultant exceed the total Contract amount throughout the term of this Contract.

[ALTERNATIVE]

3.2. The City has authorized an annual hourly rate increase of 2% for each year of this Contract. [include escalation in Exhibit C]

[ALTERNATIVE]

3.2. Discretionary Adjustment of Labor Rates Due to Inflation

Annual adjustment of hourly rates will be considered upon written request from the Consultant. Approval of a request for rate increases is solely within the City's discretion and under no circumstances is the City obligated to approve such a request.

Rate increases are subject to the following limitations:

3.2.1. No increases will be granted before the one-year anniversary of the Contract;

3.2.2. No more than one increase shall be granted per Contract year;

3.2.3. Rate increases may not exceed the preceding calendar year's Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) for the West Region Class Size A average inflation rate (as determined from the US Department of Labor statistics);

3.2.4. Rate increases shall not be retroactive.

Other than as stated above, hourly rates may not be increased.

4. Subconsultant Costs

Compensation for Subconsultants shall be subject to the same billing restrictions and requirements as those of the Consultant. Consultant may bill Subconsultant services at cost plus a __% mark-up [do not exceed 5%] and shall not be subject to any cost increase. Other direct expenses, as stated under Standard Reimbursable Costs, shall be billed at cost without mark-up. Allowable Subconsultant services can only be marked-up once. For example, the Consultant is not allowed to mark-up on a second tier Subconsultant's services if it has already been marked-up by the Consultant's Subconsultant. Mark-up is not allowed when using intergovernmental resources to complete work and will not be accepted.

5. Progress Payments

5.1. Compensation to the Consultant shall be based on the following:

5.1.1. Invoices submitted to the City, including the appropriate required information as outlined below and all supporting documentation relating to charges expressed on the invoice.

5.1.2. The invoice shall be submitted to _____.

5.1.3. Detailed monthly Project Progress Reports submitted to the City Project Manager by email.

5.2. The Consultant is required to follow Generally Accepted Accounting Principles (GAAP). Personal expenditures or expenditures not related to the Project or part of the Contract are not eligible for reimbursement. On or before the 15th of each month, the Consultant shall submit to the City Accounts Payable Department an invoice for work performed by the Consultant during the preceding month.

5.3. The Consultant shall enter all the following information on their invoice in order for the City to review and authorize the invoice for payment.

5.3.1. Contract Number, City's Project Title and any other identifying information requested by the City

5.3.2. Invoice date

5.3.3. Date range during which the services are being invoiced for work provided

5.3.4. Invoice number. The last invoice submitted on the Project must be clearly labeled "Final Invoice"

5.3.5. City Project Manager's name

5.3.6. Amount being invoiced for the current invoice

5.3.7. Consultant shall describe all services performed with particularity and by whom it was performed (Consultant's individuals or Subconsultant, labor category, direct labor rate, hours worked during the period) and shall itemize and explain all expenses for which reimbursement is claimed. If reimbursable expenses are authorized, identify by line item categories, 1) Travel Expenses and 2) General Reimbursable Expenses. Note: Invoices for Basic Services under a specific Task shall be for completed Basic Services only and shall indicate the percentage of the total Basic Services for that Task that the amount invoiced represents

5.3.8. The Consultant shall also attach photocopies of claimed reimbursable expenses, as applicable and preapproved authorization document from the City Project Manager

5.3.9. The Consultant shall stamp and approve all Subconsultant invoices and note on Subconsultant invoice what they are approving as "billable" under the Contract

5.3.10. The billing from the Consultant must clearly roll up labor and reimbursable costs for the Consultant and Subconsultants. Any billings for Subconsultants must match the Subconsultant invoices.

5.4. To the extent the City disputes any portion of the amount requested in the application for payment, the City shall indicate the undisputed amounts and the amounts that are in dispute. The City shall pay the undisputed amounts and indicate to whom such payments shall be made. The Consultant shall make such payments to itself and to Subconsultants as indicated by the City for such undisputed amounts. The City and Consultant and, if applicable, the Subconsultant shall then work to reach agreement on the disputed amounts.

5.5. Prior to initial billing, the Consultant shall develop a billing format for approval by the City. Submission of the draft billing document shall be emailed to the City Project Manager for final review and approval.

6. ACH Payments

It is the City's policy to pay its Consultant invoices via electronic funds transfers through the automated clearing house (ACH) network. To initiate payment of invoices, Consultants shall execute the City's standard ACH Vendor Payment Authorization Agreement and provide required documentation. Upon verification of the data provided, the Payment Authorization Agreement will authorize the City to deposit payments directly into Consultant's accounts with financial institutions. All payments shall be in United States currency.

7. Authorization to Proceed

Irrespective of the effective date of the Contract, the Consultant shall not proceed with any work required under this Contract without a written authorization to proceed from the City. Any work performed or expenses incurred by the Consultant prior to the Consultant's receipt of authorization to proceed shall be entirely at the Consultant's risk.

Exhibit XXX: SAMPLE CHANGE ORDER (Remove if not needed)

	BUREAU NAME	LOGO

CHANGE ORDER

Consultant		Project Title	
Contract No.		Change Order No.	*SAMPLE*
Contract Date		Change Order Date	

Select	Type	Description and Reason for Change	Modification to:
☐	Time		Project Schedule and/or Contract
☐	Scope or Specifications		Statement of Work Acceptance Requirements
☐	Deliverables		Statement of Work Acceptance Requirements
☐	Price		Statement of Work and/or Contract
☐	Terms and Conditions		Request Amendment to Contract
☐	Other		

1. Additional time is necessary and the Project Schedule for the Statement of Work or a specific Deliverable is hereby extended through (DATE) or modified as shown on the attached Project Schedule.

2. Additional work or a change in work or Specifications is necessary. For example, changes to the Statement of Work, Deliverables and/or the Acceptance.

3. A price adjustment is necessary for the following Deliverables. These changes will NOT affect the total not-to-exceed value of the Contract. For example, price changes that show the original price and the modified price.

4. An Amendment to the Contract is requested for the following reasons. For example, any change to the total value of the Contract, the term or ending date of the Contract, or the Contract terms and conditions requires an Amendment.

The Change Order is subject to the terms and conditions of the above-referenced Contract.

The rest of the Statement of Work shall remain unchanged and in full force and effect.

CITY OF PORTLAND CONTRACTOR

Authorized Signature Date Authorized Signature Date

Printed Name Printed Name

City Project Manager
Title Title

(remove this form if Consultant has Workers' Compensation Insurance)

IF YOUR FIRM DOES NOT HAVE CURRENT WORKERS' COMPENSATION INSURANCE, CONSULTANT MUST COMPLETE THE FOLLOWING INDEPENDENT CONSULTANT CERTIFICATION STATEMENT:

As an independent Consultant, I certify that I meet the following standards:

1. The individual or business entity providing labor or services is registered under ORS Chapter 701, if the individual or business entity provides labor or services for which such registration is required;

2. Federal and state income tax returns in the name of the business or a business Schedule C or form Schedule F as part of the personal income tax return were filed for the previous year if the individual or business entity performed labor or services as an independent Consultant in the previous year; and

3. The individual or business entity represents to the public that the labor or services are to be provided by an independently established business. Except when an individual or business entity files a Schedule F as part of the personal income tax returns and the individual or business entity performs farm labor or services that are reportable on Schedule C, an individual or business entity is considered to be engaged in an independently established business when four or more of the following circumstances exist. Consultant: check four or more of the following:

_____ A. The labor or services are primarily carried out at a location that is separate from the residence of an individual who performs the labor or services, or are primarily carried out in a specific portion of the residence, which portion is set aside as the location of the business;

_____ B. Commercial advertising or business cards as is customary in operating similar businesses are purchased for the business, or the individual or business entity has a trade association membership;

_____ C. Telephone listing and service are used for the business that is separate from the personal residence listing and service used by an individual who performs the labor or services;

_____ D. Labor or services are performed only pursuant to written contracts;

_____ E. Labor or services are performed for two or more different persons within a period of one year; or

_____ F. The individual or business entity assumes financial responsibility for defective workmanship or for service not provided as evidenced by the ownership of performance bonds, warranties, errors and omission insurance or liability insurance relating to the labor or services to be provided.

Consultant Signature_____Date_____

FOR CITY USE ONLY

PROJECT MANANGER-COMPLETE ONLY IF CONSULTANT DOES NOT HAVE WORKER'S COMPENSATION INSURANCE
ORS 670.600 Independent Consultant standards. As used in various provisions of ORS Chapters 316, 656, 657, and 701, an individual or business entity that performs labor or services for remuneration shall be considered to perform the labor or services as an "independent Consultant" if the standards of this section are met. The contracted work meets the following standards:

1. The individual or business entity providing the labor or services is free from direction and control over the means and manner of providing the labor or services, subject only to the right of the person for whom the labor or services are provided to specify the desired results;

2. The individual or business entity providing labor or services is responsible for obtaining all assumed business registrations or professional occupation licenses required by state law or local government ordinances for the individual or business entity to conduct the business;

3. The individual or business entity providing labor or services furnishes the tools or equipment necessary for performance of the contracted labor or services;

4. The individual or business entity providing labor or services has the authority to hire and fire employees to perform the labor or services;

5. Payment for the labor or services is made upon completion of the performance of specific portions of the project or is made on the basis of an annual or periodic retainer.

City Project Manager Signature_____Date_____

Exhibit C

FEDERAL ENERGY REGULATORY COMMISSION
Office of Energy Projects
Division of Dam Safety and Inspections – Portland Regional Office
805 SW Broadway, Suite 550
Portland, Oregon 97205
(503) 552-2700

5/19/2021

In reply refer to:
P-2821

VIA Electronic Mail

Mr. Glenn O. Pratt
Portland Hydropower Project Manager
Portland Water Bureau
Glenn.Pratt@portlandoregon.gov

Subject: Seismic Hazard Assessment, Portland Hydroelectric Project

Dear Mr. Pratt:

This letter is to acknowledge your June 22, 2020 letter transmitting the Seismic Hazard Assessment (SHA), completed by Cornforth Consultants, for the Portland Hydroelectric Project, FERC No. 2821. We have reviewed the information provided and have the following comments:

1. The latest NGA Subduction models for interface and intraslab earthquakes have been published by the Pacific Earthquake Engineering Research Center (PEER). Please update the subduction analysis based on the NGA Sub Ground Motion Models (GMMs), as they have been calibrated with larger sets of recorded data.

2. The SHA should include the Blue Ridge Fault Zone, just north of Mt. Hood. Although available scientific studies of the Blue Ridge Fault Zone are preliminary, fault rupture slip rates and potential earthquake magnitudes have been estimated. The uncertainty that results from the limited fault data could be incorporated and documented in the SHA. Refer to Chapter 13, Section 3.3, of the FERC Engineering Guidelines for further guidance.

3. Provide each of the parameters used in the GMMs in a tabular form so the spectral calculations can be independently replicated for our review. Include supporting information for each of the selected parameters. Refer to Appendix D, Table D-1, of Chapter 13 for an example of the parameters that shall be provided.

4. Spectral acceleration values and corresponding periods for each of the MCE target response spectra should be described in tables in the report.

5. There are numerous discrepancies regarding magnitudes or distances between the values cited in the text, and the values shown in the figures. For example, the distance to Dam 2 from the Mt. Hood Fault is cited as 19.3 km and shown as 18.3 km on Figure 11. Figures 14 and 15 show the weighted average interface magnitude as 7.0, instead of the 9.0 cited in the text. Clarify and correct the distances and magnitudes to be consistent with your selections.

6. Your Ninth CSIR should also include the Independent Consultants' review of the updated SHA.

Within 60 days of the date of this letter, please respond to or submit a plan and schedule to address the comments above. File your submittal using the Commission's eFiling system at https://www.ferc.gov/ferc-online/overview. For all Dam Safety and Public Safety Documents, select Hydro: Regional Office and Portland Regional Office from the eFiling menu. The cover page of the filing must indicate that the material was eFiled. For assistance with eFiling, contact FERC Online Support at FERCOnlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY).

Hard Copies Are Not Required During 100% Telework. The Commission remains on 100% telework status due to the ongoing Covid-19 Pandemic. Requirements for sending hard copies are suspended during this time. This guidance for submitting documents to the Commission is valid until FERC reconstitutes and staff returns to offices. We do not have a timeline for when that will occur. At the time that the Commission reconstitutes, we will issue further guidance regarding: 1) any need for hard copies of documents submitted during 100% telework and; 2) any need for hard copies going forward after reconstitution.

Thank you for your continued cooperation and interest in dam safety. If you have any questions, please contact Mr. Jordan Reimer of this office at (503) 552-2720.

Sincerely,

Douglas L. Johnson, P.E.
Regional Engineer

Exhibit D

Confidentiality Agreement

Parties to this Agreement:
Successful Proposer
_____(Employee)
collectively, "the Parties"

Whereas:

A. Successful Proposer is contracted by the City of Portland, Water Bureau, (the City), to provide design services for the Dam 1 Spillway Gates Replacement Project (Contract).

B. Successful Proposer has retained Employees, who shall perform portions of this work.

C. Directly or indirectly, employees may generate, receive, or otherwise learn of information that is of a confidential nature, including information that, if made public, could compromise the security of the City's water system.

D. It is critical that Successful Proposer and its employees maintain the confidentiality of the work that they perform, as disclosure of confidential information could result in damage to the City.

The Parties agree as follows:

1. For the purposes of this Agreement, "Confidential Information" means all documents and information of any type or format that the City designates as "for non-disclosure" or "confidential," including drafts and emails.

2. Confidential Information shall not apply to any portion of the Confidential Information which (i) is or becomes generally available to the public through no fault of Successful Proposer or Successful Proposer's Employees except in the instance of inadvertent disclosure; (ii) becomes available to the Successful Proposer. on a non-confidential basis except in the instance of inadvertent disclosure; or (iii) was known to Successful Proposer or its employees on a non-confidential basis and not in contravention of applicable law or a confidentiality or other similar agreement prior to its disclosure by the City or one of its representatives.

3. Confidential Information shall not be disclosed by Employees to any person within the Successful Proposer's organization who will not be involved in providing services to the City under Successful Proposer's Contract.

4. Unless ordered to do so by a court of competent jurisdiction, Confidential Information shall not be disclosed by Employee to any person outside of Successful Proposer's organization unless authorized by the City's Dam 1 Needle Valve Replacement project manager in writing.

5. All information provided to the Employee shall remain the property of the City, may not be used for any purpose not authorized in the Contract and shall be returned to the City upon request.

6. The Obligations of this Agreement shall survive termination by any means of this Agreement or the Successful Proposer's Contract with the City. The obligations of this Agreement shall survive Employee's termination of employment at Successful Proposer's company.

7. No amendment to this Agreement shall be effective without the written acknowledgement and consent of all Parties.

8. This Agreement is binding on the Parties, their agents, successors, assigns, officers, directors, and principals.

9. If any term or provision of this agreement is declared by a court of competent jurisdiction to be illegal or in conflict with any the law, the validity of the remaining terms shall not be affected.

Employee's Name: _____

Dated:_____ _____

Print Name/Sign

Company Name _____

Dated:_____ **By**:_____

Print Name/Signature