Prepared by:
WSP USA Inc.
401 B Street
San Diego, CA 92101

Phone: 619-338-9376

PROPOSAL FOR UPDATE TO THE SEISMIC EVALUATION OF SWEETWATER DAM OUTLET TOWER AND CONDUIT STUDY

Proposal to the Sweetwater Authority

Erick Del Bosque, P.E.

Director of Engineering and Operations

Chula Vista, CA

January 16, 2025

Table of Contents

1 | Introductory Letter

January 16, 2025

CONFIDENTIAL

Erick Del Bosque
Director of Engineering and Operations
Sweetwater Authority
505 Garrett Avenue
Chula Vista, CA 91910

Subject: WSP Proposal to Update the Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit Study

Dear Mr. Del Bosque:

WSP USA Inc. (WSP) is pleased to submit our proposal to the Sweetwater Authority (Authority) to update the seismic evaluation of Sweetwater Dam outlet tower and conduit study per your RFP received on December 12, 2024.

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, project managers, planners, surveyors and environmental specialists, as well as other design and program management professionals. We design and deliver lasting solutions in Infrastructure, Buildings, Transportation, Oil & Gas, Environment, Geomatics, Mining, Power and Industrial sectors as well as project delivery and strategic consulting services. With 19,000 talented people across the United States and 73,900 globally, we engineer projects that will help societies grow for generations to come.

WSP proposes a team with extensive experience in seismic evaluations and design of dams and infrastructures. Our project manager, Reza Farahani, brings 20 years of experience working on seismic evaluations, analysis and design of various structures including dams and hydraulic structures. Reza is a California registered PE and holds a PhD in Civil (Structural) Engineering. He has served as project manager and Engineer of Record (EOR) for several dams and hydraulic structures projects in California. Our seismologist, Dr. Valentina, has more than 20 years of experience in seismic hazard analysis (probabilistic and deterministic) and has worked on several dams and infrastructures projects. Our structural engineer, Praneeth Lingireddy, is PE and SE of California and has over 10 yrs of structural evaluations, analysis and design experience including working on dam safety projects.

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Introduction and Understanding of the Project Objectives

The Sweetwater Dam is located on the Sweetwater River in the Southern part of San Diego County near Chula Vista. The dam was originally constructed between 1886 and 1888 as a masonry arch dam with a height of 90 feet. The dam height was raised 20 feet in 1911 and converted to a curved gravity dam by placing mass cyclopean concrete against the downstream face of the dam. The dam was overtopped in 1916 and experienced some damage at the abutments but no damage was reported to the composite masonry section of the dam or to the outlet tower. The dam was repaired and the parapet wall raised, bringing the dam crest to the present maximum height of 127 feet.

The original outlet tower was constructed in 1888 inside the reservoir, about 40 feet from the base of the Sweetwater Dam, and adjacent to the lower portion of the right abutment slope and was presumably constructed out of the same masonry as the dam. The outlet tower was raised in 1911 by 20 feet when the main dam was raised. The present tower is about 100 feet high, from its foundation base to the top of its circular operating platform and has a hexagonal cross-section with a maximum outside width of 13.4 feet and a wall thickness of about 3.55 feet. A 51-foot one-span steel footbridge provides access to the tower from the dam crest.

The outlet conduit is located between the base of the outlet tower and the base of the dam. The conduit consists of a masonry structure with a rectangular cross section and a short wall at its top on the right-abutment side. The conduit contains three unlined water lines and conveys water from the tower to a pipeline that passes through the dam, which in turn conveys water to a pipeline that leads to the water treatment plant.

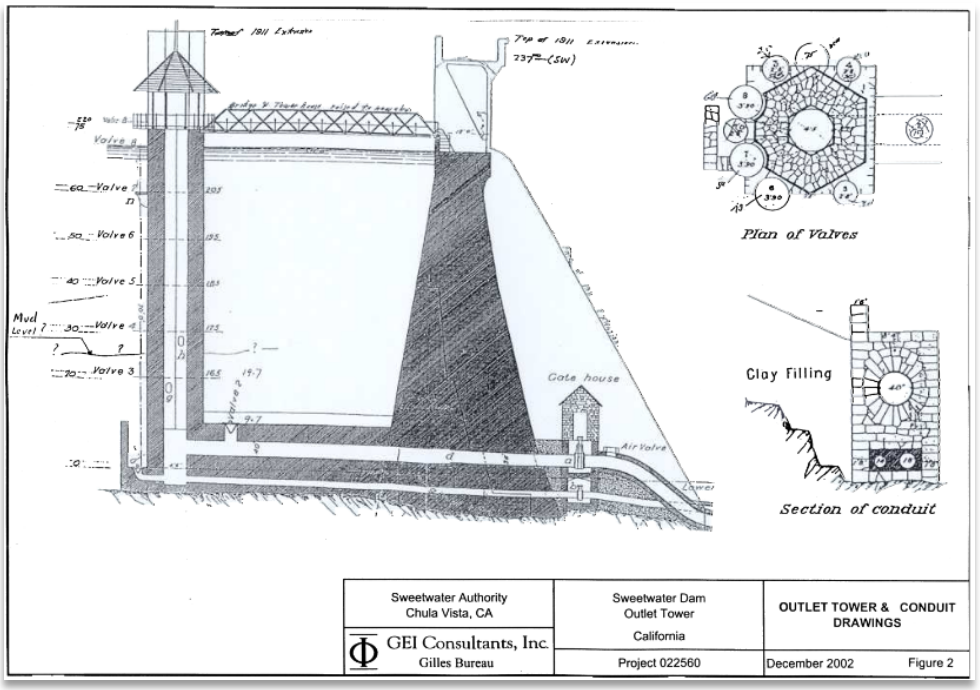

Figure 1. Sweetwater Dam Outlet Tower and Outlet Conduit

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GEI Consultants, Inc performed seismic evaluation of the Sweetwater Dam outlet tower and conduit in 2003. They estimated the level of earthquake loading that could cause the tower to fail, and the probability of that earthquake to occur. They indicated that an earthquake causing a peak ground acceleration at the site of about 0.11g (g is gravitational acceleration) could cause the tower to fail. They determined the chance of this failure to be about 50 percent in the next 100 years.

The objective of this project is to conduct a comprehensive update to the 2003 report from GEI Consultants, Inc., titled "Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit" and to complete a conceptual level design and budgetary cost for strengthening the outlet tower to withstand an earthquake with a return period of approximately of 144 years. Seismic evaluation of the dam is out of scope of this proposal and will not be considered.

Proposed Scope of Work

The proposed SOW in this memorandum has been divided into tasks with the following work breakdown structure:

- Kick-off Meeting
- Documents to be Provided by the Authority
- Developing Evaluation Criteria
- Seismic Evaluations
- Report Updates
- Conceptual Level Design and Budgetary Cost Estimates
- Project Management and Meetings

Details for each task are provided below.

- **TASK 1: Kick-off Meeting**
  WSP will schedule an in-person kick-off meeting at the Authority's office at 505 Garrett Avenue, Chula Vista, CA. WSP will produce an agenda with all the items to be discussed and follow-up with minutes of the meeting. The meeting will include the following items:

  - Review the scope of work
  - Review the budget
  - Determine the team member's roles and responsibility
  - Determine the detailed schedule
  - Discuss data and documents needed by WSP from the Authority
  - Determine any potential issues that may delay the application

  Deliverable:

  Meeting agenda and minutes

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- **TASK 2: Documents to be Provided by the Authority**

  WSP will create a list of documents needed from the Authority. The Authority will provide the following documents:

  - GEI Consultants, Inc. (2003), "Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit".
  - Other information and data as requested by WSP

- **TASK 3: Schedule Development**

  WSP will create a schedule that will result in the seismic updates and conceptual level design being submitted to the Authority on time and on Budget. WSP will work with the client to develop a successful schedule and will monitor the schedule to make sure that progress of the project is on schedule. WSP team proposes the following activity schedule for this project.

Task #	Task Name	Duration (Days)
0	Notice to Proceed (NTP)	0
1	Kick-off Meeting	1
2	Documents to be Provided by the Authority	5
3	Schedule Development	5
4	Developing Evaluation Criteria	19
5	Seismic Evaluations	70
6	Report Updates	30
	Submit Draft to Authority	0
	Authority Review Period	10
	Submit Final to Authority	30
7	Conceptual Level Design and Budgetary Cost Estimates	50
	Submit Draft to Authority	0
	Authority Review Period	10
	Submit Final to Authority	35
8	Project Management and Meetings	362

- **TASK 4: Developing Evaluation Criteria**

  WSP will review the 2003 report from GEI Consultants, Inc., titled "Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit" and will evaluate the need to update the deterministic and probabilistic analysis using the latest available ground motion models and National Hazard Maps. WSP will develop the evaluation criteria as deterministic or probabilistic response spectra. The deterministic response spectra shall represent the mean (50th percentile) levels of ground motion that could be induced at the site by a Maximum Credible Earthquake (MCE) centered along the La Nacion Fault or other upper-bound magnitude events centered along more distant faults, such as the Rose Canyon, Agua Blanca- Coronado, San Miguel-Vallecitos, San Diego Trough, and Elsinore faults. The La Nacion and Rose Canyon faults have low rates of slip. The probabilistic criteria shall represent ground motion levels with 10 or 50 percent probabilities of occurrence during a 50-year period, corresponding to return periods of 144 and 72 years.

- **TASK 5: Seismic Evaluations**

  The seismic evaluations will be mainly based on the US Army Corps of Engineers (USACE) Manual EM 1110-2-6053, "Earthquake Design and Evaluation of Concrete Hydraulic Structures". Other standards and guidelines from the governing agencies (USACE, FERC, and USBR) and design codes (ACI and ASCE) will be used when needed. The assumptions used in the 2003 report from GEI Consultants, Inc. for materials, boundary conditions, loadings and load combinations will be reviewed and updated as needed. Seismic evaluations of the outlet tower and conduit will be performed in SAP2000 finite element program, similar to the 2003 report from GEI Consultants, Inc. Seismic evaluations will include stability checks and strength design checks. Structural stability of the structures under seismic loading will be evaluated in Mathcad. For strength evaluations, three-dimensional (3D) finite element models of structures will be created in SAP2000 and response spectrum analysis will be performed to calculate critical seismic demands. Multi-directional seismic effect will be considered for both stability evaluations and strength design checks.

  Modal analysis will be performed for the outlet tower to determine dynamic characteristics of the structure. A parametric study will be performed for the outlet tower for a range of strength and elastic properties for the stone masonry in order to account for uncertainties in the estimated strength and elastic parameters of the tower material, similar to the 2003 report from GEI Consultants, Inc.

- **TASK 6: Report Updates**

  WSP will update the original 2003 report based on the new developed evaluation criteria and seismic analysis performed. WSP will have an internal quality assurance/quality control process and will conduct interactive internal reviews of the report before issuing a draft and final package to the Authority.

  Deliverable:

  - Draft updated report in PDF
  - Final updated report in PDF

- **TASK 7: Conceptual Level Design and Budgetary Cost Estimates**

  WSP will complete a conceptual level design based on the results of the seismic evaluations (Task 4) and will estimate a budgetary cost for strengthening the tower to withstand an earthquake with a return period of approximately of 144 years. WSP will perform internal quality assurance/quality control of the conceptual level design plans before issuing a draft and final package to the Authority.

  Deliverable:

  - Draft Conceptual Level Plans in PDF and Budgetary Cost Estimates
  - Final Conceptual Level Plans in PDF and Budgetary Cost Estimates

- **TASK 8: Project Management and Meetings**

  Project management activities include preparation of work plan and schedule, coordination, preparation of status reports and invoicing. The task is continuous throughout the duration of the project.

  Deliverable:

  - Meeting agendas and minutes, status reports

  Key Assumptions:

  - Seismic evaluation of the Sweetwater Dam is out of scope for this proposal. No analysis for the dam will be included.
  - Seismic Evaluation of the steel footbridge and circular operating platform located on top of outlet tower is out of scope for this proposal.
  - All deliverable components will be submitted for a single round of review and comment by Authority and will be compiled into a final deliverable.
  - No review by or presentation to DSOD or FERC is assumed for this proposal.

- All data will be provided by Authority or obtained in the public domain; no field data collection is proposed.
- WSP has assumed that a kick-off site visit is included with task 1 and up to five (5) staff from WSP will attend the site-visit.
- WSP has assumed a virtual meeting and presentation to the Authority Governing Board and/or Engineering and Operations Committee.
- A monthly 2-hour meeting has been assumed with the Authority through the duration of the project to discuss the progress of the project. The overall project duration is assumed to be 12 months for cost estimates.
- One hours bi-weekly internal meetings have been assumed for the duration of the project.
- A four-hour meeting has been assumed following each deliverable.

PROPOSED PERSONNEL & QUALIFICATIONS

WSP is proposing a multi-disciplinary team with specialized experience to deliver the proposed work. Our key team members proposed for this project are as follows:

Staff	Role	Years of Experience	Location
Reza Farahani, PhD, PE	Project Manager, Engineer of Record (EOR)	20	CA
Jeffrey Keaton, PhD, PE	Quality Controller	50	AZ
Praneeth Lingireddy, PE, SE	Seismic/Structural Engineer	10	Vancouver, CA
Ali Wahidi, PE, SE	Structural Engineer	40	WA
Stefan Schadinger, PE	Structural Engineer	28	MI
Valentina Montaldo Falero, PhD	Geologist/Seismologist	24	CA
Eric Vanhemert	Cost Estimator	17	WA

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WSP recognizes that results from the simplified finite element analysis of the outlet tower and conduit in SAP2000 may not be very precise and advanced finite modeling and analysis may be needed for more detailed and comprehensive seismic evaluation updates. Advanced finite element modeling and analysis will take more time and effort than the simplified finite element modeling and analysis conducted in SAP2000 program and considered for this proposal, and it will cost more. WSP has the capability of conducting such advanced finite element modeling and analysis of the outlet tower and conduit and will be pleased to offer that as a change order. Upon request for the advanced finite element modeling and analysis of the outlet tower, WSP team will work with the Authority to determine scope of work and estimated costs.

The WSP Team provides the Sweetwater Authority with an expert qualified team of experienced dam engineering professionals that have recent and relevant experience in the analysis and development of seismic solutions for dams. Our California based experts in seismic hazards, seismic structural modeling, and dam safety value the opportunity to support the Authority with the development of improvements to the Sweetwater Dam to increase the longevity and function of this critical asset.

As requested by the RFP, this proposal is in effect for ninety (90) days. We trust that this aligns closely with your expectations, but should you have any questions or require any further clarifications, please do not hesitate to reach out to Reza Farahani by email at Reza.Farahani@wsp.com or by phone at 916-675-3318 with any questions or comments.

Thank you for your consideration.

Sincerely,

Debby Reece, PE
California Water Business Line Leader
Senior Vice President

Reza Farahani, PhD, PE
Project Manager

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2 | Identification of Respondent

WSP is a nationally recognized firm and a global leader in engineering and water infrastructure. We are ranked No. 2 globally in Pure Engineering Design and No. 8 in Water by Engineering News Record, and offer a breadth and depth of water infrastructure design services. We have more than 73,900 engineers, technicians, scientists and environmental experts, planners, modeling specialists, and program and construction management professionals in towns and cities across 40 countries.

Legal Name/Company Address	WSP USA Inc., One Penn Plaza, New York, NY 10119
Legal Form of Company	Corporation
Parent Company	WSP Global Inc
San Diego County Office Information	401 B Street, Suite 1650, San Diego, CA 92101
Number of Employees in San Diego County	341
Sacramento County office Information	10940 White Rock Road, Suite 190, Rancho Cordova, CA 95670
Number of Employees in Sacramento County	128
Contact Person	Reza Farahani, Vice President, California Dams and Hydraulic Structures Lead 10940 White Rock Road, Suite 190, Rancho Cordova, CA 95670 916-576-3318, Reza.Farahani@wsp.com

3 | Financial Relationships Disclosure

a. Identify all existing and past financial relationships between Consultant's firm and current members of the Authority's Governing Board and staff and entities for which said members are employed or have an interest, both past and present. If there are none, clearly state this.

WSP has no known existing nor past financial relationships between Consultant's firm and current members of the Authority's Governing Board and staff and entities for which said members are employed or have an interest, both past and present.

b. Identify all existing and past financial relationships between Consultant's proposed sub-consultants and current members of the Authority's Governing Board and staff and entities for which said members are employed or have an interest, both past and present. If there are none, clearly state this.

WSP is not currently proposing any sub-consultants for this project.

4 | Approach for Completing the Work

WSP team will conduction seismic evaluations of the Sweetwater Dam outlet tower and conduit mainly based on the US Army Corps of Engineers (USACE) Manual EM 1110-2-6053, "Earthquake Design and Evaluation of Concrete Hydraulic Structures". Other standards and guidelines from the governing agencies (USACE, FERC, and USBR) and design codes (ACI and ASCE) will be used when needed.

WSP team will review the 2003 report from GEI Consultants, Inc., titled "Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit" and will evaluate the need to update the deterministic and probabilistic analysis using the latest available ground motion models and National Hazard Maps. WSP will develop the evaluation criteria as deterministic or probabilistic response spectra. The deterministic response spectra shall represent the mean (50th percentile) levels of ground motion that could be induced at the site by a Maximum Credible Earthquake (MCE) centered along the La Nacion Fault or other upper-bound magnitude events centered along more distant faults, such as the Rose Canyon, Agua Blanca- Coronado, San Miguel-Vallecitos, San Diego Trough, and Elsinore faults. The La Nacion and Rose Canyon faults have low rates of slip. The probabilistic criteria shall represent ground motion levels with 10 or 50 percent probabilities of occurrence during a 50-year period, corresponding to return periods of 144 and 72 years.

WSA team will review and update the assumptions used in the 2003 report from GEI Consultants, Inc. for materials, boundary conditions, loadings and load combinations as needed. Seismic evaluations of the outlet tower and conduit will be performed in SAP2000 finite element program, similar to the 2003 report from GEI Consultants, Inc. Seismic evaluations will include stability checks and strength design checks. Structural stability of the structures under seismic loading will be evaluated in Mathcad. For strength evaluations, three-dimensional (3D) finite element models of structures will be created in SAP2000 and response spectrum analysis will be performed to calculate critical seismic demands. Multi-directional seismic effect will be considered for both stability evaluations and strength design checks.

Modal analysis will be performed for the outlet tower to determine dynamic characteristics of the structure. A parametric study will be performed for the outlet tower for a range of strength and elastic properties for the stone masonry in order to account for uncertainties in the estimated strength and elastic parameters of the tower material, similar to the 2003 report from GEI Consultants, Inc.

WSP team will update the original 2003 report based on the new developed evaluation criteria and seismic analysis performed. WSP will have an internal quality assurance/quality control process and will conduct interactive internal reviews of the report before issuing a draft and final package to the Authority.

WSP team will complete a conceptual level design based on the results of the seismic evaluations and will estimate a budgetary cost for strengthening the tower to withstand an earthquake with a return period of approximately of 144 years. WSP will perform internal quality assurance/quality control of the conceptual level design plans before issuing a draft and final package to the Authority.

5 | Required Qualifications

a. The Respondent's primary business or the primary business of a department within the Respondent's firm shall be engineering consulting services for large-scale dam evaluations, and shall have been in the business of providing such services for at least five (5) years. ✓

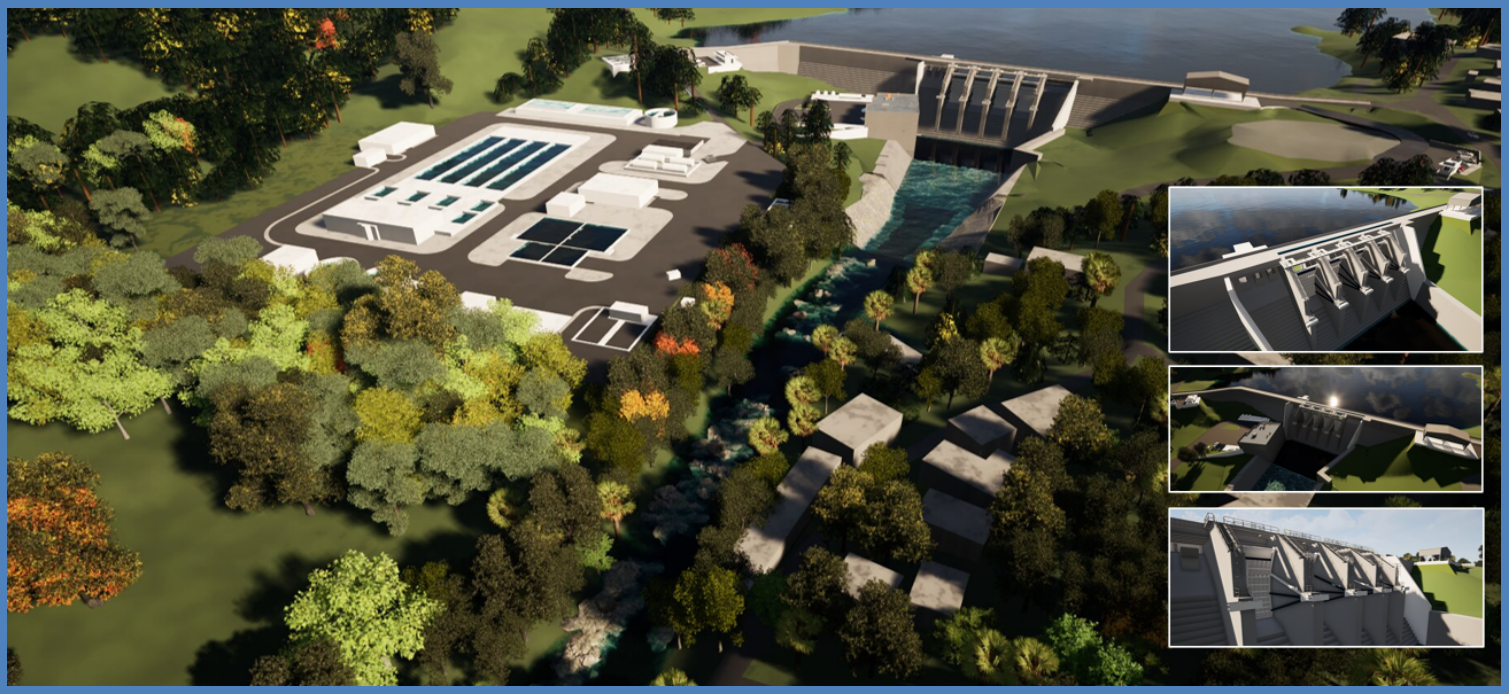
b. The Respondent shall provide a single project manager as the primary point of contact with the Authority. This project manager must have at least five (5) years total experience with current firm or other employers in projects related to large-scale dam evaluations, and shall be registered as a professional engineer in the state of California. ✓

c. Provide a list of past and ongoing qualifying projects for which the Respondent's services were or are similar to those described in this RFP. Limit the list to no more than ten projects the Respondent believes are most relevant to the RFP.
List of past and ongoing qualifying projects and requested details are presented in Section 5.1. ✓

d. Present the experience of any proposed subconsultants in the same manner.
No subconsultants is considered for our proposal. ✓

e. Provide evidence of the experience and competence of the Respondent's team proposed to work on the Project, with specific emphasis on experience in working on large-scale dam evaluation.
The requested information is presented in Section 5.1. ✓

5.1 | List of Qualifying Projects and Evidence of experience



Valenciano Dam

Juncos, PR, United States

Project Description

WSP is the lead design firm for the new Valenciano Dam, the center piece of the East Central Puerto Rico Water Supply Project. The dam is a new 120-foot tall roller compacted concrete structure with four tainter gates, a piano key weir, and an Obermeyer weir. Other features of the site include a access bridge over the dam, a water intake tower, a sediment transport tower, a new raw water pump station, an outlet energy dissipation basin training walls, retaining walls, and operations building, and various piping, valved and civil site design features throughout the site. Design of the new dam includes a full seismic study of the maximum design earthquake associated with the Muertos Trough subduction zone. WSP performed the seismic hazard analysis, the dam seismic stability analysis, and has prepared a finite element structural analysis seismic model. The team has performed long-term water yield studies on the reservoir, reservoir sedimentation studies and optimization to protect the long-term water yield, and CFD studies of the PMF to size the dam, gates, and energy dissipation basins. Currently geotechnical and geophysical field investigations are underway to document the properties and extent of high-quality native rock for use in the on site RCC plant for construction of the dam.

WSP Services

Geotechnical, structural, hydraulics, hydraulic physical modeling, seismic hazard analysis, seismic structural analysis, seismic structural FEM, civil site design, sedimentation analysis, long-term water supply yield analysis, cost estimation, construction plan development, geotechnical filed oversite, geophysical field exploration, and other services as required for the design.

Client/Owner:
Puerto Rico Aqueduct and Sewer Authority (PRASA)

Project Dates:
09/2024 – 09/2026

Key Elements:
- ✓ New RCC Dam Design
- ✓ Full seismic design study

Key Personnel:
Gregory Hebeler
Reza Farahani
Peter Bouchie
Stefan Schadinger
Ali Wahidi
Valentina Montaldo Falero
Maria Arcos
Josh Myers
Jeff Keaton

References:
Jeff Beriswell, PE
Black & Veatch Program Manager for PRASA
BeriswillJ@bv.com

Chilhowee Dam Seismic Hazard Study & Embankment Repair

Tallassee, TN, United States

Project Description

WSP developed and oversaw an extensive subsurface investigation program to determine the extent of deficient embankment materials. In parallel, WSP performed a site-specific seismic evaluation, to address recent changes to the USGS hazard maps for the area of the dam. Based on the results of the subsurface program, WSP prepared the contract documents, design drawings, technical specifications, the QCIP for a significant rehabilitation program at the site and provided on-site engineering oversight for the repair program. The repairs were successfully completed, and the reservoir restored, in the summer of 2017. The sloping clay core configuration of the embankment complicated the options for repairing the embankment. In addition, due to the depth at which repairs were needed, the reservoir was partially lowered, and a significant portion of the repair work was completed below the reservoir level.

WSP Services

Owner's Engineer, Seismic Analysis, Dam Safety Inspection, Dam Rehabilitation Design, Partial Embankment reconstruction design, during construction

Client/Owner:
Brookfield Renewable

Project Dates:
2014-2017

Key Elements:

- ✓ Geotech
- ✓ Hydraulics
- ✓ CFD Modeling
- ✓ FERC Support

Key Personnel:
Derek Olson
Stefan Schadinger
Peter Bouchie

References:
Mr. Ashley Thomas
Senior Compliance Manager
Ashley.thomas@
brookfieldrenewable.com

Cushman Dam #1 Rockfall Mitigation

Tacoma, WA

Project Description

WSP was contacted by Tacoma Public Utilities to perform an emergency site visit to the Lake Cushman Dam No. 1 Powerhouse to assess the stability of a rock slope immediately adjacent to the powerhouse, a portion of which had failed the previous night, severely damaging a tramway and associated infrastructure. WSP was to assess the condition of the remaining slope and determine remedial actions to provide temporary stabilization of the rock slope to allow worker access for repairs to the damaged infrastructure. Using the information gained from the reconnaissance, WSP designed a rockfall stabilization system that comprised rock dowels and rope anchors providing support for a high-tensile wire mesh draped over the slope area. WSP also provided construction observations and testing services during installation of the rockfall stabilization system.

WSP Services

Geohazard Analysis, Geological Investigations, Remediation Design

Client/Owner:
Tacoma Power

Project Dates:
Month, Year – Month, 2023

Key Elements:

- ✓ Geohazard
- ✓ Preliminary Design
- ✓ Detailed Design
- ✓ Construction Support

Key Personnel:
Vinod Pillai, PE PM
Jason Cox, PE

References:
Seth Frazier Doull, PE
Sr. Project Manager
Tacoma Public Utilities - Generation Civil Engineering
sdoull@cityoftacoma.org

Diablo Powerhouse Emergency Rockfall Repair

Skagit County, WA

Project Description

WSP provided preliminary engineering, design, and construction support for emergency rockfall repair at the Diablo Powerhouse in Skagit county, Washington. After multiple rockfall events at the rockface adjacent to the Diablo powerhouse, WSP designed and provided preliminary engineering for rockfall mitigation methods including an anchor-supported wire mesh wall on the North side and rockfall attenuation fencing on the south side of the rock face. WSP also acted as the owner's engineer providing construction oversite, on-site quality control support, testing support, and RFI support throughout the construction.

WSP Services

Geohazard Analysis, Remediation Design, Construction Support

Client/Owner:
Tacoma Power

Project Dates:
Month, Year – Month, 2023

Key Elements:

- ✓ Geohazard
- ✓ Preliminary Design
- ✓ Detailed Design
- ✓ Construction Support

Cost/Budget:
<$200,000.00

Key Personnel:
Vinod Pillai, PE PM
Jason Cox, PE

References:
Lisa Williams, DBIA
Sr. Project Manager
Seattle City Light- Project Delivery
Lisa.Williams@seattle.gov

Calderwood Station Seismic Analysis

Tennessee, US

Project Description

WSP prepared a three-dimensional finite element model of the Calderwood Station concrete arch dam to evaluate seismic stability and stresses. The finite element model incorporated loads that represent gravity, reservoir water levels, and thermal and seismic loads. The model was used to address thermal affects and the potentially weakened foundation at an abutment fault zone, as well as to ensure that the displacements and the stresses were acceptable. This was especially important since the material properties of the concrete and rock elements local to the fault had to be significantly reduced to account for the weakened zone beneath the abutment.

WSP Services

Seismic hazard analysis, Finite Element Modeling

Client/Owner:
Brookfield Renewable

Project Dates:
2017

Key Elements:

- ✓ Geotech
- ✓ Geophysical Services
- ✓ Seismic Modeling
- ✓ Structural FEM
- ✓ Civil Engineering

Key Personnel:
Derek Olson
Stefan Schadinger
Peter Bouchie

References:
Mr. Ashley Thomas
Senior Compliance Manager
Ashley.thomas@
brookfieldrenewable.com

Ross Arch Dam And L2RA Finite Element Foundation Modeling

North Cascades National Park, US

Project Description

WSP was responsible for finite element analysis of the rock foundations for the 165m high Ross dam for inclusion into the dam safety report for the Federal Energy Regulatory Commission. Attended a weeklong dam safety review and provided input on the rock foundations for Part 12 probable failure mode analysis and L2 risk assessment. The FEM helped identify potential wedges but also provided FOS's on the wedges that were adequate given the degree of rock bridging on release joints.

WSP Services

Finite Element Modeling

Client/Owner:
Seattle City Light

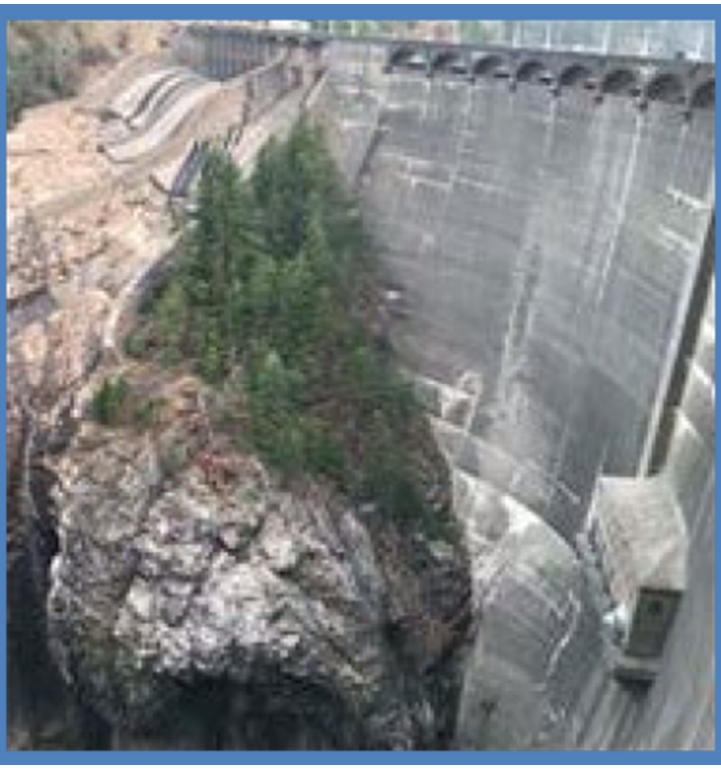
Project Dates:
2021

Key Elements:

- ✓ Geotech
- ✓ Geophysical Services
- ✓ Seismic Modeling
- ✓ Civil Engineering

Key Personnel:
Stefan Schadinger
Peter Bouchie
Vinod Pillai

Reference:
Kim Pate
Kim.Pate@seattle.gov
Sr. Project Manager
Seattle City Light- Project



Diablo Arch Dam PFMA and L2RA Foundation Finite Element Modeling

Whatcom County, WA, US

Project Description

WSP was responsible for finite element analysis of the rock foundations of the 119 m high Diablo arch dam for inclusion into the dam safety report for the Federal Energy Regulatory Commission. WSP also attended weeklong 2023 FERC dam safety review and provided input on the rock foundations for Part 12 probable failure mode analysis and risk assessment. Work also included detailed mapping of the rock mass on the right bank and spillway apron downstream of the arch dam.

WSP Services

Finite Element Modeling

Client/Owner:
Seattle City Light

Project Dates:
2021

Key Elements:

- ✓ Geotech
- ✓ Geophysical Services
- ✓ Seismic Modeling
- ✓ Civil Engineering

Key Personnel:
Stefan Schadinger
Peter Bouchie
Vinod Pillai

Reference:
Kim Pate
Kim.Pate@seattle.gov
Sr. Project Manager
Seattle City Light- Project

Spillway Rockfall Assessment

Northern California, US

Project Description

The penstock slope anchors are aging, and it was noted that some of the anchors are failing. Site geological mapping undated the geological model and strength and deformability for the penstock slope and the delivery tunnels from the dam. These data were built into a 3-D model in an RS3 equivalent program to understand the impact of seismic events on the penstock slope. The final model output was put on hold given the PGA for the dam was under review

WSP Services

Geotechnical, LiDAR, seismic analysis

Client/Owner:
Confidential Hydropower Client

Project Dates:
2022

Key Elements:

- ✓ Geotech
- ✓ Hydraulics
- ✓ CFD Modeling
- ✓ FERC Support

Key Personnel:
Vinod Pillai, Project Engineer

Power Deck Seismic Anchoring

Washington State, United States

Project Description

Seismic Upgrades at three powerhouses along a run-of-river hydroelectric project. Included ground penetrating radar (GPR) to confirm/correct owner's as-builts, Geotech and seismic analysis, structural design, and construction support.

WSP Services

Seismic, structural, project management.

Client/Owner:
Confidential Client

Project Dates:
2020-2024

Key Elements:

- ✓ Seismic Assessment
- ✓ Geotechnical
- ✓ Structural Design
- ✓ GPR Investigations
- ✓ Construction Support

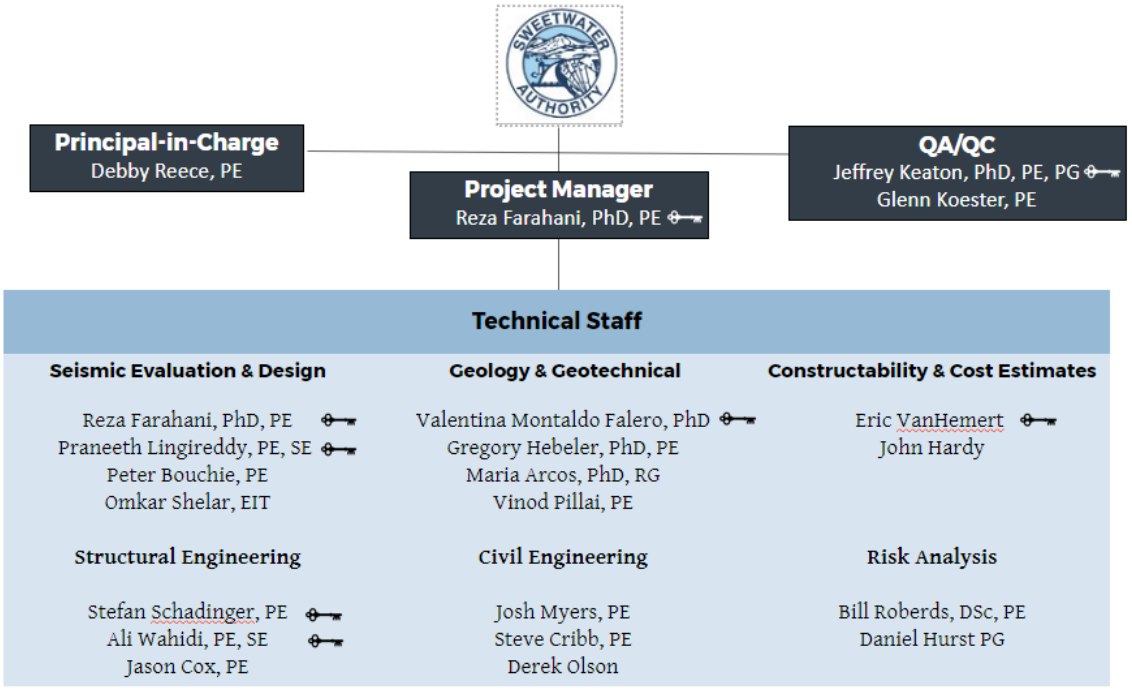
Key Personnel:
Ali Wahidi, Principal Engineer

6 | Respondent's Firm and Key Personnel

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, project managers, planners, surveyors and environmental specialists, as well as other design and program management professionals. We design and deliver lasting solutions in Infrastructure, Buildings, Transportation, Oil & Gas, Environment, Geomatics, Mining, Power and Industrial sectors as well as project delivery and strategic consulting services. With 19,000 talented people across the United States and 73,900 globally, we engineer projects that will help societies grow for generations to come.

WSP proposes a team with extensive experience in seismic evaluations and design of dams and infrastructures. Our project manager, Reza Farahani, brings 20 years of experience working on seismic evaluations, analysis and design of various structures including dams and hydraulic structures. He is PE of California and holds a PhD in Civil (Structural) Engineering. He has served as project manager and Engineer of Record (EOR) for several dams and hydraulic structures projects in California. Our seismologist, Dr. Valentina, has 24 years of experience in seismic hazard analysis (probabilistic and deterministic) and has worked on several dams and infrastructures projects. Our structural engineer, Praneeth Lingireddy, is PE and SE of California and has over 10 yrs of structural evaluations, analysis and design experience including working on dam safety projects. The key personnels are shown in the below organization chart.

6.1 Organizational Chart



6.2 Key Personnel Resumes

The resumes of key personnels are presented in next page.

REZA FARAHANI, PhD, PE

Vice President, California Dams and Hydraulic Structures Lead

Years with the firm

<1

Years total

20

Professional Registration

California Professional Engineer, Civil, License No.: CA 83722

Washington Professional Engineer, Civil, License No.: 22027230

Iowa Professional Engineer, License No.: P25810 (inactive)

Areas of practice

Civil Engineering

Structural Engineering

Earthquake Engineering

Soil-Structure Interaction

Finite Element Analysis

Office location

Sacramento

CAREER SUMMARY

Reza Farahani has more than 20 years of diverse structural engineering experience in analysis, evaluation, design, and project management. He is expert in seismic analysis of structures considering soil-structure interaction, and evaluation of existing concrete structures under extreme events. He has been involved from the early planning and proposal development stages through detailed design and has significant experience in preparing scope of work, staffing, budget estimate, scheduling, project coordination with multi-disciplinary teams, developing design criteria and specs, leading analysis and design tasks, preparing calculations and technical reports, implementing QA/QC procedures, and tracking financial aspects of projects.

EDUCATION

Ph.D., Civil Engineering (Structures), Univ. of Tennessee, Knoxville	2013
M.S., Civil Engineering (Structures), Univ. of Tennessee, Knoxville	2010
M.S., Civil Structural Engineering, Amirkabir Univ. of Technology, Iran	2004
B.S., Civil Water Engineering, KN Toosi Univ. of Technology, Iran	2001

PROFESSIONAL EXPERIENCE

— Central East Region Water Supply Improvements, Valenciano Dam and Raw Water Intake Project, Juncos, Puerto Rico: Reza is currently serving as a structural QC for stability analysis of Valenciano dam gated spillway. He is reviewing project information, drawings, and structural analysis calculations.

— NRCS Ross Dam Rehabilitation Design Project, Massachusetts, United States: Reza is currently serving as structural QC (detailed checker) for Lester Ross dam spillway design. He is reviewing project drawings, structural design calculations, and specifications.

— East Kellogg - Phase C 30902699C Project, Kansas, United States: Reza is currently serving as structural engineer for Brookhaven dam and spillway design and is designing concrete spillway and preparing structural plans, calculations and technical specifications.

— Bishop Intake No. 2 Service Spillway Coring and Repairs, Bishop, CA: Reza served as the project manager (PM) and engineer of record (EOR), and structural lead for the Bishop Intake No. 2 Service Spillway Coring and Repairs project. He led structural evaluations and resurfacing design of the existing cyclopean concrete spillway and attended site visits to observe coring progress. He was responsible for project management activities, structural analysis and design, and production of drawings and technical specifications.

— Antelope Dam Spillway Project, Plumas County, CA: Reza served as the PM and structural lead for the Antelope Dam Spillway project. He was previously structural lead and EOR for this project where he led stability analysis and strength design checks of spillway structures and prepared structural analysis technical report. He was responsible for project management activities in addition to the structural lead role.

— Sabrina Dam Spillway Retrofit Project, On-site Engineering Support, Bishop, CA: As the project manager, Reza negotiated the contract terms and personnel rates with client and was responsible for project management and coordination

with client and HDR engineers attending the site to provide required on-site engineering support.

- Big Creek Dam #7 Gate Analysis, Madera County, CA: Reza served as the PM, EOR, and structural lead for the Big Creek Dam #7 Radial Gate Analysis project. He was responsible for project management activities, structural analysis efforts and production of technical report. As the project manager, Reza was responsible for overseeing the project, schedule, and costs and coordination with client and HDR engineers to accomplish the project.
- North Shore Levee West (NSLW) Project, Aberdeen, WA: Reza served as the structural lead of Hoquiam NSLW project. He led structural analysis and design efforts of sheet pile walls (I-walls), T-walls and closure structures (stoplogs, swing gates, sliding gates, and passive tilt up gates). He was also coordinating structural designs with multi-disciplinary teams.
- Moccasin Lower Dam Long Term Improvements Project, Tuolumne County, CA: Reza served as the structural lead of the Moccasin project. He was coordinating structural designs with multi-disciplinary teams. He was responsible for structural analysis and design, production of structural drawings and technical specifications.
- Calero Dam Seismic Retrofit Project, San Jose, CA: Reza served as the structural lead in 30% design. His scope efforts included coordinating structural design with multi-disciplinary teams, preparing basis of design report and design criteria memorandum (structural), finite element modeling, analysis and design of relevant structures, production of structural drawings, and mentoring junior engineers.
- NID Scotts Flat Spillway Design, Nevada City, CA: Reza served as the structural lead for flip bucket design of NID Scotts Flat Spillway Design project in 30% design. He was responsible for structural analysis and design of flip bucket and production of structural drawings and technical specifications.
- Clarke County Iowa Reservoir Commission Project, Clarke County, IA: Reza served as the lead structural engineer and EOR in 30% design. He mentored and supervised junior structural engineers in design of spillway intake, conduit, and stilling basin. His scope efforts included coordinating structural design, finite element modeling, structural analysis and design, and production of structural drawings.
- Pyramid Dam Service Spillway Project, Los Angeles, CA: Reza served as a structural engineer and EOR for the Pyramid Dam Service Spillway Project and performed stability analysis and strength design checks of spillway structure and prepared structural analysis report.
- PCWA Interbay Dam Project, Placer County, CA: Reza served as a structural engineer and EOR for the PCWA Interbay outlet pipe support rehabilitation design. His responsibilities included analysis and design of outlet pipe and pipe supports and production of structural drawings.
- Oroville Dam FCO Non-Linear Stress Analysis, Oroville, CA: Reza served as a detail checker for Oroville Dam FCO advanced finite element modeling and analyses performed in LS-DYNA program. He investigated the FCO in SAP2000 program for new seismic ground motions.

JEFFREY KEATON, PHD, PE, PG, CEG, TF.WSP F.ASCE, F.GSA, HM.AEG, F.ABET

Senior Vice President | Engineering Geologist

Years with the firm

36

Years total

50+

Professional registrations

Registered Civil Engineer, Arizona, No. 78538 (Exp. 6/30/26); California, No. 30561 (Exp. 3/31/26), 1979

Registered Geologist, Arizona 78537 (Exp. 6/30/26); California, No. 3379 (Exp. 9/30/25), 1977

Certified Engineering Geologist, California, No. 979 (Exp. 9/30/25), 1977

Languages

English

Office location

Phoenix

CAREER SUMMARY

Extensive experience in managing, conducting, and supervising geologic, seismologic, and geotechnical projects on five continents for five decades has given Dr. Keaton understanding of a wide variety of projects, including metal, uranium, coal, potash, phosphate, and building material mines, quarries, and milling facilities; dams for water supply, power generation, flood control, tailings storage, and sediment control; energy development and transmission; fossil-fuel and nuclear power plants; gas, liquid, water, and sewer pipelines; underground gas storage facilities; refineries and tank farms; bridges, roads, and highways.

Geologic and Seismic Evaluations

Applying the principles of geology, Dr. Keaton has characterized sites and alignments of proposed and existing facilities of all types. These engineering geology evaluations focused on quantifying natural conditions and processes for siting, design, and operation. He is involved in conducting and supervising regional and detailed mapping of bedrock and surficial geology, aerial image interpretation, utilizing lidar data, logging of surface and subsurface exposures, analyzing rock structure for stability, collecting rock and sediment samples, analyzing laboratory test data, utilizing geographic information system technology for analysis and visualization, formulating recommendations, preparing reports, and providing expert witness testimony. He has written papers on engineering geology mapping symbols, mapping of slopes and landslides, liquefaction hazards, faults, debris flows, earth fissures, and engineering geology input for probabilistic flood hazard assessments.

Dr. Keaton was the Principal Investigator of three research projects involving neotectonic evaluations of seismically active faults funded by the U.S. Geological Survey under the National Earthquake Hazards Reduction Program (NEHRP), two regional earthquake-induced slope stability research projects (NEHRP), and one project to develop guidelines for evaluating scour at bridge foundations on rock funded by the National Cooperative Highway Research Program (NCHRP). He was Co-Principal Investigator of several regional liquefaction hazard mapping projects (NEHRP). He was the geotechnical and foundations team leader on an Applied Technology Council (ATC) project for a Federal Emergency Management Agency (FEMA) program to develop guidelines for seismic rehabilitation of buildings. He was selected by the Earthquake Engineering Research Institute for the 1999 Professional Fellowship award to work with two professors of seismology at University of Nevada-Reno to develop synthetic normal fault seismograms using their Composite Source Model.

Dr. Keaton has directed and conducted many projects to develop earthquake ground motions for design; stability of surficial and bedrock geologic materials under both static and earthquake loading; design parameters that incorporate ground motion; and engineering geologic characterization of sites exposed to soil liquefaction and fault rupture hazards. Dr. Keaton directed and conducted many projects involving geoseismic evaluations of fault zones for determination of degree of fault activity and earthquake design parameters. Among the fault zones he has evaluated are the San Andreas, Garlock, Sierra Madre, and Calico in California; the Stafford fault zone in Virginia; the Wasatch in Utah; the Eglington fault zone in Nevada; the Southern Whidbey Island fault zone in Washington; the East Franklin Mountains fault in West Texas; the Amargosa fault in Chihuahua, Mexico; faults associated with the East Africa rift in Ethiopia; and a number of unnamed faults in the United States, Canada, Mexico, Iran, and Great Britain. He has also performed seismic hazard studies for design of new and closure of existing mine tailings storage facilities sites in Mexico, Peru, Bolivia, Chile, Argentina, Brazil, Spain, Russia (Far East), Liberia, Botswana, Indonesia, Malaysia, the Philippines, and Angola.

JEFFREY KEATON, PHD, PE, PG, CEG, TF.WSP F.ASCE, F.GSA, HM.AEG, F.ABET

Senior Vice President | Engineering Geologist

EDUCATION

- PhD, Geology, Texas A&M University, College Station 1988
- MS, Engineering (Geotechnical), University of California, Los Angeles 1972
- BS, Geological Engineering, University of Arizona, Tucson 1971

PROFESSIONAL EXPERIENCE

- Principal Engineering Geologist: Probabilistic Earthquake Ground Motion for Stability Evaluation for Closure of Existing Tailings Storage Facilities, Newmont Canada, Golden Giant Mine, South Central Ontario, Canada, 2023. Desktop geohazard evaluation for closure of an existing gold mine tailings storage facility. Tectonic setting and seismic sources, active faults screening, and historical seismicity, and ground motion for return periods of 2,500, 5,000, and 10,000 years. Three sets of results were developed for different values of average shear-wave velocity in the upper 30m of the site to represent the range of seismic hazard. Scaled acceleration-time series were developed for the lowest shear wave velocity which corresponds to the softest ground condition and highest seismic response.
- Principal Engineering Geologist: Desktop Capable Fault Assessment, Confidential Client, Northwest England, United Kingdom, 2020-2023. Desktop assessment of geological faults within a 40km radius of a specific but confidential site with special emphasis on faults within 8km of the site. Assessment included tectonic setting, historical seismicity, potential seismic sources, geological maps of bedrock formations and surficial deposits, published geologic hazard reports for hazardous facility siting and waste disposal, publicly available onshore and offshore geophysical surveys (seismic reflection, aeromagnetic anomalies, gravity anomalies), government-produced 1m pixel bare earth lidar data, and ground investigation reports. Faults were classified with a three-tier system developed for faults in the United Kingdom consisting of active, extinct, or unproven.
- Principal Engineering Geologist: Probabilistic Earthquake Ground Motion for Design of Tailings Storage Facilities, Kirkland Minerals Tailings Storage Facility, Kirkland Lake, Ontario, Canada, 2023. Desktop geoseismic evaluation for design of mine tailings storage facilities. Tectonic setting and seismic sources, active faults screening, and historical seismicity, and ground motion for return periods of 2,500, 5,000, and 10,000 years. An assumed value of average shear-wave velocity in the upper 30m of the site was used to calculate seismic hazard in terms of acceleration response spectra. Eight sets of scaled acceleration-time series were developed for the 10,000-year return period.
- Principal Engineering Geologist: Site Specific Seismic Hazard Assessment for Expansion of Curuglú Tailings Storage Facility, West of Santa Rosalia, Baja California Sur, México for Minera y Metalúrgica del Boleo, 2023. Desktop geoseismic evaluation for design of mine tailings storage facilities. Tectonic setting and seismic sources, active faults screening, and historical seismicity, and ground motion for return periods of 2,500, 5,000, and 10,000 years. This site is located within 100km of the boundary between the North American Plate and the Pacific Plate, which is a transform fault in the middle of the Gulf of California. An historically active volcano is within 50km. A deterministic M7.8 earthquake was estimated to occur 25km from the site and a deterministic M7.15 was estimated to occur within 17.8km from the site. The site stiffness was estimated based on assumed shear-wave velocities of the two uppermost layers of the geotechnical profile

VALENTINA MONTALDO FALERO

VICE PRESIDENT, GEOLOGIST

Years with the firm

17

Years total

24

Professional associations

Member, Earthquake Engineering Research Institute

Member, Seismological Society of America

Languages

English – Fluent

Italian – Fluent

Office location

Oakland, California

CAREER SUMMARY

Dr. Montaldo Falero has more than 20 years of experience in engineering seismology, including probabilistic seismic hazard analyses (PSHA) and deterministic seismic hazard analyses (DSHA). Her experience in PSHA includes regional studies (Italy, US, Canada, Papua New Guinea), site-specific studies for proposed new reactors (US, UK, Canada) including the siting of two small modular reactors (Carbon Free Power Project and Darlington), long-term hazard analyses for nuclear waste repositories (Canada), re-evaluation of the seismic hazard for existing nuclear facilities and systems of dams (US, Spain, and Canada), site-specific seismic hazard studies for oil and gas infrastructure and US diplomatic compounds in multiple locations worldwide. She has participated in six SSHAC Level 3 and one SSHAC Level 1 projects.

Dr. Montaldo Falero has compiled earthquake catalogs from a variety of instrumental and historical sources for many regions in the world and has developed empirical magnitude conversion relationships for parts of western North America for use in PSHA. She has extensive experience in working under NQA-1 and ISO Quality Assurance Programs.

EDUCATION

Doctor of Philosophy (PhD), Geology (Seismology), Università degli Study di Milano-Bicocca, Italy	2006
Master of Science (Laurea), Geology, Università degli Study di Milano, Italy	2000

PROFESSIONAL EXPERIENCE

- Comprehensive Probabilistic Seismic Hazard Assessment, Brookfield Dams. 2022-present. The objective of this project is to perform a site-specific seismic hazard evaluation for three dams following Chapter 13 of FERC's Engineering Guidelines for the Evaluation of Hydropower Projects (Idriss et al., 2018). Dr. Montaldo Falero is responsible for updating the earthquake catalog to verify the applicability of the existing recurrence model for the Central Eastern U.S. and to perform seismic hazard calculations.

- Review of PG&E Background Seismicity Model, Pacific Gas & Electric (PG&E), 2021. Conducted third-party review of the background seismicity model that PG&E plans to use for the Deterministic Seismic Hazard Report of all PG&E dams. Dr. Montaldo Falero was responsible for evaluating the compilation and processing of the earthquake catalog, and its use in determining seismicity rates.

- Update of Valley-Wide and Site-Specific Seismic Hazard Analyses for the Tennessee Valley Region, Tennessee Valley Authority (TVA), 2028-2020. The scope of the project was to conduct a region-wide assessment of the seismic hazard and individual site-specific probabilistic seismic hazard analyses for 92 projects, including earth or concrete dams and appurtenant structures. Dr. Montaldo Falero was responsible for checking the applicability of existing models, verify the effect of induced seismicity sources on the hazard, perform seismic hazard calculations.

- U.S. Army Corps of Engineers (USACE), USACE/Willamette Valley/Seismic, Willamette, OR, 2018 – 2019. Dr. Montaldo Falero developed the earthquake catalog for use in probabilistic seismic hazard analyses and conducted probabilistic seismic hazard analyses at 13 dams located in the western Cascades Mountains in central

Oregon. The results of this seismic hazard study provide input to risk evaluations of the dams.

— Probabilistic Seismic Hazard Analysis for Mactaquac Generating Station, New Brunswick, New Brunswick Power, 2017-2018. Dr. Montaldo Falero evaluated the need to update the seismic hazard model prepared in a previous study (2012) considering new seismic data. She was also responsible for conducting the probabilistic seismic hazard analyses to obtain the design ground motion prescribed by the Canadian Dam Association guidelines.

— U.S. Army Corps of Engineers (USACE), USACE/Willamette Valley/Seismic, Willamette, OR, 2016-2017. Dr. Montaldo Falero developed the earthquake catalog for use in probabilistic seismic hazard analyses and conducted probabilistic seismic hazard analyses at 13 dams located in the western Cascades Mountains in central Oregon. The results of this seismic hazard study provide input to risk evaluations of the dams.

— Probabilistic Seismic Hazard Analysis, BCHydro and Power Authority, BC, Canada (multiple locations). 2008-2013. This SSHAC Level 3 study developed a comprehensive probabilistic seismic hazard analysis (PSHA) model for the region encompassing the dams and appurtenant structures owned and operated by BC Hydro. Dr. Montaldo Falero assisted in preparing and analyzing a uniform earthquake catalog for crustal earthquake and one for subduction earthquakes and performed the preliminary and final seismic hazard calculations at 42 sites.

— Frontier Observatory for Research in Geothermal Energy (FORGE), UT, University of Utah. 2017-2022.
— Comprehensive Probabilistic Seismic Hazard Assessment, Offshore Guyana, ExxonMobil. 2021.
— P'nyang Project PSHA, Papua New Guinea, ExxonMobil PNG Limited. 2018-2019.
— Seismic Hazard Analyses for the Landslide Footprint Mapping Project, Golder Associates. 2017.
— Comprehensive Probabilistic Seismic Hazard Assessment, Offshore Guyana, ExxonMobil. 2016.
— Santa Elena Mine Seismic Hazard Assessment, Mexico, Majestic Silver Company. 2020.
— San Dimas Mine Seismic Hazard Assessment, Mexico, Majestic Silver Company. 2020.
— Limited Seismicity Update for U.S. Diplomatic Compounds (2014-2020):

RECENT PUBLICATIONS & PRESENTATIONS

— "Modeling time dependent earthquake occurrences on faults: examples from recent PSHA studies", Montaldo Falero, V. and Youngs, R.R., Proceedings of the 18th World Conference on Earthquake Engineering, Milan, June 30-July 5, 2024.
— "Virtual fault ruptures in area-source zones for PSHA: Are they always needed?", J.J. Bommer and V. Montaldo Falero. Seismological Research Letters, doi: 10.1785/0220190345. 2020.
— "Assessing the Need for an Update of a Probabilistic Seismic Hazard Analysis Using a SSHAC Level 1 study and the Seismic Hazard Periodic Reevaluation Methodology", S.J. Payne, K. J. Coppersmith, R. Coppersmith, V. Montaldo Falero, R. R. Youngs, A. Rodriguez-Marek, and W. Silva. Nuclear Engineering and Design, Vol. 323, pp. 103-119.

ERIC VANHEMERT

Assistant Vice President/ Senior Lead Estimator, Project Controls

YEARS WITH THE FIRM

3

Years total

17+ Years

Areas of practice

Preconstruction
Management
Estimating
Management
Project Controls
Project Management

Office location

Seattle

CAREER SUMMARY

Construction management professional with extensive experience in a broad range of responsibilities in the Heavy Civil industry. Specialist in team management, project planning and constructability analysis, construction cost estimating, and support for design-build construction processes. Experienced in multiple project delivery types including design-build, progressive design build, GCCM, design-bid-build and P3 on a variety of project values up to $1.5 billion. Primary clients in the Heavy Civil industry include Transit Authorities, Federal Transportation Administration, multiple DOT's as well as local municipalities.

EDUCATION

B.S. Civil Engineering 2006

Montana Tech of the University of Montana, Butte Montana

PROFESSIONAL EXPERIENCE

- Valley Link Light Rail System, Tri-Valley San Joaquin Valley Regional Rail Authority, Alameda and San Joaquin Counties, CA. Senior lead estimator.
- Sweetheart Lake Hydroelectric Project, Juneau Hydropower Inc., Juneau, AK. Senior lead estimator.
- Alondra Park Multi-Benefit Stormwater Capture Project, County of Los Angeles Dept of Public Works, Lawndale, CA. Senior lead estimator.
- VIA ART East/ West Corridor, Bus Rapid Transit, VIA Metropolitan Transit, San Antonio TX. Senior lead estimator.
- BART Silicon Valley Phase II Extension, Santa Clara VTA, Santa Clara County, CA. Senior lead estimator.
- Multiple Hydroelectric Pumped Storage, Site Planning, Private Client, Western United States. Senior lead estimator.
- VIA ART North/ South Corridor, Bus Rapid Transit, VIA Metropolitan Transit, San Antonio TX. Senior lead estimator.
- I-405 Bus Rapid Transit and Bus Operations & Maintenance Facility, Sound Transit, King County, WA. Senior lead estimator.
- Hydroelectric Pumped Storage Facility Upgrades - 2 Sites, Private Client, Western United States. Senior lead estimator.
- Atlanta Network Distribution Center Facility Upgrades, United States Postal Service, Atlanta, GA. Senior lead estimator.
- Frontrunner Forward Commuter Rail System Expansion, Utah Transportation Authority, Salt Lake and Utah Counties, UT. Senior lead estimator.
- Hydroelectric Pumped Storage, Facility Upgrades, Private Client, Western United States. Senior lead estimator.

PREVIOUS EXPERIENCE

GRAHAM CONTRACTING, LTD.-- BELLEVUE, WA
CHIEF ESTIMATOR

- Supervision of the Heavy Civil estimating and preconstruction department
- Focus on estimate accuracy, quality and estimating team communication to provide a solid product for submission.
- Setup, organization and delegation of estimate tasks and responsibilities
- Lead and direct Joint Venture pursuits on complex civil projects
- Collaboration with design firms throughout the design build process providing direction and guidance and structured expectations to maximize efficiency and minimizing risk.
- Development of the district business plan for upcoming years and provided input and direction for strategic project selection.
- Training of new employees in estimating practices, technical/software utilization, quantity take offs and vendor communications.

WALSH GROUP-- SEATTLE, WA
CHIEF ESTIMATOR

- Provide and coordinate full estimating and preconstruction services to procure work through directing the Estimating/Pre-construction department.
- Setup, organization and delegation of estimate tasks and responsibilities.
- Assemble bid teams, develop bid strategies, and provide direction to team members throughout all pursuits.
- Lead and direct Joint Venture pursuits, draft JV documents, and organize and reconcile quantity and cost reviews.
- Interface with design firms throughout the design build process providing guidance and direction for maximum efficiency while minimizing risk.

PCL CIVIL CONSTRUCTORS-- BELLEVUE, WA
CHIEF ESTIMATOR

- Management of the estimating and preconstruction services group.
- Assemble bid teams, develop bid strategies, and provide direction to team members throughout our pursuits.
- Lead and direct Joint Venture pursuits, draft JV documents, and organize and reconcile quantity and cost reviews.
- Interface with design firms throughout the design build process providing guidance and direction for maximum efficiency while minimizing risk.
- Provide training for new employees and reinforcement training for existing employees.
- Estimate close out, subcontractor selections, risk management, fee recommendations and effective/efficient project staffing.

STEFAN SCHADINGER, PMP, PE

Senior Structural Engineer

Years with the firm

24

Years total

28

Professional qualifications

Professional Engineer: AL - DE - IN - MA - MD ME - MI - NC - NH - NJ NY - PA - TN - TX - VA VT - WI - WV

Project Management Professional (PMP)

Areas of practice

Dam Safety

Independent Consultant

Dam Rehabilitation and Remediation

Analysis and Design – Civil/Structural

Structural Inspection

Instrumentation and Monitoring

Office location

Boston

CAREER SUMMARY

Stefan Schadinger is the national business line structural lead within the Energy Group. A principal engineer with extensive experience in hydropower and thermal power projects, Stefan has performed steel and concrete detailed structural designs and stability analyses of hydropower and thermal projects. Stefan is approved as a Federal Energy Regulatory Commission (FERC) Independent Consultant to perform Part 12D dam inspections and has experience directing Potential Failure Mode Analyses (PFMA) sessions. He has over 25 years' experience, with a majority of this time, working on FERC and State Dam Safety and related concerns.

Stefan has been a FERC Independent Consultant on 9 projects, and has participated/assisted on several other Part 12D dam safety inspections and been a core member of the PFMA review sessions.

Stefan has experience inspecting, performing site condition assessments and working on various structural and stability aspects of arch dams, concrete gravity dams, earthen embankments, spillways, Tainter and Stoney gates, penstocks and tunnels, high capacity post-tensioned anchor designs and installation. As part of the analyses and evaluations performed, he also has extensive experience interpreting dam instrumentation.

Stefa has also been involved with Headwater Benefits determinations which involve the calculation of additional energy production possible at a downstream hydropower project resulting from the regulation of river flows by an upstream storage reservoir.

EDUCATION

M.S., Structural Engineering, Northeastern University	2005
B.S., Civil Engineering, University of Vermont	1995

PROFESSIONAL EXPERIENCE

- Vischer Ferry Dam (New York Power Authority (NYPA)) (2021-Present). Senior structural engineer supporting structural, mechanical and operational modifications considerations to mitigate effects of winter ice jams and flooding impacts on surrounding properties. As a lead structural engineer his responsibilities included evaluating dam stability, assessing various gate alternative impacts and identifying modifications to meet the project's stability requirements.
- Mio Dam Project (Consumers Energy, MI) FERC Part 12D Periodic Inspection (PI) (Ongoing). As Independent Consultant, specific duties included the following: Performed the field inspections for the 5 MW project structures that includes a 195 ft. long right earth embankment, 529 ft. long auxiliary spillway, 476 ft. long middle earthen embankment, 20 ft. Tainter gate spillway structure, 65 ft concrete and masonry powerhouse and a 725 ft. long left earth embankment. Preparation of the FERC Tenth Periodic Safety Inspection Report for the Mio Dam Project (On going). Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses. Responsible for the review and evaluation of the instrumentation records.
- Valenciano Dam (Puerto Rico Aqueduct and Sewer Authority). Senior Structural Engineer responsible for leading the design of structural elements of this new RCC dam, including: tainter gate support piers, training walls, water intake tower, stilling basin, and the overall structural stability analysis of the RCC Dam. Leading the

preparation of structural engineering basis of design report, coordinating on structural seismic analysis and design.

- Foote Dam Project (Consumers Energy, MI) FERC Part 12D Periodic Inspection (PI) (Ongoing). As Independent Consultant, specific duties included the following: Performed the field inspections for the 9 MW project structures that includes a 3,400 ft. long right earth embankment with emergency spillway near its termination, 103 ft concrete and masonry powerhouse, 93 ft. Tainter gate spillway structure and a 700 ft. long left earth embankment. Preparation of the FERC Tenth Periodic Safety Inspection Report for the Mio Dam Project (On going). Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses. Responsible for the review and evaluation of the instrumentation records.
- Pensacola Project (Grand River Dam Authority, OK). FERC Comprehensive Assessment (CA) (Ongoing). As the IC, specific duties included the following: Performed the field inspections for the 120 MW project structures that includes a 28 ft non-overflow section, 4,284 ft 51 multi-arches concrete dam with 52 buttresses, a 851 ft spillway, a 451 ft left non-overflow section, a middle spillway and an East spillway along with a non-water retaining powerhouse. Review and evaluation of existing project documentation, including stability. Review and evaluation of the instrumentation records. Review and partial preparation of the PIPR. Participated in the PFMA and risk workshop as the IC and as the structural subject matter expert.
- Turners Falls Hydroelectric Project (FirstLight, MA). As PFMA facilitator led the Design and Construction PFMA for the rehabilitation of the Power Canal Left Dike. 3,900 ft earthen embankment with a 1,000 ft section to undergo addition of a 2.5-ft thick earthen berm with an underlying sand filter blanket. 1,000 ft 5-ft by 8-ft deep sand diaphragm filter at the toe of the slope with 10” dia. HDPE perforated pipe surrounded by free-draining gravel.
- Northfield Mountain Pumped Storage Project (FirstLight, MA). FERC Comprehensive Assessment (CA) (2023-2024). As the structural subject matter expert, specific duties included the following: Performing field inspections of the project structures. Participated in the PFMA and risk workshop as the structural subject matter expert. Review and partial preparation of the FERC CA Report for the project. Review of the L2RA Report for the project. Review and evaluation of existing project documentation, including stability. Review and evaluation of the instrumentation records.
- Hodenpyl Dam Project (Consumers Energy, MI) FERC Part 12D Periodic Inspection (PI) (2023). As Independent Consultant, specific duties included the following: Performed the field inspections for the 13.9 MW project structures that includes a 500 ft. long uncontrolled emergency spillway, a 3,853 ft. long right earth embankment with steel sheet pile wall capped with reinforced concrete, a 105 ft. long powerhouse, and 322 ft. long left earth embankment with steel sheet pile wall capped with reinforced concrete. Preparation of the FERC Tenth Periodic Safety Inspection Report for the Hodenpyl Dam Project (On going). Responsible for the review and evaluation of existing stability, seismic and hydraulic analyses. Responsible for the review and evaluation of the instrumentation records.
- Tippy Dam Project (Consumers Energy, MI) FERC Part 12D Periodic Inspection (PI) (2023). As Independent Consultant, specific duties included the following: Performed the field inspections for the 20 MW project structures that includes a 460 ft. long right earth embankment, a 118 ft. long spillway with tumble bay and four Tainter Gates, 147 ft. long powerhouse, and 100 ft. long left earth embankment. Preparation of the FERC Tenth Periodic Safety Inspection Report for the Tippy Dam Project (On going).

7 | Cost

The estimated cost for every task identified in the proposal and total project cost are presented in a separate document.

8 | Exceptions to the RFP and/or Professional Service Agreement

WSP certifies that it takes no exceptions to this RFP, including but not limited to, the Authority's Agreement for Services (Agreement), as attached in Exhibit B of RFP.

The RFP does not outline services for Geotechnical or geophysical data collection. Based on the available data for the project, these services may be required to complete the scope of services herein. WSP's proposed cost does not include these extra services but may be included in a later data via contract modification.

The RFP notes an application process at various points. The overall proposed scope of work does not seemingly require a particular project application to any named agencies. WSP's proposed costs do not include efforts for grant, environmental, or dam safety applications. These extra services may be included at a later date via contract modification.

9 | Proposal Authorization

The proposal is signed by Debby Reece, Senior Vice President, California Water Business Line Leader at WSP.

10 | Proposal Submittal

One (1) electronic copy of the proposal document and one (1) electronic copy of the proposed costs in separate PDF files are submitted to PlanetBids.

Client Cost Estimate Breakdown
Project Name: Seismic Evaluation of Sweetwater Dam Outlet Tower and Conduit
Date Prepared: 1/16/2025

Task	Hours	Cost
1 - Kick-off Meeting	60	$16,477
2 - Documents to be Provided by the Authority	32	$7,776
3 - Schedule Development	10	$2,621
4 - Developing Evaluation Criteria	72	$17,959
5 - Seismic Evaluation	400	$76,521
6 - Report Updates	248	$50,092
7 - Conceptual Level Design & Budgetary Cost Estimates	312	$57,765
8 - Project Management and Meetings	216	$53,811
9 - Expenses		$3,356
Total Not-to-Exceed Cost Estimate	**1,350**	**$286,378**

WSP provides this cost breakdown for informational purposes only. WSP quotes only the estimated Not-to Exceed cost for this proposal. Quote is valid for 90 days.