## Statement of Qualifications for the **CITY-COUNTY OF BUTTE-SILVER BOW**



Basin Creek Dam #1 Rehabilitation



🎽 Gannett Fleming

December 22, 2021



Client Commitment 💒 Empowered Employees 🖗 Quality Solutions

#### HELENA

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#### BILLINGS

6780 Trade Center Avenue Billings, MT 59101 Ph: (406) 652-5000 F: (406) 248-1363

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#### GREAT FALLS

702 2nd Street S, #2 Great Falls, MT 59405 Ph: (406) 952-1109

#### SPOKANE

9221 N Division Street Suite F Spokane, WA 99218 Ph: (509) 413-1430



December 22, 2021

Jim Keenan Chief Water Operator Department of Public Works 126 West Granite Street Butte, MT 59701

#### RE: Request for Qualifications - Basin Creek Dam #1 Rehabilitation Project

Dear Mr. Keenan:

Great West Engineering is pleased to submit our qualifications for the design and construction management of the Basin Creek Dam #1 Rehabilitation Project. Great West has crafted a team of specialists with the experience and qualifications to provide a high-quality, cost-efficient design for this project. We have also included the firm of Gannett Fleming on our team to provide specialized geotechnical and structural engineering services.

The Project Team is uniquely qualified to design the rehabilitation of the dam. Both Great West and Gannett Fleming have completed past work on Basin Creek Dam #1 and are intimately familiar with the deficiencies and proposed recommendations. Gannett Fleming is one of the leading National firms in dam rehabilitation utilizing post-tensioned anchors. They will bring that expertise to this project to ensure successful delivery of the post-tensioned anchoring system.

Our Project Manager and Team are committed to providing responsive service from start to finish. You will find Great West Engineering easy to work with and focused on maintaining open lines of communication. Whether it be in person or virtually, our communications will be customized to best serve the preferences of City-County of Butte-Silver Bow and the needs of the project.

We appreciate this opportunity to present the qualifications of Great West Engineering and Gannett Fleming. Don't hesitate to contact me at (406) 495-6193 with any questions or requests for additional information. We are truly excited about the possibility of working for the City-County of Butte-Silver Bow on the rehabilitation of Basin Creek Dam #1.

Sincerely,

Great West Engineering, Inc.

Jeremiah Theys, PE Project Manager

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Daniel McCauley, President Emeritus Dan has 43 years of civil and structural engineering experience. Robert Church, Senior Vice President Bob has 33 years of municipal and solid waste engineering experience.	D - Specialized Experience of the Project Team	14
<b>Craig Pozega, Vice President</b> Craig has 27 years of municipal engineering experience. <b>Chad Hanson, Vice President</b> Chad has 24 years of municipal engineering experience.	E - Project Management (Work Plan)	20
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#### Basin Creek Dam #1 Rehabilitation -City-County of Butte-Silver Bow **Statement of Qualifications**

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## WHY THE GREAT WEST TEAM



**Specializing in:** Natural Resources • Water • Wastewater • Planning Grant Writing and Administration • Transportation • Solid Waste

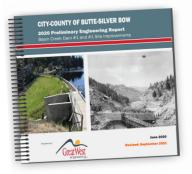








We Promise to truly listen to your project goals, be responsive to your needs, and advocate on your behalf.



#### FAMILIARITY WITH DAM

The Team of Great West Engineering and Gannett Fleming are intimately familiar with the current operations of Basin Creek Dam #1. Having prepared the structural evaluation, Preliminary Engineering Report, and the preparation of MCEP (formerly TSEP) and RRGL grants has given us a thorough understanding of operations and how this dam is integral to the municipal water supply for Butte.



#### UNDERSTANDING OF THE PROBLEM

Completing analysis of the dam and evaluation of the alternatives for rehabilitation has given our Team in-depth knowledge of the problems facing the dam. This will allow us to hit the ground running on design. We don't need to take a step back and further analyze the system, we are ready to get started on implementing a cost-effective alternative that will ensure the long-term safety and operation of this dam.



#### DAM EXPERTS

In the past 10 years, our Team has completed inspections, designs, and/or risk assessments for over 800 dams throughout the United States. Many of these projects have included design and installation of post-tensioned anchors varying in design capacity from 422 kips to 2039 kips (12-strand to 58-strand). With the project goal including post-tensioned anchors, our vast knowledge and expertise will allow us to provide the necessary skills to address regulatory concerns, structural analysis, constructability issues, contractor qualifications and construction observation.

## A-CAPABILITY AND CAPACITY OF FIRM TO MEET TIME AND BUDGET REQUIREMENTS



## Our Team has an understanding of the deficiencies and the capacity to start work on the project right away!

Great West will serve as the Prime consultant for the Basin Creek Dam #1 Rehabilitation. Located less than an hour away in Helena, we are accustomed to working with the City-County of Butte Silver-Bow (BSB) and are extremely familiar with Basin Creek Dam #1 and its needs from writing the Preliminary Engineering Report (PER) and preparing the Montana Coal Endowment and Renewable Resource Grant and Loan grant applications. We have teamed with Gannett Fleming to provide specialized dam structural and geotechnical services. Gannett Fleming completed the structural analysis in 2019 on Basin Creek Dam #1 and completed the final report on the Dam in 2020. Gannett Fleming is highly aware of the Dam's structural deficiencies and the work needed to remedy them.

Great West has 85 staff members available including registered professional engineers, staff engineers, hydrogeologists, construction specialists, designers, technicians, surveyors, IT and administrative support staff. For this staff, the total annual hours available for projects is approximately 129,000 hours after vacation, holiday, training, sick leave, and administration. Founded in 1915, Gannett Fleming has over 60 offices, over 2,500 employees and specializes in dam engineering services.

Equally important is how well staff is utilized to efficiently meet the needs of our clients. Great West maintains a detailed schedule using specialized software, which establishes resource needs for current projects and projects over the next 24 months. The schedule is maintained by firm management and is used to determine project assignments, hiring needs, and assess the feasibility of pursuing new projects. As the prime firm, Great West will manage the project team's availability ensuring the availability and accessibility to successfully complete the Basin Creek Dam #1 Rehabilitation Project.

As a client, the City-County of Butte-Silver Bow will be a top priority and we are confident in our ability to provide responsive client service to complete the Basin Creek Dam #1 Rehabilitation Project. After consulting with Gannett Fleming, and based upon Great West's current and projected workloads, our team is well-structured to provide engineering services for the Basin Creek Dam #1 Rehabilitation Project.

#### UNANTICIPATED STAFFING ISSUES

With Great West's 85 plus staff and Gannett Fleming's 2,500 plus staff, we are confident that should unanticipated staffing issues arise, our team has the horsepower to continue on without missing a beat. As the prime consultant, 50% of the Great West Team has ownership in the firm and the vast majority have been with Great West for over 10 years. Our team is committed, is not going anywhere, and will see the project through to a successful completion.



We are providing several project profiles to demonstrate some of the Team's experience with dam rehabilitation projects, including a sampling of those with post-tensioned anchor structural reinforcement.

For services related to the rehabilitation of Basin Creek Dam #1, we have teamed with Gannett Fleming to provide expertise in geotechnical and structural design of dam systems. This teaming arrangement is complementary and results in the Team's capability to offer a full range of services for the design and construction of this project. Between the two firms, there are over a dozen projects that had challenges and requirements similar to those for the rehabilitation of Basin Creek Dam #1.

#### **GREAT WEST**

With over 30 years of experience in civil and hydraulic engineering, Great West has built our strengths to offer value and service at every point in the engineering process. Our in-house professionals are experienced, having a proven track record in the design and construction of dam rehabilitation projects. Our focus is on public sector civil engineering, project development/design, and construction management services. The firm's professional staff includes scientists and engineers in the disciplines of civil, structural, water resources, environmental, and construction engineering. The Great West Project Team recently completed the Preliminary Engineering Report for the rehabilitation of Basin Creek Dam #1 which has gained us in-depth knowledge about the problems that BSB is faced with. Our team also recently completed the concrete dam face

rehabilitation project on Flint Creek Dam for Granite County. This experience with a similar project in similar climate will serve invaluable for our approach to this rehabilitation project.

#### GANNETT FLEMING

For more than a century, Gannett Fleming has kept our focus on meeting the needs of our clients to deliver value, meet extraordinary challenges, and provide the best possible solutions. We currently provide services to more than 100 municipal clients. Our ability to understand our clients' needs and respond to their comments has helped us to sustain long-term client relationships, with several clients turning to Gannett Fleming for their dam safety needs for more than 20 consecutive years. We treat every dam rehabilitation project as if it were our facility, gaining understanding from the owner of the project goals and primary objectives, to provide cost-effective solutions while meeting regulatory and operational objectives.

We have extensive experience developing innovative engineering solutions for the rehabilitation of existing dams and the design and construction of new dams. We have also been integral in the development and management of dam safety and security programs from owner and regulator perspectives. We have provided dam safety peer reviews for federal and private owners and for state dam safety programs.



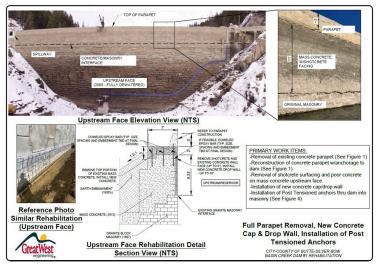


## City-County of Butte-Silver Bow, Montana

BASIN CREEK DAM #1 - PRELIMINARY ENGINEERING REPORT

In 2019, Montana's DNRC expressed concern about the deterioration of concrete on Basin Creek Dam #1, owned and operated by the City-County of Butte-Silver Bow (BSB). If BSB did not rehabilitate the structure, the DNRC could impose a reservoir restriction reducing storage in the reservoir from 1,000 acre-feet to less than 460 acre-feet. If that happened, the driving force necessary to provide gravity flow through BSB's recently completed Basin Creek Water Treatment Plant would be restricted. Basin Creek Reservoir is the source of 60% of Butte's water supply. The limited remaining capacity in the reservoir would be depleted quickly, forcing BSB to pump significantly more water from the Big Hole River, and thereby dramatically increase O&M costs.

In 2020, BSB commissioned Great West to prepare a Preliminary Engineering Report (PER) and applications for MCEP and RRGL funding. The PER identified the preferred alternative for rehabilitating the structure that included the full removal and replacement of the dam's parapet wall, concrete overlay over the dam face and installation of post-tensioned anchors.



Selected Rehabilitation Alternative (Full Parapet Removal, New Concrete Cap/Drop Wall And Post-tensioned Anchors)



Basin Creek Dam #1 Shortly After Concrete Cap and Buttress Placement in 1913

#### Grant Funding



#### Project Highlights

- Reduces threat of dam failure
- Protects 60% of BSB drinking water supply
- Prepared the two successful grants for the project, consisting of TSEP and RRGL, for \$625,000 in funding
- The quality of the PER helped propel the project in getting ranked #1 for TSEP grants (out of 41 total water/wastewater projects)

Contact

Jim Keenan Chief Water Operator (406) 475-4541

Project completed in 2020



## Granite County, Montana

FLINT CREEK DAM, SPILLWAY AND DAM FACE REPAIRS

The original masonry core of the Flint Creek Dam was constructed in the early 1900s. Over the years, weather and freeze-thaw action from the reservoir caused significant deterioration of the dam face and upstream spillway slab. Great West aided the County in securing an RRGL grant to partially fund the project. The repair design included a structural concrete cap over the existing concrete and a complete structural replacement of the upstream spillway slab. The project included structural analysis of the anchoring system to ensure the face concrete would survive freeze thaw effects and wave action from the lake. Great West also had to work with the selected contractor to develop a workable dewatering system to install the improvements.



▲ Completed Dam Face Rehabilitation, Upstream Face of Dam

## Grant Funding RRGL - \$125,000

#### Project Highlights

- Rehabilitated concrete on upstream dam face and performed minor joint and concrete repairs on spillway
- Dewatering
- Concrete surface preparation
- Reinforced concrete forming and pouring
- Construction administration
- Design
- Field inspections
- Grant writing & administration
- Permitting

#### Contact

Chuck Hinkle County Commissioner (406) 859-3519

Project completed in 2020





## Town of Clifton Forge, Virginia

CLIFTON FORGE DAM REHABILITATION

The Town of Clifton Forge contracted with Gannett Fleming to provide professional services for the Clifton Forge Dam, located in Clifton Forge, VA. The dam is a 265-foot-long, 53-foot-high concrete structure with a 135-foot-wide central spillway section, with inadequate discharge capacity and structural instability. The rehabilitation project brings this high-hazard dam into compliance with current dam safety criteria.

This original project assignment included professional services for the completion of inundation studies for the Clifton Forge Dam. The hazard classification of the dam was evaluated and inundation maps were generated to determine the potential downstream impact that a dam failure would have on the Town of Clifton Forge. Subsequent explorations of dam stability concluded that structural rehabilitation was needed, despite a decrease in the required spillway design flood because of the statewide Probable Maximum Precipitation study, which was published during project development. Field investigations also revealed substantial leakage at one horizontal construction joint and historical loading that may have overstressed the structure. Conceptual design alternatives were developed to expand the spillway capacity, improve the structural stability, and enhance the long-term reliability of various project features.

The final rehabilitation design included raising the nonoverflow sections of the dam; raising the left nonoverflow earth buttressed core wall section; removing the existing spillway piers; and installing one vertical 21-strand post-tensioned anchor in each of the three spillway monoliths. Raising the crest by approximately 3½ feet sufficiently increases structural stability by adding mass to the non-overflow sections of the dam such that no additional post-tensioned anchoring is necessary in these areas and, combined with the removal of the spillway piers, increases the spillway capacity sufficiently to allow containment of the entire spillway design flood within the spillway (i.e., no overtopping of the non-overflow section of the dam).

A new single-span pedestrian bridge was also designed for permanent access across the modified spillway. Challenging physical site constraints limit the access to perform the work and necessitated that the work be performed primarily by upstream water-borne access, including the installation of the post-tensioned anchors. Construction documents were developed using EJCDC documents, plus a construction cost estimate and anticipated schedule, all of which had to be approved both by dam safety regulatory authorities and the project's federal funding agency.

#### Project Highlights

- Structural rehabilitation
- Challenging site conditions
- Post-tensioned anchors installed by upstream water-borne access

#### Contact

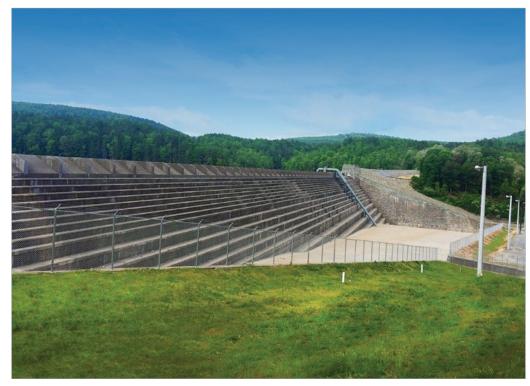
Darlene Burcham Town Manager (540) 863-2534



## New York City Department of Environmental Protection, New York



GILBOA DAM RECONSTRUCTION



The Gilboa Dam is a 96-year-old, 160-foot-high, 2,000-foot-long dam that impounds 20 billion gallons of water in the Schoharie Reservoir, providing 14% of New York City's water supply.

Gannett Fleming provided dam safety design services for complete reconstruction of the spillway and improvements to the earth portion of the dam. The dam safety modification program included structural analysis and design of innovative rock anchor technology as an interim risk reduction measure. A 220-foot-long, 5.5-foot-deep notch was cut into the spillway to divert flow from the anchor work area and serve as the primary mechanism for water level control. The 80 post-tensioned anchors have an average service load of more than 1,000 tons, making these anchors the highest capacity rock anchors installed in New York.

The spillway reconstruction also included the demolition of a stone masonry facade on the crest and downstream face of the 1,324-foot-long stairstepped spillway and replacement with reinforced concrete crest overlay and mass concrete downstream buttress, reconstruction of side channel and plunge pool paving using anchored reinforced concrete slabs, excavation, repairs, backfill **and anchoring of training walls.** 

Most of the construction work occurred within the spillway, which needed to remain fully functional throughout construction. Gannett Fleming developed a diversion plan to allow construction to take place sequentially within segments of the spillway while maintaining flow through other segments. The team also identified optimum times of the year when flood impact risks were lowest, developed a framework for a construction phase emergency operations plan, including procedures for monitoring weather and reservoir conditions, and developed measurement and payment provisions that provided for effective risk sharing between the contractor and NYCDEP.

#### Project Highlights

- Anchored reinforced concrete slabs
- Training wall anchors
- Functional spillway during construction
- 2015 ASDSO National Rehabilitation Project of the Year
- 2015 ACEC New York Diamond Award for Engineering Excellence

#### Contact

Ted Dowey, PE Portfolio Manager -Water Supply Capital Program (914) 764-4190





### Aqua Ohio, Inc., Ohio

LAKE HAMILTON DAM REHABILITATION



Lake Hamilton Dam is a 100-year-old gravity dam with primary deficiencies including insufficient spillway capacity and structural instability during the probable maximum flood (PMF) design event. The facility consists of a 70-foot high cyclopean concrete dam faced upstream and downstream with Ashlar masonry, a 140-foot wide principal spillway weir discharging into a 400-foot long spillway channel and a Lower Weir, also constructed of Ashlar masonry. The PMF was projected to overtop the dam and surrounding abutment topography by nearly 3 feet. Lake Hamilton Dam as well as the remnants of an old iron furnace adjacent to the dam are listed on the National Registry of Historic Places. Gannett Fleming conducted an alternatives analysis to assist the owner in selecting the most cost-effective solution to repair deficiencies and perform final design of the rehabilitation scheme.

Gannett Fleming's assessment and design provided a technically sound, cost-effective solution to improve the safety of the dam. Flexibility in construction documents allowed the owner to develop the project in phases to suit available funding. Cultural resource investigations and other permitting complications were successfully cleared to secure construction permits. Specialty expertise provided during construction ensured successful anchor installation. Gannett Fleming incorporated owner-directed design scope expansion and changes in permitting strategy, which increased the original design budget by approximately 36 percent and, with Owner approval, extended the project schedule to encompass bid phase, construction phase, and post-construction monitoring services.

#### Project Highlights

- Alternatives analysis
- Permitting assistance
- Structural design
- 13, 350-kip posttensioned anchors used for structural stability
- Seepage control and monitoring at abutments
- Concrete and masonry repairs

Contact

Brian Bisson, PE VP Engineering (330) 726-8151





### Mahoning Valley Sanitary District, Ohio

MINERAL RIDGE DAM



Mineral Ridge Dam is a 60-foot-high earth embankment dam with a concrete core wall impounding the Meander Creek Reservoir used for drinking water supply. The reservoir has a capacity of approximately 62,000 acre-feet (20.2 billion gallons) of water at the dam crest. Due to its large storage capacity and downstream hazard potential, ODNR has classified Mineral Ridge Dam as a Class I structure. This classification indicates that failure of the structure could result in probable loss of human life and flooding of other critical structures. To meet current requirements for Class I structures, MVSD contracted with Gannett Fleming to provide the necessary inspection, analyses, design and construction phase services of the dam, spillway and appurtenant structure rehabilitations to help to maintain the integrity of this water supply.

Unique Challenges: Gannett Fleming evaluated the hydraulic adequacy and performance of the existing water conveyance structures, including the outlet works, principal spillway, and auxiliary spillway. Embankment modifications include raising the concrete core wall to the top of dam elevation, flattening the embankment slopes, and installing a chimney, blanket and toe drain system with weir boxes and instrumentation. Planned modifications to the 260-foot-long principal spillway include concrete lining to repair the deteriorated surfaces of the ogee and training walls and raising the training wall to accommodate embankment flattening. Because the new concrete lining modifies the shape of the ogee, CFD modeling was completed to confirm that proposed modifications would not reduce the discharge capacity of the ogee weir or induce adverse hydraulic conditions. *To meet stability criteria for the principal spillway and gate house structure, Gannett Fleming designed inclined, 31-strand and 43-strand post-tensioned anchors with design capacities of 1,090 kips and 1,512 kips.* 

#### Project Highlights

- Class I structure
- Geotechnical analysis
- Underwater investigations
- Independent technical review
- Construction 2022-2023

#### Contact

James Jones, PE, CCM Chief Engineer (330) 62-3614

Basin Creek Dam #1 Rehabilitation -Statement of Qualifications



## Pennsylvania Department of Conservation and Natural Resources, Pennsylvania

LYMAN RUN DAM REHABILITATION

Lyman Run Dam creates the 40-acre lake within Lyman Run State Park and is a focal point for recreation for local communities. Since the construction of the earthfill dam in 1951, significant problems with seepage have occurred. As a result of dam safety concerns, PA DCNR decided to replace the old earthfill dam with a new earthfill dam constructed at the same location.

Benefit/Value to Client. The permit restrictions and spillway design requirements offered significant design challenges including requiring that the dam pass the full PMF, provide the same stage-discharge spillway relationship as the previous dam up to the 100-year flood, and required that the embankment dam crest remain unchanged and not be overtopped during passage of the PMF. The solution was the design of the largest two-stage labyrinth spillway constructed in Pennsylvania treated with upstream reinforced concrete facing . The project also required the design of a cold-water release system and nature-like spillway exit channel to enhance downstream trout habitat. The bedrock geology at the site was not favorable, and the labyrinth spillway design required special foundation features to provide sliding stability and seepage control. It was more cost-effective to remove weak foundation material and replace it with an RCC pad than to design traditional conventional concrete structural features. Gannett Fleming was also creative with the disposal of waste materials from the demolition of the original dam. Almost all earth fill was recycled and used to construct the new embankment dam. All concrete rubble from demolition of the original spillway structure was also recycled and used to construct fish structures within the reservoir.

Results Accomplished. Quality assurance services performed by Gannett Fleming during construction confirmed the reconstructed facility met specified quality requirements along with current dam safety performance criteria. Prior to refilling the reservoir, agency staff were trained in the skills needed to properly operate the dam and how to prepare for emergency response, if needed. Engineering design and construction phases services were completed within owner's budget and schedule constraints. Total seepage at the dam was reduced from historic peak of 470 gallons per minute (GPM) to less than 1 GPM post-filling.

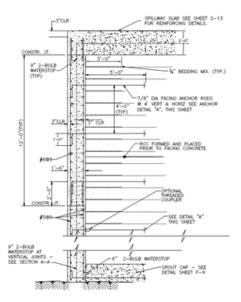


#### Project Highlights

- 224-foot-wide labyrinth spillway, reinforced concrete upstream face
- Geotechnical investigations and analysis
- Foundation design
- Seepage and stability analysis
- Reinforced concrete
- RCC placement
- Post-refilling monitoring
- Staff training

#### Contact

Ed Raptosh Chief Engineer (717) 783-3329



#### City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

December 22, 2021

## C-OVERALL AND SPECIALIZED EXPERIENCE OF THE FIRM



The proposed Team offers current expertise in concrete dam repairs and post-tensioned anchor design and construction. Great West and Gannett Fleming both have relevant dam rehabilitation experience that will be fully utilized on this project. The Team offers unparalleled expertise, qualifications, and experience to design and manage construction of this project.

Great West Engineering, Inc. is a small business enterprise with offices in Helena, Billings, Great Falls, Montana, Boise, Idaho and Spokane, Washington. We are a 33-year old, 85-person firm that provides comprehensive engineering services to local, state and federal agencies throughout Montana. Great West has managed civil, water resources, and environmental engineering projects across Montana serving entities from less than 100 residents to those with populations in excess of 50,000. We offer experience designing site specific systems capable of operating in severe climate conditions and under the fluctuating demand associated with seasonal use.

Gannett Fleming's involvement with dams began in 1915 when the firm was founded. The founders were tasked with the design of two flood control dams. Since then, completed dam projects have included more than 100 new dams, modification of more than 500 existing dams, and safety evaluations of more than 1,000 dams. In the past 10 years, Gannet Fleming has completed inspections, designs, and/or risk assessments for over 800 dams throughout the U.S. Over the last 10 years, Gannett Fleming has designed dam rehabilitation projects for concrete, zoned earthfill, homogeneous earthfill, masonry, timber crib, and inflatable dams with rehabilitation construction costs ranging from \$50,000 to \$400 million. The work completed for these projects typically includes field surveys and mapping, hydraulic and hydrologic analyses, geotechnical investigations, structural analyses, permitting, design, preparation of plans and specifications, cost estimating, and construction phase services.

The Team of Great West and Gannett Fleming bring the following areas of expertise to help ensure the successful delivering of this project:

#### **PROJECT MANAGEMENT**

Great West will serve as the prime consultant on this project and will manage the overall day-to-day activities and subconsultants. Our proposed Project Manager, Jeremiah Theys, has experience in managing dam rehabilitation projects as well as complex design projects involving many different partners. Jeremiah served as the Project Manager for the completion of the Preliminary Engineering Report for the BSB Basin Creek Dam #1 Rehabilitation so he has a detailed understanding of the design recommendations and can quickly get this project off the ground. Jeremiah also recently served as the Project Manager for the Flint Creek Dam spillway and dam face repairs project which is similar in nature to the concrete dam face repairs required on Basin Creek Dam #1. Jeremiah has over 15 years of project management experience in projects ranging from \$5,000 in design fees to over \$4 million with multiple subconsultants.

#### STRUCTURAL ENGINEERING

Our Team of structural engineers are proficient in the technical analysis, design, and evaluation of the structural stability of concrete dams, including gravity, RCC, arch, multiple-arch, and buttress types. We regularly review structural analysis and design as part of Federal Energy Regulatory Commission (FERC) Part 12 inspections and perform structural analysis using ANSYS, a Finite Element Analysis program with full linear and non-linear modeling capabilities. Our staff provides training on stability analysis of concrete

## C-OVERALL AND SPECIALIZED EXPERIENCE OF THE FIRM



## Our Team includes experts in the design of all types of hydraulic structures.

dams through Association of State Dam Safety Officials (ASDSO). Team members have successfully performed 100+ complex structural evaluations for usual (normal), unusual (flood), and extreme (seismic) loading scenarios using linear and nonlinear analysis techniques.

Many of these projects have included design and installation of post-tensioned anchors varying in design capacity from 422 kips to 2039 kips (12-strand to 58-strand). When project goals include post-tensioned anchors, our Team's vast experience has allowed us to successfully provide a one stop shop addressing regulatory concerns, constructability issues, contractor qualifications and construction observation. Posttensioned anchors are a tool available to address structural stability, especially useful in dam design and rehabilitation to address deficiencies as structures age and/or regulatory requirements change.

We are experts in the design of all types of hydraulic structures, including flood walls, spillway structures, cofferdam walls, hydraulic barrier parapet walls, hydraulic channel guide walls, lock walls, and outlet works structures. Similarly, we design a wide variety of gates that are integral to the operation and performance of hydraulic structures. As part of our design process, we fully and holistically address key design considerations such as:

- » Loading conditions (water, soil, wave, seismic, seepage uplift, BS erosive seepage force loads and overtopping scour)
- » Stability (overturning, sliding, and global)
- » Foundation support systems, settlement control, and structure deflection control
- » Soil (structure interactions and resistance mobilization)
- » Structure through-seepage control measures
- » Under-seepage control measures
- » Overtopping prevention and/or damage control measures
- » Specialized treatment of joints and penetrations

#### **GEOTECHNICAL ENGINEERING**

Gannett Fleming has been designing earth structures since 1915. Our staff uses the latest computer-aided analysis and laboratory testing to determine stability, seepage paths, and construction materials for levees, dams, dikes, highway and railroad embankments, and other earth structures. We have designed tunnels and underground structures in many different geologic conditions, including soft clays, rock, sand, and mixed faces. We have experience working in rural mountainous areas, as well as urban areas where underpinning and protection of existing structures are critical.

Gannett Fleming is one of the leading firms in the field of dam design and dam remediation. By having a broad base of experience with dam remediation projects, we have seen firsthand many of the most critical and often overlooked failure modes and are uniquely positioned to incorporate these lessons-learned into our new dam designs and rehabilitation of existing dams. In particular, our recent experience at Oroville Dam (the tallest embankment dam in the U.S.) and our work at Diascund Dam (Virginia), Gilboa Dam (New York), and DeHart Dam (Pennsylvania) has exposed new concerns regarding earth cut and lined spillways, especially those located on highly erodible foundations. As a result, Gannett Fleming has developed and implemented special design features that make dams more reliable and resilient.

Gannett Fleming has a high degree of expertise in the design and rehabilitation of earth embankment dams with experience ranging from small, 15-foot-high earthfill dams to those exceeding 300 feet in height, including reconstruction design for the 180-foot-high Gilboa Dam. We are recognized experts in seepage analysis and seepage remediation design and evaluate, design, and oversee construction of slurry wall systems, soil and rock grouting, and geosynthetic liner systems. Our vast experience ranges from grouting using cement and chemical grouts to positive cutoffs including soil mixed and soil-cement-bentonite cutoff walls. We are

## C-OVERALL AND SPECIALIZED EXPERIENCE OF THE FIRM



### Great West Engineering has secured over \$284 Million in grant funding for our clients.

extremely familiar with the benefits and limitations of various methods of seepage control. Two recent and relevant projects highlighting this experience include Tempe Town Lake for the City of Tempe, AZ and Buckeye Lake Dam for the Ohio Department of Natural Resources.

#### CONSTRUCTION MANAGEMENT AND OBSERVATION

Comprehensive construction management services are a critical component of any project. Our construction management manager will ensure BSB stays up to date on the construction schedule and activities being performed by the Contractor. Great West approaches construction as a team activity between the Engineer, Owner, and Contractor. The project Team will determine the progress meeting frequency as well as the correspondence plan. Each entity will designate a key person for all communication.

A full-time Resident Project Representative will be provided on this project to monitor the day-to-day construction progress and ensure the specifications and drawings are followed. Proper quality control is essential to the long-term performance of posttensioned anchors in dams, particularly related to corrosion protection of the anchor components and maintaining anchor load. We understand all the stages of construction necessary for post-tensioned anchors beginning with review of the contractor's work plan to final capping of the anchor head. One of the crucial steps of post-tensioned anchor installation is verifying watertight drilled anchor holes; therefore, we commonly incorporate video inspection of drilled anchor holes as an additional quality control step beyond the guidelines in Recommendations for Prestressed Rock and Soil Anchor published by the Post-Tensioning Institute.



#### GRANT WRITING AND ADMINISTRATION SERVICES

Great West is one of the leading firms in Montana for securing grant funding for projects. To date, we have secured over \$284 million in grants to help our clients offset project costs. Great West assisted BSB in securing an MCEP grant for \$500,000 and a DNRC-RRGL grant for \$125,000. We understand that BSB is still looking for grants to help close the gap in project costs, which will allow BSB to budget for other needed infrastructure projects. Our team of grant writers is closely tracking ARPA funding as well as the new federal infrastructure bill. There are also proposed changes to the FEMA High Hazard Potential Dam program which may be favorable for BSB eligibility. Our team of funding specialists will continue to monitor all potential grant funding opportunities and notify BSB of any possible grants available.

Great West has included our leading grant specialist, Craig Erickson, as part of our project team. Craig is an expert in managing MCEP (formally TSEP) and RRGL grants and regularly helps clients with start-up conditions, fund tracking, draw requests and general grant management services. Craig will be available to assist BSB as needed in the management of the MCEP and RRGL grants and other grants pursued for this project.



### Team offers experts in dam rehabilitation projects.

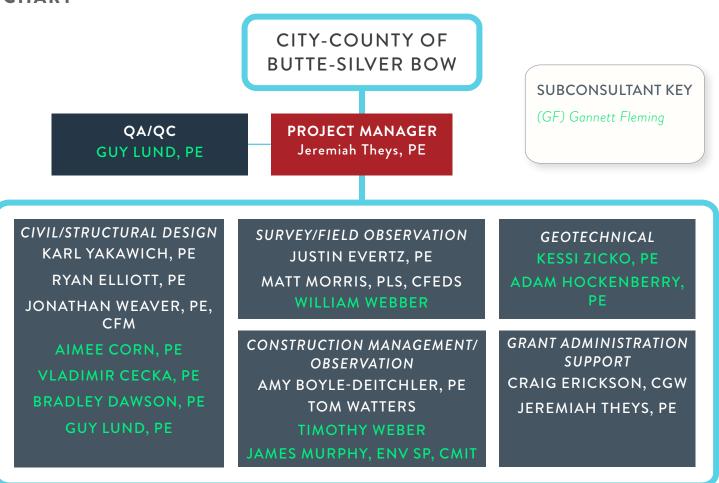
We have assembled a team of specialists that is very familiar with the Basin Creek Dam #1 Rehabilitation Project - our core members either completed the Preliminary Engineering Report or structural analysis on this dam. This experience will allow the team to hit the ground running on the project, saving time and money. We have also included Gannett Fleming as a subconsultant on this project. We anticipate utilizing Gannett Fleming's expertise in the geotechnical and structural engineering of this rehabilitation project.

Our team includes a highly experienced grant specialist who recently assisted BSB in securing \$625,000 in grants through the MCEP and RRGL programs. Please refer to

#### ORGANIZATIONAL CHART

the organizational chart below which details our team and their roles. Highlights on each team member can be found on pages 15-19. Please refer to the Appendix for detailed resumes.

Our core Team members have either completed the Preliminary Engineering Report or Structural Assessment on the Basin Creek Dam #1.





Key Staff and Role	Benefits to Butte-Silver Bow City-County	Availability
JEREMIAH THEYS, PE Project Manager	<ul> <li>Principal and Project Manager with over 20 years of experience in the design of hydraulic structures</li> <li>Jeremiah serves as the Engineer of Record for the Flint Creek Dam project in Granite County and was the Principal-In-Charge for the concrete dam face and spillway rehabilitation project</li> <li>Jeremiah assisted in the preparation of the Basin Creek Dam #1 PER and MCEP/RRGL grant applications</li> <li>Jeremiah has worked on multiple dam concrete rehabilitation projects over the last 10 years</li> </ul>	60%
GARY LUND, PE QA/QC	<ul> <li>39 years of experience in dam safety, design, analysis, inspection, and construction</li> <li>Specializes in the evaluation of concrete dams and has performed nearly 100 structural analyses on concrete dams using finite element methods of analysis</li> <li>Served on more than 5 Board of Consultant teams including emergency repairs of the Wanapum Spillway for Grant County Public Utility District</li> </ul>	30%
RYAN ELLIOTT, PE Civil/Structural Engineer	<ul> <li>Knowledgeable on the Basin Creek Dam, having performed the 2020 Preliminary Engineering Report</li> <li>Familiarity of funding agency preferences and experience with DNRC RRGL and MCEP</li> <li>14 years of experience in design and permitting for hydraulic projects</li> <li>Specialized experience in structural concrete projects for hydraulic structures, including rehabilitation projects</li> </ul>	50%
KARL YAKAWICH, PE Civil/Structural Engineer	<ul> <li>Structural Engineer with 20 years of experience in Montana</li> <li>Experienced with most current concrete rehabilitation techniques on existing structures</li> <li>Oversees a staff of ten experienced structural engineers providing diverse, robust, and specialized expertise</li> </ul>	50%



Key Staff and Role	Benefits to Butte-Silver Bow City-County	Availability
BRADLEY DAWSON, PE         Structural Engineer	<ul> <li>17 years of experience providing structural engineering services for dams and associated structures</li> <li>Expert in the structural design and analysis of concrete dams and reinforced-concrete hydraulic structures, finite element analysis, and risk analysis</li> <li>Provided structural services for more than 20 dams</li> <li>Project Manager for Basin Creek Dam #1, Structural Assessment and Stability Analysis to make recommendations for concrete repairs</li> </ul>	35%
AIMEE CORN, PE Structural Engineer	<ul> <li>9 years experience working on the design and analysis of concrete dams and reinforced-concrete hydraulic structures</li> <li>Areas of expertise include concrete dam evaluation, hydraulic structures, structural engineering, finite element analysis, post-tensioned anchors, and risk assessment</li> <li>Master's thesis focused on the evaluation of potential failure modes of post-tension anchored concrete gravity dams</li> <li>Provided structural services for more than 20 dams in the Western United States</li> <li>Provided structural assessment and stability analysis on Basin Creek Dam #1</li> </ul>	55%
AMY BOYLE-DEITCHLER, PE         Construction Manager	<ul> <li>Specializes in construction projects for Montana Communities</li> <li>Managed design and construction of infrastructure projects ranging in size from \$100,000 to \$200 million</li> <li>18 years in the construction and engineering industry focused on infrastructure improvements</li> </ul>	55%
KESSI ZICKO, PE Geotechnical Engineer	<ul> <li>22 years of geotechnical engineering experience for a variety of civil projects including dam and other water resources projects</li> <li>Specializes in soil and rock anchor design, shallow and deep foundation design, retaining wall design, settlement, material compatibility, and slope stability</li> <li>Designed passive and post-tensioned rock anchors as well as managed the subsurface exploration program at Mahoning Valley Sanitary District's Mineral Ridge Dam and Spillway Improvement Project</li> </ul>	25%



Key Staff and Role	Benefits to Butte-Silver Bow City-County	Availability
ADAM HOCKENBERRY, PE Project Engineer	<ul> <li>23 years of experience providing geotechnical services for the investigation, design, remediation, and construction of dam and reservoir projects, including high-hazard dams</li> <li>Manages and provides on-site and off-site technical support for dam foundation improvement projects, with expertise in grouting for both remediation and new construction</li> </ul>	55%
JONTAHAN WEAVER, PE, CFM Project Engineer	<ul> <li>Diverse engineering design background, specializing in water resources</li> <li>Excellent working relationship with the DNRC Dam Safety Program staff</li> <li>Worked on dam rehabilitation projects for Granite County and Hill County</li> <li>Provided construction oversight for the Flint Creek Dam Face Rehabilitation Project</li> </ul>	45%
VLADMIR CECKA, PE Project Engineer	<ul> <li>30 years of experience with expertise in structural engineering and concrete materials</li> <li>Recognized expert in concrete design, having developed Chapter 30, Concrete Design, and Chapter 70, Design and Analysis of Risers, of the NRCS National Engineering Handbook, Part 636, Structural Engineering</li> <li>Worked on more than 160 structural projects during his tenure with Gannett Fleming, including more than 50 dam projects</li> <li>Experience includes dam rehabilitation design and specifications, performing field inspections to determine damages and evaluate recommendations for improvement, and a variety of structural modification services</li> </ul>	30%
JUSTIN EVERTZ, PE Project Engineer	<ul> <li>Hydraulic Engineer with over 5 years of surveying and field experience</li> <li>Justin has been responsible for completing the Dam Safety Surveillance and Monitoring Report (DSSMR) for Flint Creek Dam in Granite County for the last 5 years</li> <li>Background in hydraulic analysis and design gives a unique perspective during data collection to ensure quality and relevant data is collected</li> <li>Survey crew chief for data collection on Flint Creek Dam in Granite County used to support the improvements of intake valves, stilling basin, dam face, and spillway</li> </ul>	60%



Key Staff and Role	Benefits to Butte-Silver Bow City-County	Availability
MATT MORRIS, PLS, CFEDS Surveyor	<ul> <li>PSL/CfedS surveyor with over 20 years of experience in Montana</li> <li>Highly experienced surveyor who has completed hundreds of surveys throughout Montana</li> <li>Experienced in survey support for engineering projects, utility improvement, subdivision plat and COS development, preparation and filing, FEMA Flood Zone surveys, dam improvements, and construction staking</li> </ul>	70%
WILLIAM WEBBER Survey/Site Investigation	<ul> <li>9 years of experience providing geological services for dam projects</li> <li>Develops and executes geotechnical and field investigative testing in support of dam assessments and remediation efforts</li> </ul>	70%
TOM WATTERS Construction Oversight/Inspection	<ul> <li>Tom has over 38 years of construction experience having owned construction companies in CA, AK, and MT</li> <li>Tom has provided inspection services on over 12 Natural Resource projects in the last three years while with Great West</li> <li>Has significant experience with the construction of complex structural concrete projects</li> </ul>	75%
TIMOTHY WEBER Construction Oversight/Inspection	<ul> <li>35 years of experience providing construction management, oversight, and inspection services for dam and spillway rehabilitation projects as well as other water resources projects</li> <li>Construction oversight and inspection for post-tensioned anchor installation</li> <li>Construction Manager for more than 15 dam/reservoir projects including the \$40.8 million Tempe Town Lake Dam Replacement where services included construction-phase services, post-design coordination, equipment start-up and testing services</li> <li>Experience includes determining whether work being completed meets the design intent and specifications; making recommendations to project staff, owner, and/or EOR for steering the project and each of its activities in the right direction; creating project-specific quality documents; and identifying, investigating, and managing projects risks</li> </ul>	50%



Key Staff and Role	Benefits to Butte-Silver Bow City-County	Availability
JAMES MURPHY, CMIT, ENV SP Construction Oversight/ Inspection	<ul> <li>12 years of experience providing construction oversight and project management on dam rehabilitation projects</li> <li>Construction oversight and inspection for post-tensioned anchor installation</li> <li>American Concrete Institute Concrete Field Testing Technician - Grade I</li> <li>Provides inspection of work, client coordination, quality assurance (QA), preparation of monthly pay estimates, submittal reviews, subconsultant management, interfacing with design team members, regulatory agency coordination, daily reporting, schedule reviews, as- built and quality assurance surveying, and overall project controls</li> </ul>	50%
CRAIG ERICKSON, CGW Senior Grant Writer	<ul> <li>Has helped small communities and water and sewer districts win over \$100 million in state and federal funding</li> <li>In 2020, Craig prepared Montana Coal Endowment Program (MCEP) applications for Butte-Silver Bow and Thompson Falls that were ranked #1 and #2 by the Montana Department of Commerce</li> <li>Offers expert-level project administration with over 20 years of experience funding and managing local, state, and federal funding for projects of all types and sizes</li> <li>Assisted with or prepared 60 Treasure State Endowment Program/ Montana Coal Endowment Program applications that received over \$50 million in TSEP/MCEP grant funding</li> </ul>	65%



## The following section provides a general work plan to complete the design and construction services for the Basin Creek Dam #1 Rehabilitation Project.

## PROJECT MANAGEMENT AND COORDINATION

Great West will provide project management services in support of the Basin Creek Dam #1 Rehabilitation Project. Activities associated with managing the project team, including subconsultants, monitoring and mitigating risk, assuring that quality checking activities are being conducted, and monitoring budget and schedule will be performed on a frequent basis. On a monthly basis, Jeremiah will assess the earned value of the work performed to determine the overall budget and schedule status of the project. As the work progresses, Jeremiah will closely monitor critical path activities and regularly report out the status to the team.

Quality, scope, budget, and schedule are critically linked throughout a successful project. Delivery of a quality project on budget and schedule requires careful planning and intensive on-going management throughout the implementation of the project.

#### KICKOFF WORK SESSION

We propose to initiate work on this project with a kickoff work session at which we will develop a clear set of project goals and objectives to ensure the project will meet everyone's expectations, improve efficiency, reduce costs, and prevent project delays. All interested stakeholders, as requested by BSB, will be invited to the work session. Communication and listening are key to successful implementation of all projects and this work session will give us the opportunity to set up an appropriate project management and communications plan.

#### COMMUNICATION

Critical project tasks include communication and active listening. Great West will add value to this project

through frequent and meaningful communication, by being responsive, and by proactively looking ahead to build momentum in completing the project. Our communications, whether it be in person or by video conferences, telephone conversations, email, or text messages, will be customized to best serve the preferences of BSB and the needs of the project.

#### **DESIGN SERVICES** PRELIMINARY ENGINEERING

As the project team has prepared the Structural Assessment and Preliminary Engineering Report for this rehabilitation project, we have a thorough understanding of the project deficiencies and recommended rehabilitation alternative. The recommendations from the PER will be compiled into a technical memorandum that will be submitted to the DNRC dam safety division and regional engineer to ensure their concurrence with the project recommendations. The technical memorandum will incorporate the project goals and objectives, including project schedule for concurrence with all stakeholders. This will be the basis for the design and schedule of the project.

#### SURVEY AND SITE INVESTIGATIONS

We will conduct a topographic survey of the site, locating all physical features and all utilities that may exist throughout the areas in which improvements will be made. We will also verify structural components of the dam and potential access and staging locations for construction. We understand that a bathymetric survey of the reservoir was completed recently, and we will utilize that data to the extent possible, along with previous designs completed for recent repairs. An aerial drone will be utilized during the survey phase to provide high quality imagery for design/ layout purposes.

# W Clear and frequent communication will be key to a successful project.

City-County of Butte-Silver Bow Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

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Site investigations for the design effort may be required. To determine need and scope of required site investigations, our team's first step will be to review and evaluate historical sampling and testing data. Previous investigations are understood to include physical observations, coring and testing of the existing mass concrete stair-stepped overlay. Available testing data is understood to include petrographic, compressive strength, and ASR susceptibility.

Observations completed by Gannett Fleming during execution of previous tasks at Basin Creek Dam #1 have included sounding of the upstream face and examination of the existing parapet. The upstream shotcrete overlay was found to be generally unsound with spalled sections and corroded wire mesh visible. Additionally, freeze-thaw damage exists along the parapet with deterioration extending several inches into the section. Additional investigations of the shotcrete and parapet are not anticipated. However, sampling and testing of the anticipated anchor bond zone may be required and is discussed in Section C, Geotechnical Engineering.

#### FOUNDATION INVESTIGATION/ GEOTECHNICAL ANALYSIS

Geotechnical analyses will consist of development of engineering parameters for anchor capacity calculations. At a minimum, engineering parameters of materials located within the bond zone will be required. If data to develop these parameters are not available, subsurface exploration to obtain samples will be required. Generally, materials present within the bond zone are subject to unit weight and unconfined compressive strength laboratory testing. Our conceptual evaluation determined that anchor capacity can be achieved within the "granite blocks and concrete" dam section. Extending the anchors into foundation bedrock is not anticipated.

Gannett Fleming has extensive experience with subsurface explorations for new post-tensioned anchors at gravity and arch concrete dams. We have developed relationships with subsurface investigation contractors throughout the US, several of which we maintain 'open-end' type contracts for rapid deployment. For existing dams, significant consideration must be given to site access for drilling equipment and safety of personnel.

Basin Creek Dam #1 site access challenges are not new to the Team. We envision use of a small track, skid or tripod rig on the dam crest to complete drilling depths through the anticipated anchor bond zone within the existing gravity "granite blocks and concrete" dam section. Although the top of the dam is less than 6 feet wide, we understand that truck access to both abutments exists to within several hundred feet of Basin Creek Dam #1. The left abutment includes an area for potential crane set-up to enhance drill equipment mobilization to the dam crest. Stairs exist on both abutments and will need to be considered, as well as the 1.5H:1V downstream earth fill slope. It is likely that removal of existing hand rail will be required to provide an adequate temporary work platform since the exposed concrete at the crest of Basin Creek Dam #1 is less than 6 feet wide.



A Post-tensioned Anchor Installation

Additionally, mixed face drilling is anticipated due to the granite masonry which will be encountered in the gravity section of "granite blocks and concrete" portion of the dam. If subsurface exploration is completed, pressure testing to develop lugeon value within the bond zone will be considered due to the age and condition of the masonry section of dam. Additionally, triple tube barrel coring of the existing dam section, including anticipated anchor bond zone, is anticipated to limit disturbance of the sample prior to laboratory testing.

#### STRUCTURAL DESIGN

Our team, who was involved in the feasibility study performed in 2020, will refine the structural stability calculations for the design phase of the rehabilitation project. The purpose of the structural remediation is to remove the deteriorated concrete and replace with a reinforced concrete overlay to extend the life of the dam. In addition, post-tensioned anchors are being installed to provide stability of the top mass concrete during the flood loading condition.



### Structural remediation will remove deteriorated concrete and replace with reinforced concrete overlay.

It is the team's understanding that the concrete overlay will extend from the upstream face, along the crest, and down the downstream face of the mass concrete. The intent of the overlay is to protect and prevent additional deterioration of the mass concrete portion of the dam, thereby extending the life of Basin Creek Dam #1. For the concrete overlay portion of the project, the team will evaluate the concrete mix design and the size and spacing of reinforcement to current American Concrete Institute standards. Additionally, the team will determine the necessary anchorage required to support the overlay of the existing dam. The team will design water stops to prevent seepage through the overlay to the mass concrete preventing both uplift and additional freeze-thaw damage. In addition, the upstream concrete overlay will extend above the crest elevation, replacing the existing parapet and will be designed to withstand the loading from the probable maximum flood (PMF).

The purpose of the post-tensioned anchors (PTA) is to stabilize the upper mass concrete against sliding and overturning during the PMF event. This will be accomplished by anchoring the upper mass concrete to the original masonry dam. To ensure that the PTAs are economically feasible, the team will design the posttensioned anchors by optimizing the anchor spacing, orientation, and length. The PTAs will be designed in accordance with Recommendations for Prestressed Rock and Soil Anchor published by the Post-Tensioning Institute and USACE Guidelines. Constructability concerns will be considered throughout design process.

#### PLANS AND SPECIFICATIONS

Upon approval of the final design recommendations by BSB, our Team will prepare design drawings and technical specifications in accordance with standard procedures and in conformance with applicable state and federal requirements, including those set forth by DNRC and the funding agencies utilized to finance the project. These plans and specifications will outline the work to be conducted by the contractor, along with the legal responsibilities of all parties. The plans and specifications will be incorporated into a construction bid package. This bid package will include drawings and details, the aforementioned technical specifications, general conditions, applicable funding agency special conditions, wage rates, and bid documents.

We will submit to BSB, DNRC, and the funding agencies a copy of the draft plans and specifications for review. Based upon any comments received, we will make the necessary modifications to the plans and specifications and work with appropriate officials, as necessary, to obtain approvals and/ or permits for the plans and specifications. The plans and specifications will be submitted for review at the 30%, 60% and 90% completion stages.



🔺 Reinforcing Along Concrete Dam Face

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications



### We will provide frequent communication with project stakeholders.

Throughout the design of the improvements, we will keep BSB and agencies informed on the status of the project and will continue to provide appropriate cost and scheduling information as required.

#### **BIDDING PROCEDURES**

Once the plans and specifications are approved by the appropriate officials, we will provide the necessary assistance in order that bids may be received and construction contracts awarded. Working with dam owners, our team frequently recommends pre-qualification of anchor contractors to help ensure they have the experience, personnel, and equipment necessary to install the anchors at complex sites such as Basin Creek Dam #1. For dam safety and personnel safety during construction, anchor contractors must be familiar with site restrictions posed by working on a reservoir and with the quality control requirements necessary for installation and stressing of post-tensioned anchors in an existing dam. Pre-qualification provides an opportunity for interested contractors to visit the site and become familiar with not only the design considerations, but also site access, work platform and constraints.

#### ASSISTANCE IN BIDDING PROCEDURES

We will prepare the bid advertisement and assist BSB in advertising for and obtaining competitive bids. We will also prepare and distribute sufficient copies of plans and specifications to qualified bidders and arrange and attend a pre-bid conference to answer specific questions that potential bidders may have about the project. We will arrange and attend the bid opening, review and tabulate all bids, and make a recommendation to BSB for the selection of a contractor.

Bidding procedures will be coordinated with the grant agencies and will satisfy all funding agency requirements.

#### PREPARE AGREEMENTS

Upon award of the bids, we will prepare the necessary Notice of Award, Agreement, and Notice to Proceed forms for use in awarding the contract.

Award and agreement will be closely coordinated with BSB and funding agencies.

## CONSTRUCTION ADMINISTRATION

#### CONSTRUCTION ADMINISTRATION

Once the construction contract has been awarded, our team will provide the engineering and construction management necessary to ensure that all work conforms to the plans, specifications, and local, state, and federal requirements. These services will include:

#### 1. Project Coordination

Throughout construction, we will coordinate among BSB, contractor(s), and funding agencies. Weekly meetings will be scheduled with the contractor(s), engineer, and BSB officials to discuss project status. As required, status reports will be provided.

#### 2. Pre-construction Conference

We will hold a pre-construction conference at the site with the contractor, owner, and local and state officials to discuss all appropriate details concerning construction of the improvements. In addition, we will coordinate with the grant agencies to ensure that all funding agency requirements such as labor standards are addressed and made clear to the contractor.

#### 3. Staking

We will provide necessary control staking, including profiles, benchmarks, and other pertinent information



Crews Applying Post-Tensioning to Anchor

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications



### Specialized construction management services will be provided to ensure work is completed as intended.

in order that the contractor can construct the project and our inspector can check and approve the work.

#### 4. Shop Drawings and Submittal Reviews We will review shop drawings and submittals provided

by the contractor to ensure that all materials, systems, and components meet or exceed the specifications.

#### 5. Payment Requests

We will review each monthly payment request submitted by the contractor. Upon our approval of each request, we will work with BSB and submit to the funding agencies for a drawdown of funds, if necessary. In addition, we will prepare and process change orders as required.

#### CONSTRUCTION OBSERVATION

Our team will provide full-time, on-site inspection for the duration of the construction period. The design team will also make periodic on-site visits to review work progress. The inspector will be responsible for the contractor meeting the requirements of the plans and specifications. Our inspector will keep daily logs of all work performed and provide BSB with weekly progress reports.

Upon completion of all work, we will conduct a final inspection of the project. Upon approval of all work, we will write a letter of acceptance to BSB and assist with processing final payments.

We will also prepare the record drawings and submit them to BSB and DNRC for final approval. Included with the submittal will be a letter from our firm certifying that the project was constructed in accordance with approved plans and specifications. A set of reproducible record drawings will be provided to BSB upon final completion and approval of the project.

#### GRANT ADMINISTRATION ASSISTANCE

Our team will be available to assist as needed in the administration of the Montana Coal Endowment Program (MCEP) and DNRC Renewal Resource Grant and Loan (RRGL) funds that we assisted BSB in securing; in addition to other potential grants used for implementation of this project. Grant administration services that we typically provide include:

- » Assistance in meeting MCEP and RRGL start-up conditions which involve preparing the signature and deposit forms, project schedule, management plan, and other items identified in the project management manuals.
- » Assisting BSB with establishing and maintaining complete and accurate project files.
- » Preparing documents, manuals, forms, and reports required for administration of the grant programs.
- » Reviewing proposed project expenditures to ensure their propriety and proper allocation to the project's budget.
- » Assuring compliance with applicable civil rights requirements, including preparation of an equal opportunity plan.

Our team will monitor the construction process for labor standards and project expenditures. Review federal and state labor standard reports submitted by the Contractor and Subcontractors. Submit documentation of reviews and comments to BSB, MCEP, and RRGL. Transfer labor standards files to BSB with letter of certification that requirements have been met.

Great West will assist BSB with coordinating MCEP monitoring visits, preparing performance reports, and project closeout documents. We will help prepare reimbursement draw request and assist the BSB financial department with submitting the reimbursements to the grant agencies.

We are experts at providing grant administration services and will be available for guidance or to assist as needed.

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

December 22, 2021





## Jeremiah Theys, PE

Project Manager

19 years with Great West 20 years of experience

Education

- » Montana State University, BS, Civil Engineering, 2002
- » Flathead Valley Community College, AS, AA, 2000

#### Professional Registrations

» Professional Engineer, MT, ID, WA, WY, OR, UT, NV, NM

#### Professional Trainings

- » DNRC Spillway Hydraulics Workshop, 2018
- » A/E/C Principals Bootcamp, 2018
- » FERC Emergency Action Plan Design Course, 2017
- » A/E/C Emerging Leaders Workshop, 2016
- » Rosgen Level 2 Training, 2015
- » Rosgen Level 1 Training, 2013
- » Streambank Stabilization for Restoration, 2010
- » Stream Instability, Bridge Scour and Countermeasures, 2008
- » Advanced HEC-RAS and HEC-HMS With Application to Dam Break Analysis, 2007
- » Storm Water Detention Basin Design, 2005
- » Storm Sewer System Design, 2005
- » HEC-RAS Computer Workshop, ASCE, 2003
- » Design of Geosynthetic Reinforced Flexible Pavement, MDT, 2002
- » Nuclear Gauge User Training

#### **Professional Affiliations**

» President - Montana Association of Dams and Canal Systems

#### FEATURED EXPERIENCE

#### Flint Creek Dam Engineer of Record, Granite County, Montana

Jeremiah serves as the Engineer of Record for the Flint Creek Dam Hydroelectric project that is owned by Granite County. Jeremiah is in close communication between FERC, the County, and DNRC related to regulatory submittals and updates required by FERC. Jeremiah participates in the yearly inspections, DSSMR and EAP updates, tabletop exercises and emergency planning; and oversees all improvements that have been accomplished on the dam since 2016. Jeremiah is currently assisting the County in developing a corrective plan and schedule to address deficiencies identified in the 2021 Part 12D Inspection.

Jeremiah is a registered professional engineer with extensive experience in hydrologic, hydraulic, environmental, planning, and transportation design. His responsibilities include project management, field surveys, design, specifications, technical reports, grant writing and administration, contract administration, facilitating public meetings, and inspection of projects such as stream rehabilitation, irrigation projects, road construction, bridge/ culvert replacements, and stormwater collection systems. Jeremiah has extensive experience in securing grant and loan funds so that projects may be implemented at affordable costs to users. Jeremiah has excellent communication skills, a good understanding of the engineering design process, and is able to make sound decisions which help him to continually provide superior client service.



#### RELATED EXPERIENCE

#### Bullhook and Scott Coulee Dams Gate Rehabilitation, City of Havre

Project Manager responsible for the design and replacement of gates for these two flood control reservoirs. Work included hydraulic evaluation and preliminary investigation of gate replacement alternatives, cost estimates, and Corps of Engineers permitting. These projects are currently in the permitting phase with the USACE.

#### Flint Creek Dam Repairs, Granite County, Montana

Principal in Charge for the design of dam face repairs and spillway repairs to the 100-year old concrete on the Flint Creek Dam (Georgetown Lake). The dam face and upstream spillway slab has been deteriorating considerably over the past 20-years and had progressed to becoming and item of concern. Other work included spillway joint replacement and concrete spall repairs. Work for the project included overseeing the design, construction plans, details, specifications, bidding and construction management.

Beaver Creek Dam Outlet Works Rehabilitation, Hill County, Montana

Project Manager responsible for preliminary and final design of improvements to address pressure chamber leakage and regulating gate cavitation damage. Work included evaluating different repair and replacement alternatives to remedy the outlet works deficiencies and preparing a Preliminary Engineering Report. Final design included a site inspection, topographic survey, structural design, plan and specification preparation, bidding and construction management.

#### Doney Lake Dam Inspection, DNRC

Engineer responsible for field stability assessment and general evaluation of this private earthen embankment on Doney Lake near Ovando. Responsibilities included: investigation of the embankment toe to identify signs of piping; evaluation of vegetative cover & patterns; inspection of dam outlet works; pool stage/fluctuation observations; assessment of outfall scour protection; and preparation of the required inspection report for this high-hazard dam.

#### Flint Creek Dam Stilling Basin Rehabilitation and Gate Valve Replacements, Granite County, Montana

Project Manager responsible for the upgrade of the stilling basin and intake valves for this reservoir. Work included the design of new gabion baskets for the stilling basin and design of new knife gate values for the 30-inch intake lines. Jeremiah oversaw the bidding and construction management process. Great West administered a \$125,000 DNRC RRGL grant to aid in the funding of the project.

#### Nature Park Detention Pond, City of Helena

Project Manager responsible for the design of a 2-acre stormwater pond to facilitate water quality treatment and detention for the Bull Run drainage basin in Helena, MT. Work included Tasks include a detailed hydraulic and hydrologic evaluation of the area for storm detention and pond sizing. Developing low-flow storage areas to promote water quality and wetland creation. A detailed intermittent release structure was designed to accommodate multiple storm events.

#### Beaver Creek Dam Spillway and Stilling Basin Improvements, Hill County, Montana

Project Manager responsible for field investigation and data collection, design, cost and quantity estimates, modeling, reports, manuals, and drafting of dam spillway and stilling basin improvements. Designed and constructed dam spillway and stilling basin improvements for replacing the deteriorating stilling basin, scour hole from irrigation outlet, spillway cracking, and related maintenance items. The improvements were identified in past dam inspections.





## Ryan Elliott, PE

Project Engineer

14 years with Great West 14 years of experience

#### Education

» Montana State University, BS, Civil Engineering, 2007

#### Professional Registrations

» Professional Engineer, MT, ID, AK, ND, OR, WA

#### Professional Training

- » USFS Aquatic Organism Passage Workshop
- » ASDSO Inspection and Assessment of Dams
- » NHI Safety Inspection of In-Service Bridges
- » NHI Fracture Critical Inspection for Steel Bridges

#### Professional Certifications

- » Association of State Sam Safety Officials (ASESO)
- » MT Fish Screen Workshop

#### FEATURED EXPERIENCE

Ryan is a Project Manager whose background includes experience in transportation, structural and hydraulic engineering. His primary design responsibilities include: roads, vehicular bridges, culverts, stream restoration projects, irrigation structures, fish screens, fish passage structures, parking lots and retaining walls. He is also an experienced bridge inspector in both routine and fracture critical bridge inspections of timber, concrete and steel structures. Ryan's technical writing background includes; Preliminary Engineering Reports, technical document review, project specification development and an assortment of stream permitting documents.

Basin Creek Dam Preliminary Engineering Report, City-County of Butte-Silver Bow, Montana

Prepared the Preliminary Engineering Report for improvements to the Basin Creek Dam, an important water supply for the City/County of Butte-Silver Bow. The dam provides water to the Basin Creek Water Treatment Plant (WTP) on a gravity system, which minimizes the need to pump and reduces the cost and energy consumption related to pumping. Since the Basin Creek WTP became operational in May 2017, BSB has drawn approximately 60% of the City's water from Basin Creek Reservoir. The State of Montana classified Basin Creek Dam #1 as a high-hazard potential dam and over the past ten years, concrete deterioration, specifically on the concrete cap and parapet wall, has progressed to the point of necessitating rehabilitation. This project will target the condition of dam features, specifically the poor-quality concrete condition on the upstream dam face and parapet wall. Additionally, an anchorage system will be installed to ensure dam stability during a probable maximum flood (PMF). The project will protect public safety and downstream properties. It will preserve a primary source of water for Butte residents, protect rare fish species, conserve water in the Big Hole River, and maintain BSB's capacity to manage its water utility efficiently and cost-effectively. The project was successfully funded with the number one ranked water/ wastewater project through Montana Department of Commerce - TSEP and the number 10 ranked project from DNRC RRGL.

#### RELATED EXPERIENCE

#### Flint Creek Dam Repairs, Granite County, Montana

Project manager and lead engineer for the design of dam face repairs and spillway repairs to the 100-year old concrete on the Flint Creek Dam (Georgetown Lake). The dam face and upstream spillway slab has been deteriorating considerably over the past 20-years and had progressed to becoming and item of concern. Other ancillary work included spillway joint replacement and concrete spall repairs. Work for the project included overseeing the design, construction plans, details, specifications, bidding and construction management.

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#### Beaver Creek Dam 5-Year Inspection, Hill County, Montana

Performed a five-year detailed inspection of the Beaver Creek Dam, a 1500-foot long earth embankment dam with a primary concrete spillway and earthen auxiliary spillway. The inspection was completed in accordance with DNRC criteria for five-year detailed inspections and involved a detailed inspection of the dam and appurtenant elements, photographs, and reporting corrective recommendations.

#### Montana Dams & Hydropower Brochure, Montana DNRC, Montana

Project manager responsible for overseeing the development of an informational brochure relating to hydropower dams and activities throughout Montana. The brochure provides a detailed look into regulation, existing hydropower dams, proposed hydropower dams and feasibility of hydropower dams.

#### Olive Lake Dam EAP and TTX QA/QC, Umatilla National Forest, Oregon

Assisted in the development of and QA/QC services for the Olive Lake Dam Emergency Action Plan and Tabletop Exercise. The Olive Lake Dam is a high hazard, earthen embankment dam located in rural northeastern Oregon.

#### Prison Ranch Dams EAP and TTX QA/QC, Montana DNRC, Montana

Lead QA/QC engineer responsible for the review of a combined EAP covering five earthen embankment, high hazard dams located near Deer Lodge, MT. Several of the dams did not have EAP's and several were extremely outdated. The new EAP generally followed NRCS templated guidelines. Also oversaw the review of the tabletop exercise documentation and presentation.

#### DNRC EAP Development & Dam Workshops (9 Dams), DNRC, Various Locations, Montana

Completed new Emergency Action Plans (EAP's) for identified dams throughout Montana. The new EAP's were based on modified NRCS templates. The EAPs included an evaluation of existing data, inspection reports and discussions with the dam operators. Additionally, we completed an EAP workshop for the dams, which included the development of up to 5 powerpoint presentations in focuses areas (Liability, Dam Overview, Inundation Maps, Tabletop on EAP, Intervention Actions). Great West facilitated and coordinated these workshops with applicable local, state and federal agencies and dam owners. The workshops typically were held over a 2 to 3 hours period.

#### Lolo Creek (Maclay Ditch) Fish Screen, CFC, Montana

Project manager and principal designer for the Lolo Creek (Maclay Ditch) Fish Screen. The Lolo Creek watershed near Lolo, Montana is an important priority stream for restoration, as a critical tributary to the Bitterroot River. Lolo Creek has strong populations of both native and wild fish species (including Westslope Cutthroat Trout and Bull Trout). The existing Maclay Ditch off Lolo Creek is an unscreened ditch and FWP fish salvage efforts over the years indicate the ditch entrains thousands of trout (perhaps up to 10,000 annually) and this screening project was of critical importance to FWP. The purpose of the project was to install a new, low maintenance fish screen capable of handling a variety of flows (up to 36 CFS). Improvements to the headgate and adjacent diversion structure were off the table due to the floodplain and work that has already been completed on these structures. The new selected fish screen was a custom corrugated water screen, with the ability to screen a variety of flow rates. Project challenges at the site included very difficult access, site dewatering and winter construction.

Preliminary design and survey was performed in 2017/2018, final design completed in 2019 and the project was successfully installed in fall of 2020. The project was funded in partnership with the Clark Fork Coalition, Montana FWP and USFWS.

#### Flint Creek Dam Focused Spillway Inspection & Spillway PFMA, Granite County, Montana

Following the February 2017 spillway failures at Oroville Dam in California, the Federal Energy Regulatory Commission (FERC) directed focused spillway inspections and assessments for all U.S. dams with high- and significant-hazard potential and similar spillways. When FERC requested that Granite County quickly review documents and inspect Flint Creek Dam, Granite County turned to Great West for support. Constructed more than a hundred years ago, Flint Creek Dam has several chute spillway characteristics like Oroville's service spillway that merited additional investigation.

Great West senior civil engineer, Ryan Elliott P.E., performed a comprehensive document review, developed a detailed field inspection plan and led the joint field inspection team that consisted of members from FERC, and Granite County in August 2017. The non-destructive site inspection included a visual inspection of the 75-foot long spillway and assisted in determining the appropriate sounding technique to identify potential voids underneath the concrete spillway slab. While at the site, Ryan also participated in a PFMA assessment with the inspection team to identify potential failure modes that may not have been fully considered in the past but have been recently highlighted due to the Oroville Dam incident. Great West prepared a final report that summarized the inspection and PFMA session and identifies follow-up steps and potential risk reduction measures for Granite County.

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

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## Karl Yakawich, PE

#### Project Engineer



#### Education

» Montana State University, BS Civil Engineering 2001

#### **Professional Registrations**

» Professional Engineer, MT, ID, UT, CO

#### Professional Trainings

- » Project Managers Boot Camp, PSMJ
- » A/E/C Emerging Leaders Workshop, 2016
- » Earned Value Estimating, MDT
- » Safety Inspection of In-Service Bridges
- » Fracture Critical Inspection Techniques for Steel Bridges
- » Design for Aquatic Species Passage at Stream Crossings
- » LRFD Highway Bridge Design
- » AISC Steel Field Fixes
- » SEA Structural Engineering Emergency Response
- » Residential Design of Wood Structures

#### **Professional Affiliations**

- » Montana Society of Engineers (Board Member)
- » Association of Conservation Engineers

#### AWARDS

» 2013 Montana Engineering Excellence Award – Gates Park Suspension Pack Bridge

#### FEATURED EXPERIENCE

#### Structural Engineering Services for Municipalities

Karl has provided consulting services to Cities and Towns across Montana for 20-years. Work has included rehabilitation of concrete, steel and timber structures. His 20 years of structural design experience has resulted in work on numerous municipal buildings including water, wastewater, park, and solid waste handling facilities. He is also experienced in bridge engineering, building inspections, and dam rehabilitation.

#### RELATED EXPERIENCE

#### Beaver Creek Dam Outlet Works Rehabilitation, Design and Construction, Hill County, Havre, Montana

Structural design engineer responsible for reviewing the plan details for reconstruction of the irrigation outlet works for the 100-foot tall Beaver Creek Dam.

#### Flint Creek Dam Spillway and Dam Face Repairs, Design and Construction, Granite County, Montana

The Flint Creek hydroelectric facility was constructed in the late 1800s and has undergone several improvements and upgrades since. Karl served as structural design engineer for the project. The project included new cast-in-place concrete on approximately 200 linear feet of the dam face, repair of the joints on the spillway, and other miscellaneous concrete repairs.

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

Karl is a registered professional engineer with extensive experience in the project management and technical design of structural systems, retaining walls, and buildings. Karl has provided engineering support to various agencies for 20 years involving a multitude of project types. His background includes significant experience with design, structure inspections, bidding oversight, contract administration, and management of projects such as bridges, roads, retaining walls, trails, sidewalks, buildings, and stream rehabilitation projects. He has extensive understanding and familiarities with the preparation of technical engineering reports and grant applications, resulting in projects that are implemented efficiently and at affordable costs to users. Karl has excellent communication skills and is experienced with the project coordination and administration necessary to ensure successful project delivery and continually provide superior client service.



#### Headworks Building, Three Forks, Montana

Engineer responsible for the structural design of a reinforced masonry building with concrete foundation and slabs. Work included structural design and preparation of the structural plans and details.

#### Water Storage Tank Inspection and Evaluation, City of Three Forks, Montana

Karl completed a structural inspection of a concrete water tank for the City of Three Forks. The tank, constructed in 1916, is 19-feet deep with a 50-foot inside diameter. The tank was used for non-potable irrigation needs and the community was considering future use of the facility for potable water storage. An on-site structural evaluation was conducted with subsequent cost estimates developed to upgrade the facility. This information allowed the City to make an informed decision to upgrade the existing tank.

#### Water Intake, City of Laurel, Montana

Engineer responsible for the structural design of a reinforced concrete and drilled shaft structure in the Yellowstone River. Work included structural design, preparation of the structural plans and details.

#### Water Intake Control Building, City of Laurel, Montana

Engineer responsible for the structural design of a reinforced masonry building with concrete foundation and slabs. Work included structural design and preparation of the structural plans and details.

#### Jefferson Canal Headgate Rehabilitation, Jefferson Canal Company

Engineer responsible for the structural design of a concrete retaining wall structure for the Jefferson Canal off of the Jefferson River. The new headgate was comprised of reinforced concrete with two slide gates, allowing over 100 cfs to be diverted.

#### Kipp Lake Irrigation Diversion Structure Replacement, Blackfeet Nation, Montana

Engineer responsible for replacement of a fish barrier and irrigation structure. The designed utilized a cast-in-place concrete drop structure with headgates.

#### Crooked Creek Fish Barrier, Custer National Forest, Montana

Structural Engineer responsible for the design of a fish barrier structure that would prevent the upstream migration of nonnative Rainbow and Brown Trout. Work included structural design and layout of the barrier structure. The design featured rock bolts attached to nearby canyon walls and colored concrete to address site and aesthetic concerns.

#### Transfer Station, Sanders County, Montana

Engineer responsible for the structural design of the structural design of the transfer station and maintenance building.

#### Helena Water Treatment Plant Structural Recommendations, Montana

Engineer responsible for the inspection and load rating at two treatment plants to ensure compliance with building codes and OSHA requirements.

#### Transfer Station Repairs, Broadwater County, Montana

Engineer responsible for the evaluation and rehabilitation plans of a solid waste transfer station facility.

#### Twin Falls Transfer Station Design-Build Retaining Wall Designs, Idaho

Engineer responsible for the design and construction engineering on reinforced concrete retaining walls and slabs. Work included structural design and preparation of the structural plans and details.

#### Harlowton Water Storage Tank Alternatives - City of Harlowton, Montana

Provided inspection services and rehabilitation alternatives with cost estimates of a reinforced concrete water tank.

#### Building Evaluations - Custer County CIP, Montana

Engineer responsible for the evaluation of county buildings and recommended improvements as part of the county capital improvement plan.

#### City Park Pavilion, Cut Bank, Montana

Engineer responsible for the management and design of a steel frame pavilion structure with a concrete foundation.





Amy Boyle-Deitchler, PE

Project Engineer

14 years with Great West 18 years of experience

#### Education

» Montana Tech of the University of Montana, BS, Mining Engineering, 2003

#### Professional Registrations

» Professional Engineer, MT, ID, UT

#### **Professional Certifications**

- » National Association of Sewer Service Companies (NASSCO), Pipeline Assessment and Certification Program (PACP)
- » National Association of Sewer Service Companies (NASSCO), Manhole Assessment and Certification Program (MACP)

#### **Professional Affiliations**

- » MWEA (Montana Water Environmental Association)
- » WEF (Water Environment Federation) Montana National Delegate
- » Past President, MWEA Board

#### Professional Training

» Aqua-Aerobic Systems Process and Product Application Workshop

#### FEATURED EXPERIENCE

#### Wastewater Treatment Plant (3 Stage BNR) - NPDES Permit Evaluation, Preliminary Engineering Report, Grant Applications, Design and Construction Management, City of Cut Bank, Montana

Project Manager responsible for bidding and construction of the new advanced biological nutrient removal mechanical treatment plant. Project includes new headworks facility, biological nutrient removal wastewater treatment, control building, RAS/WAS pumping, clarifiers, bio-solids dewatering equipment and building, chemical addition, UV disinfection, effluent pipe, water main installation, CIPP installation, and sewer main replacement. The project was funded with grant funds from DNRC-RRGL, SRF, Rural Development, and TSEP. The project was completed in 2018.

#### RELATED EXPERIENCE

#### Wastewater Improvements Project Preliminary Engineering Report, Design, and Construction Management, Ryegate, Montana

Project Manager responsible for preparing a detailed Preliminary Engineering Report (PER), design, and construction of new total retention lagoon construction and lift station upgrade. The Town's existing lagoons are leaking in excess of current Montana DEQ allowable limits, do not operate properly, and are in poor structural shape. The current and future discharge permit limits were analyzed during the process. The project will be funded using DNRC-RRGL grant funds and Rural Development grant funds. The project cost was \$2 million with construction completed in 2020.

City-County of Butte-Silver Bow | Basin Creek Dam #1 Rehabilitation -Statement of Qualifications

Amy has 18 years of engineering experience, three of which have been in the heavy construction industry and eleven in municipal wastewater and water projects. She has a strong background in design, bidding oversight, analysis, reports, environmental assessments, construction management, surveying, underground pipeline installation, pipeline and manhole rehabilitation, construction inspection, and QA/QC procedures. Amy has worked on many projects utilizing funding from agencies such as TSEP (Treasure State Endowment Program), CDBG (Community Development Block Grant), SRF (State Revolving Fund), DNRC (Department of Natural Resources and Conservation), RD (Rural Development), and WRDA (Water Resource Development Act).

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#### Wastewater Treatment Lagoon Upgrade with Clarifiers and Disinfection for Effluent Disposal by Irrigation on Golf Course - Grants, Design and Construction Management, City of Fort Benton, Montana

Project manager responsible for bidding and construction of the wastewater system improvements project. Project will remove surface water discharge to reuse in the summer months when nutrient limits are in effect. Project includes improvements to the main lift station, including an emergency power generator, new forcemain, treatment lagoon site piping, control structure improvements, pumping systems, aeration system upgrades in ponds, clarifiers, UV and chlorine disinfection, golf course irrigation system upgrades, existing pond upgrades on golf course, electrical upgrades, and control upgrades. The project was funded with grant funds from DNRC-RRGL, TSEP, and Rural Development. The project was completed in 2018.

#### BNR Wastewater Treatment Plant – Preliminary Engineering Report, Grant Applications, Design and Construction Management, Glendive, Montana

Project Engineer responsible for Preliminary Engineering Report, funding applications, design and construction of the new wastewater treatment facility. The project includes design and construction of new headworks facility, advanced treatment process, disinfection, solids disposal, and effluent disposal. The project also included MPDES permit modifications to relocate the existing wastewater effluent outfall from Glendive Creek to the Yellowstone River. The design will eliminate the facultative lagoons and build a biological nutrient removal (BNR) treatment system. The wastewater treatment plant will be designed for 1.9 MGD average day flow. Additional design elements include package treatment system evaluation, treatment plant site selection, headworks design criteria, UV disinfection design, outfall design, waste sludge handling, electrical instrumentation and control requirements. The project was funded with grant funds from TSEP, DNRC-RRGL, and SRF. The new wastewater treatment plant was on-line in December 2015.

## Sewer Rehabilitation for 1&1 Reduction and Treatment Plant Disinfection Improvements – Analysis, Design, Construction Management, and Inspection, Whitefish, Montana

Project engineer responsible for design and construction management of 14,155 lineal feet of existing sewer main rehabilitation. The rehabilitation improvements consisted of lining 12,540 lineal feet of existing sewer main with Cured-in-Place Pipe. Open cut replacement was utilized to replace 1,615 lineal feet of existing sewer main. Rehabilitation of two lift stations with a chemical grout was completed and greatly reduced I&I to the system. Chlorine disinfection was added to the City's current wastewater treatment plant. A sodium bisulfate feed system was installed for removing any residual chlorine prior to discharge to the Whitefish River.

#### Sewer Rehabilitation Project - Analysis, Design, Construction Management and Inspection, City of Bozeman, Montana

Project Engineer responsible for analysis and design of 17,500 lineal feet of existing sewer main rehabilitation and all manholes within the pipelines. Project analysis included watching approximately 17,500 lineal feet of CCTV (closed-circuit television) video for structural condition. The analysis included pipe bursting and pipe reaming of a 10" sewer main to 15" sewer main. The rehabilitation improvements consisted of approximately 6,700 lineal feet of lining existing 8", 10", 12" and 15" sewer mains with Cured-in-Place Pipe and 17 manholes being rehabilitated. Also completed an analysis of the sewer services, recommending the services that should have the connection replaced. Approximately 60 sewer services have been replaced to eliminate root problems, structural problems, or inflow and infiltration. Completed the inspection of the manhole rehabilitation and CIPP construction work.

#### Wellfield Improvements - Design and Construction Management, City of Shelby, Montana

Project manager for the design and construction improvements to the City's wellfield to ensure water production and supply. The project consists of 1,850 lineal feet of 6-inch transmission main, 220 lineal feet of 4-inch transmission main, fittings, installation of prebuilt fabricated well houses, existing well house improvements, new well house piping, valves, meters, UV installation, UV room piping improvements, SCADA improvements, and electrical upgrades. The project included by-pass piping improvements at the South Tank due to the risk of collapse. The project was funded with grants from TSEP and WRDA with a grant/loan package from SRF. Construction is expected to be complete in 2021.

#### Water Treatment Plant Improvements - Design and Construction Management, City of Glendive, Montana

Project manager for the design and construction of two new solids contact units/high rate clarifier equipment, abandoning the existing solids contact basin, installing new piping to and from treatment equipment, installing new chemical feed equipment and storage, upgrading the lime slaker and associated equipment, replacing the piping and valves in the existing filtration building, construction of a new electrical room and complete replacement of all electrical equipment, new generator, replacing all process control equipment, and installing new energy efficient windows in the filter building. All of the new components were integrated into the existing SCADA system to allow for full automated control of the water treatment plant with input from the operator on-site. This project will be completed utilizing grant funding from the Delivery Local Assistance (DLA) and a grant/loan package from the SRF program. The project is scheduled to be completed in 2021.





## Jonathan Weaver, PE, CFM

Project Engineer

12 years with Great West 13 years of experience

#### Education

- » Montana State University, BS Civil Engineering 2009
- » Flathead Valley Community College, Associate of Science, 2004

#### Professional Registrations

- » Professional Engineer, MT, ID, WA
- » Certified Floodplain Manager

#### Professional Certifications

- » ASDSO Inspection and Assessment of Dams (2020)
- » DNRC Dam Spillway Hydraulics Work Shop (2018)
- » DNRC Floodplain Resource Seminar Two-Dimensional Hydraulic Modeling Training (2017)
- » NHI Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments (2017)
- » PSMJ Project Management Bootcamp (2017)
- » NHI Stream Stability and Scour at Highway Bridges (2016)
- » Two Dimensional Hydraulic Modeling with HEC-RAS (2015)
- » Fish Screen Oversight Committee (2015)
- » NHI Hydraulic Design of Safe Bridges (2014)
- » NHI Culvert Design (2013)
- » FHWA GRS-IBS Bridge Foundations Seminar (2012)
- » HEC RAS Computer Workshop (2012)
- » River Restoration Northwest Symposium (2011)

#### FEATURED EXPERIENCE

#### Flint Creek Dam Spillway and Dam Face Repairs, Design and Construction, Granite County, Montana

The Flint Creek hydroelectric facility was constructed in the late 1800s and has undergone several improvements and upgrades since. Served as the construction manager during the project, which poured new concrete on approximately 200 linear feet of the dam face, repaired the joints on the spillway, and made other miscellaneous concrete repairs.

#### RELATED EXPERIENCE

#### Bullhook and Scott Coulee Dams Gate Valve Replacements, Havre, Montana

The Bullhook and Scott Coulee dams provide critical flood protection to the City of Havre. The dams are dry most of the year but fill in the spring to capture flood waters before they flow through town. The primary flow control valves for each dam have reached the end of their useful life and are no longer operable. Jonathan is the lead design engineer who performed an inspection of each gate and is now working with the Corps of Engineers to obtain approval for the replacement gates. Replacement is scheduled for fall 2021.

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Jonathan's primary responsibilities include the design of stream crossing structures, hydraulic modeling, floodplain mapping, Preliminary Engineering Reports, specifications and special provisions, field surveys, construction inspection, stream rehabilitation, irrigation projects, permitting, computerized drafting, and roadway design. He has experience working with many design programs such as Auto-CAD and HEC-RAS.



#### Beaver Creek Dam Annual Inspection, Hill County, Montana

Jonathan was on the inspection team who performed the annual inspection of the Beaver Creek Dam, owned by Hill County. Jonathan prepared the inspection report.

#### Tauck L O Creek Dam Feasibility Study, Ekalaka, Carter County, Montana

A historically used dam on L O Creek failed in the 1970s. The ranch wanted to investigate the feasibility of restoring the dam to continue use for irrigation purposes.

#### Ekalaka Levee Accreditation Feasibility Study, Ekalaka, Carter County, Montana

Project Manager responsible for the evaluation of the Russell Creek levee, which protects the Town from flooding. The analysis included hydraulics, geotechnical, and right-of-way. These items were evaluated against the CFR 65.10 criteria. The result was a report that made recommendations for levee improvements and funding.

# Flint Creek Dam Stilling Basin Rehabilitation and Gate Valve Replacements, Design and Construction, Granite County, Montana

The Flint Creek hydroelectric facility was constructed in the late 1800s and has undergone several improvements and upgrades since. However, the most recent upgrades were completed over 30 years ago, and the stilling basin and intake valves were failing. I completed the topographic survey of the dam. I also completed the design of new gabions for the stilling basin and selected the correct type of valve for the intake lines. I oversaw the bidding and construction management process. Great West administered a \$125,000 DNRC RRGL grant to aid in the funding of the project.

#### Beaver Creek Dam Spillway Rehabilitation, Design, Hill County, Montana

The Beaver Creek Dam, located south of Havre, has numerous deficiencies related to the dam spillway that have been identified by the NRCS in their annual inspections. Jonathan was on a team that completed a detailed inspection of the spillway. The data from the inspection was used to draft a technical narrative to evaluate several alternatives for repairing the spillway deficiencies. The technical narrative was submitted to the Montana DNRC in a funding application.

#### Butte-Silver Bow Sewer Crossing on Blacktail Creek Fish Passage, Design, Natural Resource Damage Program, Butte, Montana

Design engineer responsible for hydraulic analysis, conceptual design, and cost estimates for a rock step structure to allow fish to pass over an exposed sewer line crossing on Blacktail Creek in Butte, MT.

#### Beaver Creek Dam Outlet Works Rehabilitation, Design and Construction, Hill County, Havre, Montana

Design engineer responsible for initial site inspection, topographic survey, structural design, plan and specification preparation, bidding and construction management for the reconstruction of the irrigation outlet works for the 100-foot tall Beaver Creek Dam.

#### Water Treatment Plant Intake on the Yellowstone River, Design and Construction, City of Laurel, Montana

Design engineer responsible for geomorphological analysis, hydraulic and hydrologic analysis, alternatives development, coordinating with permitting agencies, and development of an Environmental Assessment. The project entailed considering a wide range of alternatives in order to provide with City of Laurel with a reliable, long-term supply of raw water for municipal use. Jonathan was the construction engineer during the nine-month construction duration.

# Jefferson Canal Headgate Rehabilitation, Design and Construction, Jefferson Canal Co. & Fish Creek Irrigating/Ditch Co., Whitehall, Montana

Design engineer responsible for the design of a replacement headgate for the Jefferson Canal off of the Jefferson River. The new headgate was comprised of reinforced concrete with two slide gates, allowing over 100 cfs to be diverted. Responsibilities involved design, bidding, and construction management/inspection for this project.

#### Three Forks Flood Mitigation Study, Design, Three Forks, Montana

Based on the results of a new floodplain study, a significant portion of the City of Three Forks was shown to be in the Special Flood Hazard Area. This study used 2-dimensional hydraulic modeling to evaluate alternatives to mitigate the flood risk within the City.

#### Milk River Levee System-Wide Improvements Framework (SWIF), Capital Improvements Plan, Hill County, Havre, Montana

Hill County owns and operates levees along the left and right banks of the Milk River. The levees were constructed decades ago by the Army Corps of Engineers. Design engineer responsible for drafting the Letter of Intent (LOI) and SWIF for the Milk River Levee in Hill County, which provides flood protection for the City of Havre.





# Craig Erickson, CGW

Certified Grant Writer

11 years with Great West 22 years of experience

#### Education

» Broadcast Communications, Brown College, Minneapolis, MN 1983-1984

#### Professional Certifications

- » American Grant Writer's Association Certified Grant Writer
- » Advanced Facilitation Training through Leadership Strategies Institute
- » Workplace Mediation Training
- » Montana Economic Developers Association/PPL Montana Economic Development
- » U.S. Department of Housing and Urban Development (HUD) Art and Science of Grant Writing
- » ACCRA Research Methods for Economic Developers Training
- » FHWA Contract Administration Training

Craig has over 21 years of grant-writing and grant administration experience. In 2016, the American Grant Writers Association awarded Craig its Certified Grant Writer® credential. The Certified Grant Writer® (CGW) credential is the industry standard for professionals in the field of grant writing. The CGW credential documents that Craig has demonstrated proficiency in grant researching, proposal writing, budgeting and professional ethics. Craig is one of five people in Montana who has earned the CGW certification.

#### FEATURED EXPERIENCE

Basin Creek Dam #1 - Project Planning and Grant Writing, Butte-Silver Bow City-County, Montana Prepared BSB's applications that resulted in the award of a \$750,000 Montana Coal Endowment Program (MCEP) grant, and a \$125,000 DNRC Renewable Resource grant. Of the 41 applications submitted to the Montana Department of Commerce in 2020, BSB's MCEP application received the highest score. BSB's Renewable Resource grant application was ranked number 12 out of 74 applications received by the DNRC.

#### RELATED EXPERIENCE

# Central Montana Regional Water Authority (CMRWA) – Phase 1 Musselshell Judith Rural Water Project – Grant Writing, and Grant Administration

Prepared the CMRWA's application for funding from USDA Rural Development to fund the construction of a 24 mile pipeline from the Ubet wellfield in southern Judith Basin County to the City of Harlowton. With Craig' assistance, the CMRWA received a \$7.3 million grant with a \$3.9 million loan to help Phase 1 of the project. The project includes the construction of the pipeline, as well as treatment facilities, improvements to Well #3, 40 services line to rural users, and various appurtences. Construction of the project is expected to being in April or May 2022.

# Thompson Falls Phase 1 & 2 Wastewater System Construction Project - Project Planning, Grant Writing, and Administration – Thompson Falls, Montana

Prepared the City's applications that resulted in the award of a \$750,000 Treasure State Endowment Program (TSEP) grants, a \$125,000 DNRC Renewable Resource grant, and three grants from USDA Rural Development totaling \$9.4 million to finance the construction of Phase 1 and Phase 2 of the \$30-million project. Construction of the Phase 1 & Phase 2 project began in January 2021.

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# Thompson Falls Phase 3 Wastewater System Construction Project - Project Planning, Grant Writing, and Administration – Thompson Falls, Montana

Prepared the City's applications that resulted in the award of a \$750,000 Montana Coal Endowment Program (MCEP) grants, a \$450,000 Community Development Block Grant (CDBG), a \$125,000 DNRC Renewable Resource grant, and a funding package from USDA Rural Development that includes a \$4.4 million grant with a \$1.7 million loan. Construction of the Phase 3 project scheduled to began in September 2022.

#### City of Cut Bank Phase 4 Drinking Water System Project - Grant Writing and Administration – Cut Bank, Montana

Prepared the City's applications that resulted in the award of a \$750,000 Treasure State Endowment Program (TSEP) grants, a \$125,000 DNRC Renewable Resource grant, and \$500,000 in principal forgiveness along with a \$2-million loan from the Drinking Water State Revolving Fund for the \$3.7-million project. Craig also helped the City secure similar funding packages for Phase 1, Phase 2, and Phase 3. Construction of Phase 4 will began this spring.

#### Absarokee Water Distribution System Replacement, Project Planning, Grant Writing, and Administration – Absarokee, Montana

Assisted the Project Engineer with developing a realistic funding package that maximizes grant funding to keep user rates affordable. Also assisted with writing the applications for Treasure State Endowment Program (TSEP) and State Revolving Fund (SRF) funding. With Craig's help, the District secured a \$500,000 TSEP grant and an SRF funding package that includes \$500,000 in "principal forgiveness." Great West is now assisting the District with meeting the start-up conditions of the TSEP grant.

#### Cascade Phase 4 Water System Improvements Project – Project Planning, Grant Writing, and Administration – Cascade, Montana

Assisted with preparing the City's applications that resulted in the award of a \$500,000 Treasure State Endowment Program (TSEP) grant, a \$125,000 DNRC Renewable Resource grant, and \$495,000 in principal forgiveness from Montana's SRF program. With assistance from Great West, Cascade secured similar funding packages for Phase 1 – 3.

#### Water Supply, Storage and Distribution System Improvements, Grant Administration, Homestead Acres County Water and Sewer District, Montana

Soon after arriving a Great West, Craig took over the administration of the District's TSEP, DNRC, and RD funding package. Craig was responsible for the helping the District meet the start-up conditions of its TSEP and DNRC grants, monitoring contractor prevailing wage compliance, preparing drawdown requests and project closeout reports.

#### Water Treatment and Transmission Main Improvements, Project Planning, Grant Writing, and Administration, City of Harlem, Montana

Worked with the Project Engineer to develop a comprehensive funding package that maximized grant funding to help keep user rates affordable for the very low-income community. While at Bear Paw Development, Craig prepared Harlem's applications for TSEP, CDBG, and SRF funding. With Craig's help, the City secured a \$750,000 TSEP grant and \$450,000 CDBG grant. With the funding, Harlem upgraded its water treatment plant with two microfiltration units, a telemetry system, expanded its wet well, installed new pumps, and replaced 1,250 linear feet of 10-inch transmission main.





# Justin Evertz, PE

Project Engineer

5 years with Great West 5 years of experience

#### Education

» Montana State University, BS, Civil Engineering, 2016

#### Professional Certifications

» Professional Engineer, MT

#### Professional Trainings

- » Nuclear Density Testing Gauge and Hazmat Training
- » ASCE-Introduction to HEC-RAS Modeling (2018)
- » NHI-Introduction to Highway Hydraulics (2018)
- » NHI-Countermeasure Design for Bridge Scour and Stream Instability (2019)
- » NHI-Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments (2020)

Justin is a Project Engineer with a background in hydraulic and transportation engineering related projects. Project background includes: FEMA floodplain modeling, one- & twodimensional hydraulic analysis, county & state bridge replacements, forest service bridge and culvert replacements, paved and gravel roadway rating, as well as road and trail assessments. He has drafting experience using Autodesk's Civil 3D platform. He is familiar with USFS, MDT, & FEMA design standards. Other relevant software experience includes HEC-RAS 1D, SMS SRH-2D, HY-8, Hydraulic Toolbox, USGS's PeakFQ, RASPLOT, cHECk-RAS, ArcGIS Pro, & Leica Infinity.

#### FEATURED EXPERIENCE

#### Town of Twin Bridges, Montana

Survey crew chief responsible for multiple terrestrial, bathymetric, monument, and construction surveys for the Town of Twin Bridges. Projects surveyed included roads, bridges, sidewalks, stormwater, planning level analysis, and floodplain related surveys. Other related tasks include providing technical support for field crews and office personnel, coordination with the Town and construction crews, and communication with local residents.

#### RELATED EXPERIENCE

# Flint Creek Dam Stilling Basin Rehabilitation and Gate Valve Replacements, Design and Construction, Granite County, Montana

Design engineer responsible for the design of a new gabion stilling basin and replacement valves for the intake lines on Flint Creek Dam, as well as construction staking, and construction observation during key points of construction. The Flint Creek Dam was constructed in the late 1800s and has undergone several improvements and upgrades since. However, the most recent upgrades were completed over 30 years ago, and the stilling basin and intake valves were failing. Great West administered a \$125,000 DNRC RRGL grant to aid in the funding of the project.

#### Flint Creek Dam DSSMR, Granite County, Montana

Design Engineer responsible for yearly collection of data related to the safety and observation of Flint Creek Dam, analysis of data, drafting of DSSMR report, and communication with FERC.

December 22, 2021



#### Milk River Modernization, Hydraulic Data Collection, Montana DNRC, Hill, Blaine, Phillips, and Valley Counties, Montana

Survey crew chief responsible for field investigations, data collection, and project management. Data collection included terrestrial, bathymetric, and hydraulic structure survey for over 2,000 miles of the Milk River and tributaries. A total of 383 structures, 3 stream gages, and 14.4 stream miles of bathymetry were collected. Numerous different structure types including bridges, culverts, diversions, fords, headgates, dams, siphons, and levees were documented during field investigations. The collected data will be used to develop new FEMA-approved floodplain maps. Various survey and GIS equipment and software was utilized in the collection of the data. The project was completed for the Montana DNRC and funded by FEMA.

#### Silver Lake Infrastructure Improvements, Natural Resources Damage Program, Anaconda/Deer Lodge County, Montana

Survey crew chief responsible for completing terrestrial, infrastructure, and bathymetric survey, bankfull measurements, and other geomorphic assessment to support design for a new fish trap design. The fish traps will be located on three diversion structures located in the Warm Springs Creek watershed. The traps will be used to capture and facilitate movement of spawning Bull Trout, around the diversion structures, to critical spawning habitat.

#### Sullivan Lake Road Feasibility Study, Colville National Forest, Washington

Survey crew chief responsible for completing terrestrial and bathymetric survey, bankfull measurements, instream pebble counts, instream grade-control structures, and other geomorphic assessment to assess the feasibility rerouting Sullivan Lake Road out of the current floodplain of Harvey and Paupac Creeks. Bathymetric survey included approximately 2.5 miles of Harvey and Paupac Creeks, which was then merged with LiDAR data provided by Colville National Forest.

#### Whiskey Creek Culvert, Idaho Transportation Department, Elk City, Idaho

Survey crew chief responsible for completing terrestrial and bathymetric survey, bankfull measurements, and other geomorphic assessment to support design for a new, open-bottom, steel structural plate-arch. The new steel structural plate-arch will replace an existing perched, circular culvert, that impedes aquatic organism passage and will restore salmon and steelhead connectivity between Whiskey Creek and the South Fork of the Clearwater River.

#### Big Creek Bridge Replacement, Malheur National Forest, Oregon

Survey crew chief responsible for completing terrestrial and bathymetric survey, bankfull measurements, instream pebble counts, grade-control, and woody debris structures, and other geomorphic assessment to support design for a new, single-span bridge and three-sided box culvert. The new single-span bridge will replace three existing cmp culverts, that constrict flow and regularly clog due to beaver activity. The new three-sided box culvert will replace an additional three overflow cmp culverts, that will provide extra capacity during high flows. Bathymetric survey included approximately 5,000 feet of Big Creek and the overflow channel.

#### Spring Creek Road Bridge Replacement, Stillwater County, Montana

Survey crew chief responsible for collecting survey data to support the design and construction of a new 130' precast concrete bulb-tee bridge over the Stillwater River on Spring Creek Road. Bathymetry data was also collected to be used in a no-rise analysis for floodplain permitting. Coordination and documentation of multiple private roadway approaches and fencing, directly adjacent to the existing bridge, was critical to ensure proper design of the new bridge structure.

#### Ingersoll Creek Road Bridge, Stillwater County, Montana

Survey crew chief responsible for collecting survey data to support the design and construction of a new 90' precast concrete bulb-tee bridge over West Rosebud Creek on Ingersoll Creek Road. Because the bridge is located in a Zone AE floodplain, detailed bathymetry data was also collected to be used in a no-rise analysis for floodplain permitting. Coordination and documentation of multiple private roadway approaches and fencing, directly adjacent to the existing bridge, was critical to ensure proper design of the new bridge structure.

#### Bible Lane Bridge Replacement, Stillwater County, Montana

Survey crew chief responsible for collecting survey data to support the design and construction of a new 49' precast concrete tri-deck bridge over Petty Creek on Bible Lane. Because the bridge is located in a Zone AE floodplain, detailed bathymetry data was also collected to be used in a no-rise analysis for floodplain permitting. Coordination and documentation of multiple roadway intersections and railroad infrastructure, directly adjacent to the existing bridge, was critical to ensure proper design of the new bridge structure.





# Tom Watters



3 years with Great West 36 years of experience

#### Education

» Montana State University, BS, Civil Engineering, 2016

#### Professional Certifications

» Orland High School, Orland California

#### Professional Trainings

» Great West Engineering RPR Training

Tom has 38 years of industry experience as the owner of construction companies in CA, AK, and MT. He is knowledgeable in a wide range of standard construction practices and regulatory requirements, has a good understanding of the operations and construction processes. He has experience supervising, implementing and inspecting projects of wide variety from start to completion. His construction background includes inspection experience in irrigation infrastructure, hydraulic structures, transportation, water and wastewater projects Toms excellent communication skills aid him while collaborating with engineers, subcontractors, inspectors, officials, grant agencies and owners.

#### FEATURED EXPERIENCE

#### NRDP - Cottonwood Creek Fish Screen

Construction inspector for the Lower Applegate Fish Screen. The existing ditch was unscreened and studies indicated that considerable fish were entrained within the ditch network during irrigation activities. The purpose of the project was to install a new, low maintenance fish screen capable of handling a variety of flows (up to 7 cfs) and a new fish friendly diversion structure. The project was successfully installed in October of 2021. Duties included overseeing construction, quantity verification, project meetings and project staking. The project partners included NRDP and WRC.

#### RELATED EXPERIENCE

#### Bohrnsen Marletto Fish Screen, NRDP, Philipsburg, Montana

Construction inspector for the Bohrnsen Marletto Fish Screen. The Rock Creek drainage near Philipsburg, Montana is an important Blue Ribbon trout stream harboring critical habitat for both native Bull Trout and Westslope Cutthroat Trout), in addition to additional wild trout species. The existing diversion pin and plank diversion was located on the Ranch at Rock Creek property. The existing ditch was unscreened and studies indicated that considerable fish were entrained within the ditch network during irrigation activities. The purpose of the project was to install a new, low maintenance fish screen capable of handling a variety of flows (up to 32 cfs). Improvements to the headgate were also designed. After analysis of two passive fish screen types, a dual modular FCA fish screen was selected. Project challenges at the site include winter construction and dewatering. The project was successfully installed in January of 2021. Duties included overseeing construction, quantity verification, project meetings and project staking. The project partners included NRDP and Trout Unlimited.



#### Lolo Creek (Maclay Ditch) Fish Screen, CFC, Montana

Construction inspector for the Lolo Creek (Maclay Ditch) Fish Screen. The existing Maclay Ditch off Lolo Creek is an unscreened ditch and FWP fish salvage efforts over the years indicate the ditch entrains thousands of trout (perhaps up to 10,000 annually) and this screening project was of critical importance to FWP. The purpose of the project was to install a new, low maintenance fish screen capable of handling a variety of flows (up to 36 CFS). Project challenges at the site included very difficult access, site dewatering and winter construction. Duties included overseeing construction, quantity verification, project meetings and project staking. The project was successfully installed in fall of 2020.

#### Watershed Restoration Coalition/NRCS Aspen Grove Irrigation Pivots, Deer Lodge, Montana

Construction inspector for two large irrigation pivots on Aspen Grove Ranch, covering approximately 190 acres, on the upper Cottonwood Creek Drainage near Deer Lodge, MT. Responsibilities included on-site observations, quantity verification, contractor coordination and project meetings. The project was successfully constructed in winter of 2020.

#### Elk Creek Road Bridge (EK7), Lewis & Clark County, Montana

Construction inspector responsible for overseeing the installation of a new 75' single-span concrete bulb tee bridge on pile foundation to replace the existing washed out bridge. The bridge replacement was a high priority project due to the previous bridge washing out during high flows. Duties included overseeing construction, quantity verification, project meetings and project staking. The project was successfully constructed in the fall of 2021.

#### Rock Creek Road Bridges, Beaverhead County, Montana

Construction inspector responsible for overseeing the installation of a two new steel modular bridge on pile foundations over the Big Hole River near Wisdom. The bridge replacements were a high priority project due to the critical condition of the existing bridge, with issues consisting of 5-ton existing postings, limiting many vehicle types from crossing safely. Duties included overseeing construction, quantity verification, project meetings and project staking. The project was successfully constructed in the fall of 2021.

#### Old Boulder Road Bridge over the Boulder River, Sweet Grass County, Montana

Construction inspector responsible for overseeing the installation of a new 140' single-span bulb tee bridge on pile foundation to replace the deficient steel through truss bridge. The bridge replacement was a high priority project due to the critical condition of the existing bridge, with issues consisting of a 10-ton existing posting, limiting many vehicle types from crossing safely. Duties included overseeing construction, quantity verification, project meetings and project staking. The project was successfully constructed in the fall of 2020.

Giem Bridge over the Beaverhead River, Madison County, Montana

Construction inspector responsible for overseeing the installation of a new 140' single-span bulb tee bridge on pile foundation to replace the deficient steel through truss bridge. The bridge replacement was a high priority project due to the critical condition of the existing bridge, with issues consisting of a 5-ton existing posting, limiting many vehicle types from crossing safely. Duties included overseeing construction, quantity verification, project meetings and project staking. The project was successfully construction in the fall of 2020.

#### Bible Lane and Mill Creek Bridges, Missoula County, Montana

Construction inspector responsible for overseeing the installation of two new bridges in Missoula County. One bridge consisted of the replacement of a substandard three-span steel bridge over Petty Creek with a new single-span concrete bridge at a geometrically complex site adjacent to the railroad line. The other bridge consisted of the replacement of two large diameter culverts with a new single-span concrete bulb-tee bridge. This project was complex due to the private property concerns and detour route for the adjacent elementary school. The projects were successfully installed in 2020.





# Matt Morris, PLS

Surveyor

20 Years of experience

#### Education

» Montana State University, BA, Licensed Surveyor Intern Candidate, Business Administration Minor, 2003

#### **Professional Registrations**

- » Professional Land Surveyor, MT, ID, WY
- » Certified Federal Surveyor CfedS

#### **Professional Affiliations**

- » Montana Association of Registered Land Surveyors (MARLS)
- » Professional Land Surveyors of Wyoming (PLSW), Special Member
- » Idaho Society of Professional Land Surveyors, Member

#### Professional Training

» Department of Interior - 20 week course - Certified Federal Land Surveyor

### FEATURED EXPERIENCE

#### Varney Road and Bridge, MDT & Madison County, Ennis, Montana

Survey Manager for the property boundary and topographic survey for design of this roadway and bridge replacement project. Established control monuments, collected topographic information, and completed the project Certificate of Survey to document property boundaries. Varney Road is located within the Madison River floodplain in an area that is prone to ice-gorging during the winter months. Matt will provide legal survey services for this project if needed. He has 20 years of survey experience and is a Certified Federal Land Surveyor. He is experienced in survey support for Transportation projects, survey support for utility improvement projects, site planning, subdivision plats, COS development, adjustment of common boundary lines, and construction staking.

#### RELATED EXPERIENCE

- » Green Meadow Drive Section Line Adjustments, Helena, Montana
- » Sidewalk and Pedestrian Routing Improvements, MDT, Fairfield, Montana
- » 7th Avenue NW Sidewalks, MDT, Chouteau, Montana
- » Highway 89 Kiowa Junction, MDT, Browning, Montana
- » York Road Sand Shed Survey, Helena, Montana
- » Dearborn Road Improvements Construction Agreements, Wolf Creek, Montana
- » Water and Sewer Improvements Control & Aerial Survey, Seeley Lake, Montana



## RESUME

# Adam Hockenberry, PE

### Geotechnical

#### **CURRENT RESPONSIBILITIES:**

**Senior Geotechnical Engineer** for performing and managing geotechnical services for investigations, design, remediation, and construction of dams and reservoir projects. Also manages and provides on-site and off-site technical support for numerous dam foundation improvement projects, primarily by grouting for both remediation and new construction.

#### **PROFESSIONAL REGISTRATION(S):**

PE: PA

#### SUMMARY OF EXPERIENCE:

Dam Safety Engineering Services, Priest Rapids Spillway

Stability Improvement Project, Grant County, WA, Grant County

*Public Utility District.* Senior Geotechnical Engineer for preliminary and final designs for stability improvements of a 1,142-foot-long gated concrete spillway. Regulated by FERC, the nearly 10,000-foot-long dam consists of a left embankment, left bank fish passage facilities, erection bay, powerhouse, spillway, right bank concrete gravity dam with fish passage facilities, and a right embankment. The spillway structure comprises 22 bays with each bay having a 40-foot-wide by 50-foot-high steel radial gate on top of a fixed ogee crest. The discovery of dis-bonded, horizontal, concrete lift joints in portions of the spillway during previous subsurface investigations led to evaluations of long-term stability of the spillway structure and remedial alternatives. The selected alternative includes installation of two posttensioned, high-capacity rock anchors in each spillway monolith to meet stability design criteria for usual, unusual, and seismic loading conditions. Specific tasks and responsibilities include assessment and characterization of subsurface conditions; design of post-tensioned anchors; performing constructability reviews; and developing cost estimates, contract drawings, and specifications.

**Gilboa Dam Improvements, Schoharie County, NY,** *NYCDEP*. Geotechnical Engineer responsible for condition assessments, preliminary and final design, and construction plans and specifications for repairs and upgrades to two dams and appurtenant structures located in the Catskill Mountain region. Gilboa Dam forms Schoharie Reservoir with a storage capacity of 17.6 Bgal. The Ashokan Reservoir, which has a storage capacity of 123 Bgal, is formed by Olive Bridge Dam and a system of seven combination earthfill and rockfill embankment dikes. Specific tasks have included review of subsurface investigations and designs previously performed by others; field reconnaissance; compilation and interpretation of instrumentation data and field testing; development of the subsurface investigation program, including

**YEARS EXPERIENCE WITH FIRM:** 22

YEARS EXPERIENCE WITH OTHER FIRMS: 1

#### EDUCATION:

BS, Civil Engineering, Drexel University, 1997 MS, Civil Engineering, Drexel University, 1999 MS, Engineering Geology, Drexel University, 1999

**PROFESSIONAL AFFILIATIONS:** ASCE, USSD



permitting and specifications; stabilization design for an existing slope failure; evaluation and remediation of an existing gravity training wall that exceeds 100 feet in height; and subsurface investigations at Gilboa Dam. Rotary-sonic drilling was used to drill through the existing earthen embankment section at Gilboa Dam to minimize the potential for damage to the dam and to investigate the condition of the embankment soils. The subsurface investigation also included the installation of piezometers at various locations in the embankment and foundation. The Gilboa Dam project won the 2015 Diamond Award, presented by the American Council of Engineering Companies (ACEC) New York.

**Briery Branch Dam Engineering Services, Bridgewater, Rockingham County, VA**, *Virginia Department of Conservation and Recreation*. Assistant Project Manager responsible for assisting with the subsurface exploration and laboratory testing program, and the spillway alternatives refinement and evaluation of the Phase III Preliminary Design for repairs and improvements needed to bring this dam into compliance with current Virginia Dam Safety Regulations and NRCS regulations. Briery Branch Dam is a zoned-earthfill embankment dam with a 760-foot-long crest and a maximum height of 98 feet. Spillway improvements alternatives included increasing existing auxiliary spillway capacity to safely pass the probable maximum flood event by either replacing/abandoning the existing auxiliary spillway with a new RCC chute spillway over the dam's earth embankment or constructing a buried cutoff wall at the downstream end of the existing auxiliary spillway exit channel and raising the embankment.

**Dam Safety Review Services, Diascund Dam Principal Spillway Reconstruction, VA,** *City of Newport News, Newport News Waterworks.* Senior Geotechnical Engineer responsible for supervising the subsurface investigation of a 250-foot-wide concrete principal spillway to support preliminary and final design. Diascund Dam comprises a 35-foot maximum-height earthfill embankment with a 5,700-foot crest length. Excess reservoir inflow is discharged through a 250-foot-wide concrete principal spillway that bisects the embankment. The purpose of the reconstruction project was to perform a subsurface investigation of the current seepage conditions, reconstruct the principal spillway to correct design defects, and to safely pass the full range of discharge flows up to and including the probable maximum flood. The subsurface investigation program comprised standard penetration testing, piezometer installation, hydraulic conductivity testing, and ground penetrating radar (GPR) to identify the existence of any voids under the spillway. The subsurface exploration results were summarized in a geotechnical exploration report and used in the preliminary geotechnical design report. This project won the 2018 Best Major Rehabilitation – Publicly Owned, presented by the Virginia Lakes & Watershed Association.

**Pikes Creek Dam Rehabilitation Project – Preliminary Design Phase, Luzerne County, PA**, *Pennsylvania American Water*. Senior Geotechnical Engineer responsible for supervising the subsurface investigation of the 65-foot-high, 2,155-foot-long earthfill embankment dam. The purpose of the project was to correct significant dam safety issues, including spillway capacity, excessive seepage, lack of internal drainage features, and slope stability. The subsurface investigation program consisted of standard penetration testing, NX-size triple tube rock coring, and water pressure testing to determine hydraulic conductivities of the underlying bedrock. In addition, a seismic refraction survey and a multichannel analysis of surface waves survey were performed to identify top of rock.

**Devil's Kitchen Dam Evaluation, Williamson County, IL**, *U.S. Fish and Wildlife Service.* Geotechnical Engineer responsible for assisting in the geotechnical review and assessment of the foundation bedrock underlying the dam. An investigation was performed to further evaluate a weak horizon discovered near the dam foundation contact. Specific responsibilities included visually assessing and collecting rock cores of the weak horizon, conducting shear-strength testing on the collected rock cores for analyzing dam stability, evaluating high-resolution optical televiewer logs, and assisting in foundation drain evaluations.







## RESUME

## Aimee Corn, PE

### **Structural**

#### **CURRENT RESPONSIBILITIES:**

**Civil Structural Engineer** working on the design and analysis of concrete dams and reinforced-concrete hydraulic structures. Tasks also involve analysis reports, inspection reports, and other such documentation. Experience includes working on the analysis and evaluation of existing concrete gravity dams, spillways, and intake towers. Also experienced in risk assessment, as well as design alternatives. Master's thesis focused on the evaluation of potential failure modes of post-tension anchored concrete gravity dams. Areas of expertise include concrete dam evaluation, hydraulic structures, structural engineering, finite element analysis, post-tensioned anchors, and risk assessment.

**YEARS EXPERIENCE WITH FIRM:** 7

YEARS EXPERIENCE WITH OTHER FIRMS: 2

#### EDUCATION:

BS, Civil Engineering (Mathematics Minor), Seattle University, 2012 MS, Civil Engineering, Colorado State University, 2014

**PROFESSIONAL AFFILIATIONS:** ASCE; USSD; ASDSO

#### **PROFESSIONAL REGISTRATION(S):**

PE: CA, CO

#### **CONTINUING EDUCATION:**

Analysis System (ANSYS), 2014

#### SUMMARY OF EXPERIENCE:

**Basin Creek Dam No. 1, Structural Assessment and Stability Analysis, Butte, MT,** *The City-County of Butte Silver Bow.* Project Engineer responsible for the structural assessment and the stability analysis of Basin Creek Dam No. 1 to make recommendations for repairs to the deteriorated concrete. The structural assessment and the stability analysis evaluated the behavior of the dam due to static conditions in accordance with Federal Energy Regulatory Commission (FERC) guidelines. Responsible for review of project data, providing support for concrete coring and lab testing, completed a site visit to visually inspect the concrete, developed remediation recommendations including post-tensioned anchors and a concrete overlay, and prepared a letter report that documented work performed.

**Risk Assessment of Lake Hamilton Dam, Mahoning County, OH,** *Aqua Ohio.* Structural Engineer conducting a structural evaluation of the existing concrete gravity dam using hand calculations and Excel spreadsheets, then completing a hydrologic and seismic risk assessment of the identified potential failure modes. Designed preliminary post-tension anchors and cost estimates for retrofit options.



## Aimee Corn, PE

**Dam Safety Engineer Staff Augmentation, Chico, CA,** *Pacific Gas and Electric Company.* Dam Safety Engineer responsible for supporting internal and regulatory agency (i.e., DSOD and FERC) dam safety inspections for PG&E's Shasta and Desabla area hydroelectric facilities. Engineer responsible for addressing Independent Consultant and regulatory recommendations to ensure compliance requirements of the Dam Safety Program are met. Responsible for coordinating 21 Federal Energy Regulatory Commission Part 12D Safety Inspections and Potential Failure Mode Workshops for concrete gravity dams, concrete arch dams, slab-and-buttress dams, and embankment dams in the Shasta and Desabla regions of PG&E's assets.

**Carvin Cove Dam Structural Stability Evaluation, Roanoke, VA**, *Western Virginia Water Authority*. As Structural Engineer, analyzed the spillway and non-overflow sections for overturning, sliding, and overstressing for various flood and seismic events. The analysis was done to evaluate the stability of the concrete gravity dam. The analysis was calculated by hand, compared with Excel spreadsheets, and followed by both linear and non-linear 2D finite element (ANSYS) analyses.

**Morris Sheppard Dam CASSLE, Palo Pinto County, TX**, *Brazos River Authority*. Project Engineer involved in the Concrete Assessment and Service Life Extension (CAASLE) project, utilizing a multiphase risk-informed decision-making approach. Phase I consists of performing a simplified structural analysis; a potential failure mode analysis (PFMA), along with a semi-quantitative risk analysis (SQRA); the preparation of a concrete assessment investigation and testing program; and a Supporting Technical Information Document (STID). The dam is a 150-foot-high, and 1,600-foot-long, reinforced concrete Ambersen structural with a 400-foot-long earth embankment section and a 1,400-foot-long emergency spillway. Responsible for completing the simplified structural analysis, development of the failure modes and compiling a project overview workbook for the SQRA workshop, review of the concrete assessment investigation and testing program, and completing the STID update.

**Mineral Creek Dam Safety Review, Ray, AZ**, *ASARCO*. Project Engineer responsible for visual inspection of the Mineral Creek Dam, a 185-foot-high concrete arch dam located on the ASARCO Ray Mine property. Project Engineer responsible for dam safety inspection to evaluate the condition of the dam. An assessment was made of the general physical condition of the structure and its operations with respect to safety based on the visual inspection and available data. Engineer responsible for reviewing available pertinent engineering data relative to the design, construction, operation, and monitoring of the dam and recommendations were developed to prioritize work recommended to maintain the integrity and operation adequacy of the dam.

**Quanah Parker Dam Stability Analysis, Comanche, OK,** *U.S. Fish and Wildlife Services (USFWS).* Project Engineer responsible for performing the stress and stability analysis on Quanah Parker Dam, a high-hazard, 53-foot-high gravity arch dam constructed in 1936. The analysis was a 3D analysis of this arch dam using the 3-d finite element method of analysis to evaluate the dam for usual (normal), unusual (flood), and extreme (seismic) loading conditions.

**Structural Evaluation of Electric Lake Dam Intake Tower, Huntington, UT,** *PacifiCorp Energy.* As Structural Engineer, performed structural analysis using hand calculations and finite element modeling (ANSYS) of the intake tower, reviewed the structural analysis of the valve chamber and stilling basin, and reviewed the report.





## RESUME

## **Bradley Dawson, PE**

### **Structural**

#### **CURRENT RESPONSIBILITIES:**

**Project Engineer** working on the design and analysis of concrete dams and reinforced-concrete hydraulic structures. Responsibilities include analyzing hydraulic structures using finite element methods and closed form solutions, performing inspections on hydraulic structures, managing projects, and preparing reports. Areas of expertise include finite element analysis, concrete dam evaluation, hydraulic structures, risk analysis, and structural engineering.

#### **PROFESSIONAL REGISTRATION(S):**

PE: CO

#### **SUMMARY OF EXPERIENCE:**

**YEARS EXPERIENCE WITH FIRM:** 3

YEARS EXPERIENCE WITH OTHER FIRMS: 14

#### **EDUCATION:**

BS, Mechanical Engineering, University of Vermont, 2002 MS, Structural Mechanics, UCLA, 2003

**PROFESSIONAL AFFILIATIONS:** ASDSO; USSD

**Basin Creek Dam No. 1, Structural Assessment and Stability Analysis, Butte, MT,** *The City-County of Butte Silver Bow.* Project Manager overseeing a structural assessment and the stability analysis of Basin Creek Dam No. 1 to make recommendations for repairs to the deteriorated concrete. The structural assessment and the stability analysis evaluated the behavior of the dam due to static conditions in accordance with FERC guidelines. Reviewed project data, provided support for concrete coring and lab testing, completed site visits, performed static analyses, developed remediation recommendations, and prepared a letter report that documented work performed.

**Dam Safety Engineering Services, Seismic Stability Analyses, Beverly, Grant County, WA**, *GCPUD*. Structural Engineer performing 2-D structural stability evaluations for spillway and non-overflow structures at the Priest Rapids and Wanapum Hydroelectric Developments. Gravity and pseudodynamic methods are being used to evaluate typical failure modes including overstressing, overturning, and sliding stability. Recommendations are being made for the piezometer threshold values based on the results of the analyses. Also developing an amplified response spectra at the spillway trunnions using finite element methods that will be used as the load for the updated seismic evaluation of the radial gates.

**Dam Auxiliary Spillway Stability Evaluation, Western U.S.,** *Confidential Client.* Structural Engineer performing 2-D structural stability evaluations for the auxiliary spillway at a dam project. Gravity and pseudodynamic methods were used to evaluate typical failure modes including overstressing, overturning, and sliding stability. The auxiliary spillway is being evaluated as a result of a recommendation made by the Independent Consultant in the most recent 5-year CSIR.



**Dam Spillway Pier Seismic Evaluation, Western U.S.,** *Confidential Client.* Structural Engineer performing the seismic evaluation of the spillway piers at a dam project using finite element methods. A 3-D finite element model of the spillway pier was used to evaluate the pier for the seismic load using the response spectrum method of analysis. The target ground spectra at the base of the dam was amplified to the crest of the dam for evaluation of the pier. Developed the amplified response spectrum acting at the base of the spillway piers by evaluating the dynamic response of the dam.

#### Hydropower Technical Services, Risk Informed Decision Making Pilot, Rosemead, CA, Southern

*California Edison Company.* Structural Engineer for the structural analysis for failure of the concrete facing slab on the upstream face of Rhinedollar Dam. Participated in the quantitative risk analysis workshop as the structural subject matter expert. Rhinedollar Dam is a concrete-faced rockfill dam in the high Sierras of California. Primary potential failure modes associated with the project included overtopping due to inadequate spillway capacity leading to headcutting or impinging rockfill erosion and breach.

**Morris Sheppard Dam Concrete Assessment and Service Life Extension, Palo Pinto County, TX**, *Brazos River Authority.* Structural Engineer for the development of a targeted and credible investigation program for the overall concrete and structural assessment of the slab and buttress dam and revising the probable failure mode analysis to focus the investigation and testing program on critical needs of the structure.

**Bliss and Lower Salmon Dams PFMA Assessments, Multiple Locations in ID**, *Idaho Power Company.* Senior Engineer for the condition assessment of the Lower Salmon uncontrolled overflow spillway and the Bliss far left gated spillway chute. The assessment was initiated by FERC following the recent Oroville Dam events to evaluate the potential geologic, structural, and performance issues that could jeopardize the ability to safely pass a flood event. Reviewed documents, performed site inspections, developed potential failure modes, acted as the structural subject matter expert in the PFMA workshop, and wrote a report documenting the results of the assessment.

**Hells Canyon Developments – FERC Part 12 Inspections, Multiple Locations in ID**, *Idaho Power Company.* Senior Engineer assisting the Independent Consultant in the 5-year CSIR for this 300-foot-tall concrete gravity dam on the Snake River. Responsibilities included site inspection and assessment, PFMA review, preparation of the consultant safety inspection report, and complete revision of the Supporting Technical Information Document. As part of this effort the dam safety surveillance and monitoring program (DSSMP) was revised and the historical performance of the uplift piezometers and drainage measurements were evaluated. Recommendations to the action and threshold values were made and the DSSMP was modified accordingly.

**Tarryall Dam Stability Evaluation, Park County, CO**, *Colorado Parks & Wildlife*. As Structural Engineer, performed a structural stability analysis of the dam to assess the safety of the dam for the usual (normal), unusual (100-year flood event), and extreme (seismic) loading conditions. Tarryall Dam is a single-curvature, concrete-arch dam with a concrete thrust block located at the right abutment. The maximum structural height of the dam is approximately 70 feet, and the crest length is approximately 205 feet. The thickness of the arch section varies from approximately 14.5 feet at the base to 4 feet at the crest. Seepage flowing beneath the downstream fill along the toe of the dam raised concerns for the dam owner. As part of this study, investigated the passive resistance offered by the downstream fill of the dam using finite element methods. Results of the study indicated that the downstream fill had little effect on the overall behavior of the arch dam.





### **Bradley Dawson, PE**

Ashton Dam, Remediation Phase 2 – Embankment and Concrete Structures, Ashton, ID, *PacificCorp*. As Structural Engineer, assisted with the development of various designs consisting of rehabilitation, replacement, and/or removal of several ancillary structures to improve stability and durability. Ashton Dam had historical seepage problems and significant freeze-thaw damage. Structural upgrades were designed for the powerhouse, powerhouse buttresses, tailrace wall, headrace wall, gates, spillway piers, and spillway training wall. Damaged concrete from freeze-thaw activity was removed and new reinforced-concrete armor layers were attached to the existing concrete using epoxy-grouted anchors. Employed special design details using multiple water stops and intermediate concrete segments at connections between new concrete and existing concrete to prevent water infiltration. Ashton Dam is an earth-and-rockfill dam with a RCC downstream overlay, an integral powerhouse (right abutment), and a concrete-gated spillway (left abutment).

**Risk Study for Proposed Design Remediation of McKelvey Lake Dam, Youngstown, OH,** *Aqua Ohio, Inc.* Structural Engineer tasked with performing structural analyses of the arch dam and concrete spillway weir using finite element methods, flood routing, erosion evaluation of rock abutments, and scour-hole analysis. Conducted analyses for the current condition of the dam and several design repair alternatives. Results for each repair alternative were used to evaluate various failure modes of the dam. Conducted a risk workshop including the analysis team and members of Aqua Ohio, Inc. to determine which repairs resulted in the greatest risk reduction. Used the results of the risk analysis to prioritize the repair stages so that available monies were used most efficiently. Repair designs included demolishing and removing the existing concrete spillway crest, saw-cutting and removing a notch in the central section of the main dam, constructing a reinforced-concrete apron downstream of the dam, and constructing a 3-foot-high parapet wall along the crest of the dam. McKelvey Lake Dam is a single-curvature, concrete-arch dam with a structural height of 77 feet and a crest length of approximately 355 feet. The thickness of the arch dam varies from 8 feet at the crest to approximately 34 feet at the base. The arch dam is supported by thrust blocks on both the right and left abutments.

**Pit 3 Dam Stability Evaluation, Shasta County, CA**, *Pacific Gas and Electric Company (PG&E)*. As Structural Engineer, performed the stability analysis of the Pit 3 Dam using finite element methods. Evaluated concrete overstressing, overturning stability, and sliding stability for the usual load combination (normal operation), unusual load combination (probable maximum flood), extreme load combination (maximum credible earthquake), and the post-earthquake load combination. Nonlinear contact elements were included at the dam/foundation interface and contraction joints for the unusual load combination. The maximum credible earthquake was evaluated using time history with modal superposition. Pit 3 Dam is a curved concrete gravity structure with a crest length of approximately 484 feet and a maximum structural height of approximately 130 feet. The thickness of the dam varies from approximately 101.5 feet at the base to approximately 10 feet at the crest.





## RESUME

# Guy Lund, PE

### QA/QC

#### **CURRENT RESPONSIBILITIES:**

Principal Engineer in the Dams and Hydraulics Practice responsible for serving clients in the hydropower sector and assisting in further development of the Dams and Hydraulics Practice in the West Region. Specializes in the civil/structural engineering of dams and the appurtenant structures associated with dams. Proficient in the technical analysis, design, and evaluation of the structural stability of concrete dams, including gravity, RCC, arch, multiple-arch, and buttress types. Experienced in dam safety, inspection, and project management. Nationally recognized leader in the structural analysis of concrete dams. Served as a consultant on the independent technical review team for the Gilboa Dam rehabilitation project in Schoharie County, NY, where our firm was the lead designer as part of a joint venture. Has published numerous papers on concrete dams, foundation erodibility, and risk assessments and has prepared concrete dam analysis workshops for both USSD and ASDSO. Moderated the "Aging Concrete Dams" workshop at the 2013 meeting of the

**YEARS EXPERIENCE WITH FIRM:** 6

YEARS EXPERIENCE WITH OTHER FIRMS: 33

#### **EDUCATION:**

BS, Civil Engineering, Colorado State University, 1982 MS, Civil Engineering, University of Colorado, Denver, 1990

**PROFESSIONAL AFFILIATIONS:** 

ACI, ASCE, ASDSO, USSD, Denver Water's Gross Reservoir Expansion Project Board of Consultants

International Committee on Large Dams in Seattle, WA. Recognized thought leader and national speaker in the dams and hydraulics industry.

#### **PROFESSIONAL REGISTRATION(S):**

PE: Montana - No. PEL-PE-LIC-20249, CO, WA, CA, UT, AZ, NM, TX, ID, VA, WV, PA, OH, NY

#### **SUMMARY OF EXPERIENCE:**

Hamilton Dam, Butler County, OH, *Aqua Ohio, Inc.* Project Manager and Responsible Engineer for the risk assessment of this 75-foot-high cyclopean concrete dam. Previous studies had determined that the project did not have adequate spillway capacity for the full PMF, nor did the main dam have the capacity to support the peak reservoir levels. Consequently, post-tensioned anchor tendons were installed along the crest of the dam in 2005. Additional repairs, including an auxiliary spillway and downstream embankment berm to the gravity dam, were not implemented. Project responsibilities included revising hydrology using site-specific precipitation data, performing structural evaluations for flood and earthquake loads, developing fragility curves relating stability versus load, estimating potential life loss from potential failure, and estimating overall project risk. Results showed that the current condition of the dam had adequate capacity for approximately 57 percent PMF, which is estimated to have a 30,000-year return period. The estimated project risk was below the accepted U.S. Army Corps of Engineers

tolerable-risk-level guideline and minimized the urgency to modify the dam to further reduce risk. However, the project did not meet the Ohio Department of Natural Resources standard, which required high-hazard projects to safely pass the full PMF event.

**Gilboa Dam, Schoharie County, NY,** *New York City Department of Environmental Protection (NYCDEP).* Structural Engineer responsible for the review of modifications to Gilboa Dam. The NYCDEP had developed plans to construct emergency remedial measures that would improve the structural stability of the dam, which is a composite, consisting of an embankment and concrete/masonry spillway section. The spillway consists of a 1,324-foot-long concrete/masonry gravity overflow structure with a maximum height of 150 feet. The dam was originally designed and to form the Schoharie Reservoir. The reservoir provides a supplemental source of water supply for the City of New York. Responsibilities included structural peer review and independent verification of the proposed notch spillway and post-tensioned anchor design.

**Lake Medina Dam, Medina County, TX,** *Bexar-Medina-Atascosa Water District.* Principal Engineer for the final design of post-tensioned anchors and downstream erosion protection at this 165-foot-tall concrete gravity dam. Facilitated the pre-bid meeting and assisted with the review of bids and selection of the contractor.

**Jed Johnson Dam, OK.** Senior Structural Engineer on the final design of rehabilitation measures for the seismic loading condition. The structure is a 51-foot-high straight concrete gravity dam. The design was developed with 2-D finite element method of analysis techniques using ANSYS. Final rehabilitation design included adding post-tensioned anchors for stability.

**Wanapum Dam Spillway Consulting Services, Beverly, WA**, *GCPUD District*. Chairman of the Board of Consultants (BOC) for emergency repairs for this project located on the mainstream of the Columbia River in south central Washington. During an inspection in February 2014, significant crest deflections were observed for the pier on Monolith 4. The GCPUD initiated evaluation of the reservoir and established a BOC. Responsibilities included: forensic investigations to establish the event/cause of the crack; new or existing potential failure modes related to the incident; structural stability of the spillway, gates, and foundation; interim risk-reduction measures to reduce the likelihood and consequences due to any identified probable maximum floods; and remediation of any problems identified.

**Masonry Dam, Seattle, WA.** Project Manager/Principal Structural Engineer for the structural stability analysis of this masonry concrete gravity dam located on Cedar Creek. The dam was completed in 1914, has a maximum structural height of 230 feet, and is an approximately 980-foot-long, 77-foot-high concrete arch dam with a crest length of 450 feet. The 2007 inspection and analysis included a 3-D finite element analysis of the dam for the usual (normal), unusual (flood), and extreme loading conditions. The stability of the dam was evaluated for sliding at the dam/foundation interface.

**Cheesman Dam Analysis, Jefferson County, CO**, *Denver Water*. Senior Structural Engineer responsible for preparing the analysis of a 234-foot-high cyclopean masonry gravity arch dam located on the South Fork of the South Platte River. The dam was evaluated for static and dynamic loading conditions. Duties included performing numerous trial-load analyses to determine the most-severe loading conditions on the dam and preparing three-dimensional finite element models to study the dam's behavior under the previously defined severe loading conditions. The stresses from the finite element model, near the dam/foundation contact, were transformed to determine the thrusts acting on the foundation. These thrusts were then used in stability calculations of foundation abutments.







## RESUME

# James Murphy, CMIT, ENV SP

### **Construction Oversight/Inspection**

#### **CURRENT RESPONSIBILITIES:**

**Construction Manager** for construction oversight and project management on dam rehabilitation projects. Duties include inspection of work, client coordination, quality assurance (QA), preparation of monthly pay estimates, submittal reviews, subconsultant management, interfacing with design team members, regulatory agency coordination, daily reporting, schedule reviews, as-built and quality assurance surveying, and overall project controls. His computer software skills include Autodesk Inventor; AutoCad; AutoCad Civil 3D; AutoCad Mechanical; Revit; MicroStation; surveying with a Leica Total **YEARS EXPERIENCE WITH FIRM:** 3

YEARS EXPERIENCE WITH OTHER FIRMS: 9

#### EDUCATION:

BS, Civil Engineering, Minor in Environmental Engineering, The Pennsylvania State University, 2013

Station System, surveying with a Trimble Total Station System; Bluebeam Revu; SolidWorks; CorelCAD; GroundCAD; Microsoft Project; Microsoft Office Suite; and Adobe Suite.

#### **PROFESSIONAL REGISTRATION(S):**

ACI Concrete Field Testing Technician - Grade I Construction Manager in Training (CMIT): Construction Management Association of America Envision Sustainability Professional (ENV SP): Institute for Sustainable Infrastructure Hazmat Certification

#### **CONTINUING EDUCATION:**

Pursuing MS, Energy and Mineral Engineering, The Pennsylvania State University OSHA Confined Space Entry Training OSHA Fall Protection Training OSHA PPE Training Personal Protective Equipment Training OSHA 30-Hour Construction Training Federal Aviation Administration Remote Pilot Training

#### **SUMMARY OF EXPERIENCE:**

Lake Scranton Dam Rehabilitation - Construction Management Services, Lackawanna County, PA, *Pennsylvania American Water.* Project Representative for the management of design upgrades during construction-phase work. Rehabilitation objectives include increasing spillway capacity and correcting other dam safety concerns, including inadequate global stability, embankment seepage, and slope stability. The main dam is a 60-foot-high, 610-foot-long composite stone masonry dam and earth fill



embankment with a masonry core wall. The spillway dam is a 20-foot high, 380-foot long composite concrete ogee weir and earthfill embankment with masonry core wall. Key duties included acting as the primary interface and coordination point for field progress between the owner and the contractor, the design professionals, and regulatory agencies; providing document coordination, reviews and project controls, schedule and issue impact assessments, value and change management, cost estimating, claim negotiations, and direct quality assurance/quality control oversight to make certain the project was constructed in accordance with the contract plans and specifications. Improvements include demolishing an existing ogee weir spillway, construction of a new labyrinth spillway, rehabilitation of the downstream embankment and installation of a blanket drain, installation of post-tensioned anchors at the main dam, repointing of the main stone masonry dam, and improvements to the intake valves.

**Elmhurst Dam Construction-Phase Services, Elmhurst, PA**, *Pennsylvania American Water*. Construction Manager providing construction oversight and inspection services for the rehabilitation of an existing 64-foot-high, 380-foot-long composite earth-fill embankment and stone masonry structure with masonry core wall. Modifications to correct significant dam safety issues include increasing spillway capacity, structural stability, and seepage mitigation by installing post-tensioned rock anchors; demolishing and reconstructing a "chute spillway" overflow section and stepped armoring of the embankment; installing modern embankment and toe drains and a new labyrinth spillway with side channel; armoring the stream channel by extending the stilling basin apron and divider wall; raising two 1200-foot-long dike walls; and upgrading instrumentation. Also, provided instrumentation services including oversight of drilling and installation of permanent piezometers, installation of the LC-2 single channel data loggers for collecting piezometer data, implementation of the new wireless data loggers, a site wide trail run of the instrumentation, and development of the post-construction instrumentation baseline report for the client.

**Pikes Creek Dam Rehabilitation Project – Preliminary Design Phase, Luzerne County, PA**, *Pennsylvania American Water*. Resident Project Representative for implementation and making certain of the design intent for improvements to the Pikes Creek Dam. The project's intent is to bring the dam into compliance due to spillway capacity, and seepage and stability concerns. The rehabilitation effort for the 2500-foot-long homogenous earthen embankment with concrete-core wall dam, includes both structural and geotechnical upgrades comprising of installing a labyrinth-type HydroPlus fuse gates within the existing auxiliary to increase the discharge capacity to the mandated spillway design flood along with flattening the downstream embankment slope. Work includes installing new chimney and toe drainage systems, and retrofitting the outlet works with pneumatically-operated knife gate valves. Also provided instrumentation specialist services for the Pikes Creek Dam Rehabilitation, which included providing oversight of the drilling and installation of the piezometers, installation of the weir monitors, installation of the wireless GeoNet instrument system, start up and trail monitoring of the instrumentation at the project site, and development of the post-construction instrumentation baseline report for the client.

West Virginia Dam Rehabilitation Program, Upper Deckers Site 1 Dam Rehabilitation, Preston County, WV, West Virginia Conservation Agency. Construction Manager overseeing the rehabilitation of an existing 45-foot-high earthen embankment dam. Dam rehabilitation features included abandonment of the existing under-sized auxiliary spillway, armoring of the embankment crest and downstream slope with RCC to provide the design spillway capacity, raising the crest of the dam by 5 feet, replacing the riser structure to allow for an 11-foot increase in normal pool elevation, and adding a flattened downstream embankment slope with a new toe drain system, a new filter diaphragm, and an automated piezometer and seepage monitoring system. Also served as the resident surveyor to record all improvements for development of the project as-builts.





## RESUME

# Kessi Zicko, PE

### Geotechnical

#### **CURRENT RESPONSIBILITIES:**

**Principal Geotechnical Engineer** for project management, conducting site reconnaissance, directing subsurface exploration and instrumentation programs, evaluating laboratory and field test results, and performing geotechnical analyses for dam, transportation, and building projects. Geotechnical analyses include shallow and deep foundation design, retaining wall design, settlement, soil and rock anchor design, material compatibility, and slope stability. Also reviews drawings for construction; prepares geotechnical reports, cost estimates, and specifications; conducts shop drawing review; and advises on geotechnical construction activities.

**PROFESSIONAL REGISTRATION(S):** 

PE: PA, NY

#### **SUMMARY OF EXPERIENCE:**

**Priest Rapids Spillway Stability Improvement Project, Grant County, WA**, *Grant County Public Utility District*. Senior Geotechnical Engineer for preliminary and final designs for stability improvements of a 1,142-foot-long gated concrete spillway. Regulated by FERC, the nearly 10,000-foot-long dam consists of a left embankment, left bank fish passage facilities, erection bay, powerhouse, spillway, right bank concrete gravity dam with fish passage facilities, and a right embankment. The spillway structure comprises 22 bays with each bay having a 40-foot-wide by 50-foot-high steel radial gate on top of a fixed ogee crest. The discovery of dis-bonded, horizontal, concrete lift joints in portions of the spillway during previous subsurface investigations led to evaluations of long-term stability of the spillway structure and remedial alternatives. The selected alternative includes installation of two post-tensioned, high-capacity rock anchors (54-strand with design load of 1,758 kips) in each spillway monolith to meet stability design criteria for usual, unusual, and seismic loading conditions. Specific tasks and responsibilities include assessment and characterization of subsurface conditions; design of post-tensioned anchors; performing constructability reviews; writing design reports; and developing cost estimates, contract drawings, and specifications.

**Mineral Ridge Dam and Spillway Improvement Project, Mineral Ridge, OH**, *Mahoning Valley Sanitary District.* Senior Geotechnical Engineer managing the subsurface exploration program at an existing dam and preliminary and final design for rehabilitation. The dam comprises a 60-foot-high, 3,480-foot-long

**YEARS EXPERIENCE WITH FIRM:** 22

YEARS EXPERIENCE WITH OTHER FIRMS: 0

#### **EDUCATION:**

BS Civil Engineering, Ohio Northern University, 1993 MS Civil (Geotechnical) Engineering, The Pennsylvania State University, 1995

**PROFESSIONAL AFFILIATIONS:** ASCE, ASDSO



## Kessi Zicko, PE

earthen embankment dam and its 260-foot-wide principal spillway ogee weir concrete gravity structure, stilling basin, and two 375-foot-wide concrete lined uncontrolled emergency spillways, as well as a stone masonry superstructure and a concrete roadway at the top of dam. The subsurface exploration program includes 22 borings, installation of 27 vibrating wire piezometers, 12 test pits, and laboratory testing of soil and rock samples. Design responsibilities comprise interpreting data for development of cross-sections and soil/rock parameters; reduction and evaluation of piezometric data; analyzing embankment seepage and slope stability; sizing chimney and toe drains; assessing filter compatibility for dispersive soils; designing passive and post-tensioned rock anchors; assessing liquefaction; evaluating uplift/blowout due to excess pore pressure in foundation bull's liver; and preparing reports, specifications, and drawings.

Lake Scranton Dam Rehabilitation Engineering Services, Lackawanna County, PA, *Pennsylvania American Water.* Senior Geotechnical Engineer for anchor designs for a 320-foot-long, 60-foot-high stone masonry gravity dam and for spillway slabs at the labyrinth spillway. Twenty-three 16-strand, posttensioned rock anchors, each with a design load of 546 kips, were recommended to stabilize the masonry dam. The design and specifications were impacted by the presence of a mudstone layer encountered below the bottom of the sandstone bond zone. To resist hydrostatic uplift pressures at the spillway slabs, passive, epoxy-coated dowels were drilled and grouted into rock.

**Rehabilitation of Elmhurst Dam, Lackawanna County, PA**, *Pennsylvania American Water*. Senior Geotechnical Engineer for post-tensioned anchor design and construction support for stabilization of an existing 64-foot-high composite-stone-masonry spillway and a non-overflow gravity section. Specific tasks include reviewing calculations, drawings, and specifications for 11 rock anchors composed of 19 and 41 strands bonded in rock, and advising during anchor installation. Subsurface conditions impacting the design and construction included portions of the primary spillway being founded on soil and interbedded shale, sandstone, and limestone bedrock. Also performed shop drawing review and support during construction of a 93-foot-long, anchored soldier beam and lagging wall installed for temporary excavation support.

**Gilboa Dam Improvements - CAT-211, Schoharie County, NY**, *New York City Department of Environmental Protection.* Geotechnical Engineer for condition assessments, preliminary and final design, cost estimates, construction plans and specifications, and design services during construction including shop drawing reviews for geotechnical repairs and upgrades to Gilboa Dam and appurtenant structures located in the Catskill Mountain region. Gilboa Dam forms Schoharie Reservoir with a storage capacity of 17.6 Bgal. Repairs to the 180-foot-high Gilboa Dam include modification and replacement of a stone masonry facade on a 1,324-foot-long, stair-stepped spillway. Specific design tasks include review of subsurface investigations and designs previously performed by others; field reconnaissance; compilation and interpretation of instrumentation data and field testing; development of a subsurface investigation program including permitting and specifications; selection of laboratory testing on soil and rock samples and interpretation of results; embankment stability analyses; stability evaluations for an existing slope failure; passive anchor bar design to resist uplift; evaluation and remediation of existing gravity training walls with heights exceeding 100 feet; vertical and inclined post-tensioned rock anchor designs; and evaluation of foundation drains.

#### **PUBLICATIONS:**

Zicko, K.E., D.A. Bruce, and R.A. Kline. "The Stabilization of Gilboa Dam, New York, Using High Capacity Rock Anchors: Addressing Service Performance Issues." *Proceedings of the International Conference on Ground Anchorages and Anchored Structures in Service* 2007, London, UK, November 2007.







## RESUME

## **Timothy Weber**

### **Construction Oversight/Inspection**

#### **CURRENT RESPONSIBILITIES:**

**Construction Manager III** responsible for site monitoring, contract conformity, and serving as the owner's liaison among the contractor, designers, and regulatory agencies.

**CONTINUING EDUCATION:** 

10-Hour OSHA Construction Safety and Health Training Fall Protection Training Course Personal Protective Equipment Training Course Permit-Required Confined Space Entrant, Attendant, and Supervisor

#### **SUMMARY OF EXPERIENCE:**

**Elmhurst Dam Construction-Phase Services, Elmhurst, PA,** *Pennsylvania American Water.* Construction Manager supporting construction oversight and inspection services for the rehabilitation of an existing 64-foot-high, 380-foot-long composite earth-fill embankment and stone masonry structure with masonry core wall. Modifications to correct significant dam safety issues include increasing spillway capacity, structural stability, and seepage mitigation by installing post-tensioned rock anchors; demolishing and reconstructing a "chute spillway" overflow section and stepped armoring of the embankment; installing modern embankment and toe drains and a new labyrinth spillway with side channel; armoring the stream channel by extending the stilling basin apron and divider wall; raising two 1200-foot-long dike walls; and upgrading instrumentation.

**West Virginia Dam Rehabilitation Program, Upper Deckers Site 1 Dam Rehab, Preston County, WV,** *West Virginia Conservation Agency*. Construction Manager during rehabilitation of a 45-foot-high, 600-footlong, zoned earth embankment dam originally constructed in 1969. Responsibilities included ensuring contractor compliance with contract drawings and specifications, quantity verification and client liaison. The dam rehabilitation includes placing approximately 18,000 cubic yards of roller-compacted concrete (RCC) for a new auxiliary spillway over the existing dam embankment, constructing a new reinforced concrete riser structure, installing an internal drainage system and flattening the downstream slope, modifying the outlet works, placing articulated-concrete block wave protection on the upstream slope, and constructing a new embankment section in the existing earthen auxiliary spillway.

**Pikes Creek Dam Rehabilitation Project – Preliminary Design Phase, Luzerne County, PA**, *Pennsylvania American Water*. Construction Manager supporting construction oversight and inspection services for a 2,155-foot-long, 65-foot-high earthfill embankment with a reinforced concrete core wall outfitted with 2

**YEARS EXPERIENCE WITH FIRM:** 12

YEARS EXPERIENCE WITH OTHER FIRMS: 23

#### EDUCATION:

Diploma, Morgantown High School, Morgantown, WV, 1981





## **Timothy Weber**

spillways, including a primary 72-foot-wide concrete ogee crest and an auxiliary 244-foot-wide concrete ogee crest with flashboards. Modifications to increase spillway capacity to pass probable maximum flood, mitigate seepage, and improving slope stability are required to meet current dam safety design criteria. Improvements include providing upstream supply line closure valves, widening the crest and flattening the downstream embankment, installing a new toe drain system with chimney and blanket drain, modernizing the auxiliary spillway with new HydroPlus fuse gates, and widening the downstream channel to increase spillway capacity.

**Tempe Town Lake Dam Postdesign Construction Management Services, Tempe, AZ,** *City of Tempe.* Construction Manager for the \$40.8 million Tempe Town Lake downstream dam replacement project. The proposed replacement dam comprises eight 17-foot-high hydraulically operated steel crest gates, each 106 feet long, with a roller-compacted concrete (RCC) foundation approximately 100 feet downstream of the existing dam. Services include construction-phase services, postdesign coordination, equipment start-up and testing services.

**Beaverdam Creek and Goose Creek Dams – Master Plan Study and Dams Operation, Ashburn, Loudoun County, VA,** *Loudoun Water.* Construction Manager for construction oversight and inspection services for the rehabilitation of an existing 55-foot-high, 1165-foot-long homogeneous earth-fill embankment structure. Modifications to satisfy dam safety requirements, mainly by increasing spillway capacity, included installation of a new labyrinth spillway, crest widening and embankment flattening with modern blanket and toe drains, low-level outlet works extension and permanent stream crossing improvements, control tower and electrical building upgrades with a new transfer pump station, and instrumentation upgrades.

**Conowingo Dam Fishing Wharf, Darlington, MD,** *Exelon Generation Company*. Resident Project Representative for the construction of a fishing wharf. Aspects included rock drilling, concrete piles, riprap, dewatering, waterfront, cofferdam, concrete walkways and retaining walls, stamped concrete, articulated concrete blocks, lighting, Americans with Disabilities Act (ADA) facilities, signage, lighting, and electrical. Involvement included full-time observation and record-keeping.

**Rehabilitation of Watres Dam, Spring Hill Township, Lackawanna County, PA**, *Pennsylvania American Water*. Inspector VI responsible for maintaining contact with the owner and acting as liaison among the contractor, the designers, and regulatory agencies as well as monitoring construction activities, material deliveries, and testing to verify contract compliance. The rehabilitation of the Watres Dam included widening the existing spillway, installing a toe drain system, and resurfacing the face of the dam to improve stability.



## RESUME

# Vladimir Cecka, PE

### **Structural**

#### **CURRENT RESPONSIBILITIES:**

**Structural Project Manager** experienced in the inspection, design, and rehabilitation of commercial and industrial buildings, water and wastewater treatment facilities, and maintenance facilities for bus and rail systems. Responsibilities include project management, design development, contract document production, discipline coordination, and in-house construction-phase supervision for structural projects.

#### **PROFESSIONAL REGISTRATION(S):**

PE: CO, PA, VA, FL, IN

#### **SUMMARY OF EXPERIENCE:**

**YEARS EXPERIENCE WITH FIRM:** 30

YEARS EXPERIENCE WITH OTHER FIRMS: 0

#### **EDUCATION:**

BS, Civil Engineering, Structural Design, South Dakota School of Mines and Technology, 1987

**PROFESSIONAL AFFILIATIONS:** ACI

**Gilboa Dam Improvements, CAT 211, Schoharie County, NY,** *New York City Department of Environmental Protection.* Structural Project Manager responsible for design and construction-phase services for the Gilboa Dam located in the Catskill Mountain region. Responsible for design of spillway slabs, mass concrete dam steps, anchors for spillway slabs, endsill details, stairs, miscellaneous metal details and concrete repairs. Gilboa Dam was constructed between 1919 and 1927 and forms Schoharie Reservoir, which has a storage capacity of 17.6 Bgal. Repairs to the 180-foot-high Gilboa Dam include modification and replacement of a stone masonry facade on a 1,324-foot-long stair-stepped spillway.

**Concrete Design Chapter for the** *National Engineering Handbook*, *Nationwide*, *U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS).* Project Manager responsible for developing Chapter 30, Concrete Design, of the *National Engineering Handbook*, Part 636, Structural Engineering. This chapter is used by NRCS personnel as a guide for designing or repairing concrete structures within their jurisdiction. Included within the manual are sections on strength and serviceability, flexure and axial loads, shear, reinforcement details, traditional working-stress design, plain concrete, and special topics such as torsion and seismic detailing. Additionally, the appendices include example problems for each of the major topics discussed. The project also included training sessions to present the new design chapter to NRCS personnel.

**Buckeye Lake Dam Improvements, Columbus, OH,** *Ohio Department of Natural Resources (ODNR).* Senior Structural Engineer responsible for providing structural input for concrete structures at Buckeye Lake Dam located in Licking County, Ohio. Responsible for design of structural elements such as slabs, miscellaneous anchorage details and specification development. The dam was constructed 1825 to 1832 as an earthen embankment and measures approximately 4.1 miles long. Lake storage capacity is more than



4.5 billion gallons of water at principal spillway level. Buckeye Lake Dam is designated as a Class I highhazard potential dam.

**Ryerson Station State Park Dam, Greene County, PA**, *Pennsylvania Department of Conservation and Natural Resources*. Structural Project Manager for design and construction services for a concrete gravity dam and related project features to replace the damaged existing structure and bring the modified structure into compliance with current dam safety regulations.

**Pikes Creek Dam Rehabilitation Project – Preliminary Design Phase, Luzerne County, PA**, *Pennsylvania American Water*. Structural Project Manager responsible for design plans and specifications for dam with a 72-foot-wide reinforced concrete principal spillway, training walls and four cast-in-place concrete valve vaults. Responsible for reviewing structural shop drawings and responding to requests for information.

**Upper Occoquan Dam Facilities Upgrades, Occoquan, VA,** *Fairfax Water*. Structural Project Manager responsible for the design of a new control tower and intake bar racks, and modifications to the existing intake structure. Work involved developing alternatives, cost estimates, and structural facility upgrade construction documents. Designed structural repairs to address severe structural cracking, seepage, and concrete aesthetics issues at the existing intake and powerhouse structures that form part of the existing 740-foot-long concrete gravity dam that was constructed in 1955. Demolition drawings were prepared for a portion of the existing powerhouse structure to make space for the new control tower, which is tied to the existing dam. The existing dam intake portals with large-diameter pipes encased in concrete were used to supply water to the new control tower. Under normal conditions, the dam will have up to 60 feet of reservoir head.

**Chapter 70**, *National Engineering Handbook*, Nationwide, U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). Project Manager responsible for developing Chapter 70, Design and Analysis of Risers, of the National Engineering Handbook, Part 636, Structural Engineering. The document will be used by NRCS personnel as a guide for designing riser structures within their jurisdiction. Included within the manual are sections on lateral earth and hydrostatic pressures, seismic loads and analysis procedures, reinforced-concrete design, and stability requirements. Example problems are also included to illustrate many of the concepts presented within the chapter.

**Redbank Valley Intake Dam Rehabilitation, Armstrong and Clarion Counties, PA**, *Redbank Valley Municipal Authority*. Structural Project Engineer for a project that involved the final design of a new concrete gravity dam, water supply intake, and Denil-type fish passage facility to replace the existing dam and eliminate hazardous hydraulic backwash. Responsible for the design of the concrete structures, including the bar rack and screens.

**Elkwater Fork Dam, Randolph County, WV,** *U.S. Department of Agriculture, Natural Resources Conservation Service.* Structural Project Manager responsible for designing an inlet and concrete conduit in the principal spillway of a roller-compacted concrete (RCC) dam.





## RESUME

# William Webber

### Survey/Site Investigation

#### **CURRENT RESPONSIBILITIES:**

As **Project Geologist**, assists in inspection and assessment of dams. Develops and executes geotechnical and investigative testing plans in support of dam assessments and remediation efforts. Manages subcontractor and subconsultant agreements. Provides third-party review of design concepts for construction of dams. Assists in review and development of construction specifications and permitting requirements. Provides construction inspection services as it pertains to geologic and geotechnical engineering principals.

#### **PROFESSIONAL REGISTRATION(S):**

MSHA Part 46: U.S. Department of Labor - No. 1219-00009

# YEARS EXPERIENCE WITH FIRM:

YEARS EXPERIENCE WITH OTHER FIRMS: 8

#### **EDUCATION:**

1

BS, Geology, Minor in Environmental Engineering, Clemson University, 2012

**PROFESSIONAL AFFILIATIONS:** ASDSO

#### **SUMMARY OF EXPERIENCE:**

On-Call Services for South Fork Dam, Elko County, NV, Nevada Division of Water Resources. Geologist responsible for management and execution of an on-call services agreement related to the inspection and assessment of South Fork Dam. South Fork Dam is located on the South Fork of the Humboldt River in Elko County, NV, approximately 10 miles south of Elko, NV. The dam is a multipurpose, zoned-earth embankment structure, approximately 85 feet high and 1,800 feet long and maintains a normal reservoir pool storage of 41,000 acre-feet. Dam appurtenances include two spillways: a 20-foot wide concrete chute spillway located on the left abutment, and a fuseplug auxiliary spillway in the form of an earthen saddle dike located to the northeast of the right abutment. The structure is currently classified by NV DWR as a high hazard dam and has experienced recent issues at multiple relief wells and the toe drain. Services to date include completion of an independent dam safety inspection and report, seepage and slope stability analyses, evaluation of remediation alternatives specific to toe drain and relief well concerns, and development of a geotechnical investigation and testing plan in support of remediation efforts. Assisted in field investigation and laboratory testing allocation to facilitate evaluation of relief wells and toe drain at the downstream toe of the dam; execution of on-call services agreement through coordination with subcontractors and subconsultants; and in evaluation of data for support of remediation efforts.

Hawaii 2021 Phase I Dam Safety Inspections, State of Hawaii Department of Land and Natural Resources. Geologist responsible for assisting in assessing the general physical condition of 26 dams on the islands of Kauai, and Maui with respect to safety base on available data, visual observations, and approximate field measurements. This work included reviewing available pertinent engineering data relative to the design, construction, operation, and monitoring of the dam and appurtenant structures including previous



## William Webber

inspection reports and owner short and long-term plans. Based on the visual inspection and review of available information, a determination of the need for remedial actions and additional studies and investigations was determined.

Hamilton City Levee, Hamilton City, CA, United States Army Corp of Engineers. Field Geologist providing onsite observations and construction documentation of the rehabilitation of the Hamilton City Levee. The levee is an embankment levee about 15 feet tall that extends along the Sacramento River. The rehabilitated section was a little over one mile long. Responsibilities included inspection of the foundation soils along the observations trench, review and reporting of quality control documentation, and reporting field observations to the lead design engineer for USACE.

**Ka Loko Dam Rehabilitation Project, HI,** *Mary Lucas Trust.* Geologist providing third party review of design concepts for the reconstruction of the Ka Loko Dam. Includes consultation services on dam safety, risk, and permitting requirements for various rehabilitation alternatives, and review of design team conceptual plans and analysis associated with the project. Coordinated review of historical documentation to develop a geotechnical investigation and testing plan in support of rehabilitation design alternatives.

Kalihiwai Dam, Liue, HI, *Kalihiwai Ridge Community Association*. Geologist for the final rehabilitation design of this high hazard small size dam, consisting of an approximately 950-foot long, 20-foot high earthen embankment. Responsibilities include selection of soil parameters; performing geotechnical analysis including seepage, slope stability, filter and toe drain design, foundation settlement and earthquake-induced deformations; and completing a SQRA for seismic potential failure modes identified in agreement with risk analysis guidelines by the U.S. Bureau of Reclamation. Assisted in the review and development of construction specifications and permitting requirements. Based on the proposed design, created a construction material quantity summary for the contractor and assisted in the design of an embankment preloading and settlement system.

**Sylvan Lake State Park Dam, Eagle County, CO**, *Colorado Parks and Wildlife*. This project included work on a high-hazard earth embankment core dam with a RCC armoring. Worked closely with client and contractors to re-construct inlet and outlet structures, embankment core, and building RCC armoring to meet current safety protocols and specifications set by Colorado Division of Water Resources, Dam Safety. Provided recommendations for material construction deficiencies, and interpreted materials testing results.

**Spring Creek Reservoir, Gunnison County, CO.** Worked with client to provide quality assurance for construction of the new saddle dam. Successfully provided preliminary material engineering properties using field methods onsite to facilitate construction progression as final laboratory results were rushed for testing 5 hours away.

Adobe Creek Reservoir, Las Animas, CO, *Colorado Parks and Wildlife*. Worked with client to provide quality assurance for rebuilt inlet tower, outlet pipe, and outlet structure; embankment core, toe drains, and filter diaphragms for an earth embankment dam.

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