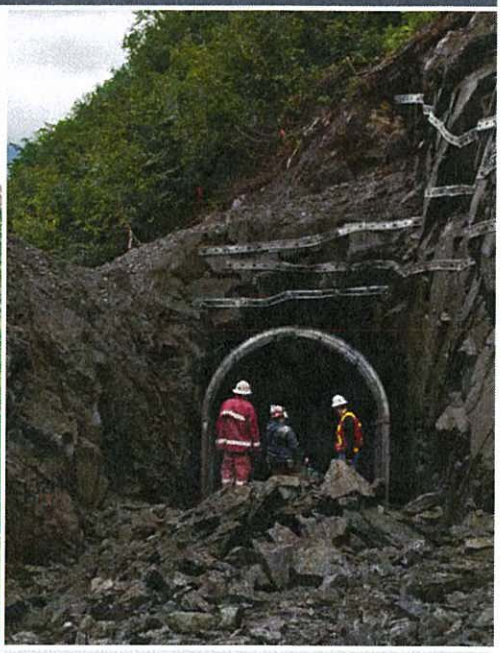
Statement of Qualifications
HYDROPOWER DAMS

McMILLEN JACOBS ASSOCIATES

mcmjac.com



Firm Profile

Allison Creek Hydroelectric D-B Project; Valdez, Alaska

McMillen Jacobs is fully qualified to contribute to a project at the planning stage, navigate the regulatory and permitting requirements, develop detailed design, self perform construction, and participate in startup, commissioning, and support of operations.

McMillen Jacobs Associates (McMillen Jacobs) is a full-service environmental, engineering, and self-performing construction firm in the water resources, hydropower, fisheries, water conveyance, transportation, heavy civil, and underground markets. We are fully qualified to contribute to a project at the planning stage with feasibility studies and alternatives analysis, navigate the regulatory and permitting requirements, develop detailed design, self-perform construction, and participate in startup, commissioning, and support of operations.

Currently serving clients from 20 offices with over 430 staff members worldwide, our technical skills includes environmental studies and permits; civil, structural, mechanical, electrical, and geotechnical engineering; hydraulics and hydrology; and tunnel/underground engineering.

McMillen Jacobs works closely with our clients at every stage of the project. Our client-centered relationships are key to our success—achieving over 80% of our work from repeat clients. This is an outstanding indicator of our quality people, our strong business practices, and a shared culture that focuses on meeting client expectations and delivering projects within budget and on schedule.

In addition to the standard Design-Bid-Build, Construction Management, or Architectural/Engineering contracts, we have earned a strong reputation as a self-executing Design-Build firm. We provide both in-house design and construction and have led over 50 Design-Build projects. Unlike our large competitors, we do not segregate our design and construction groups and treat them as separate organizations. Instead, at McMillen Jacobs, our designers and constructors report to the same management team and intentionally work side-by-side in our offices. This ensures seamless integration while working toward a common goal of efficient project execution. Regardless of the scope of work at hand, this benefits our clients because our design and construction experts have easy and open access to experienced team members offering best practices and lessons learned.

Lower Baker Dam Inspections

Cover Photo captions: Nine Mile Dam Rehabilitation (top); Swan Falls Lake Dam Raise (lower left); Eklutna Tunnel (lower right)

Our Markets

Water Resources

At McMillen Jacobs, we have experience in feasibility studies or alternative analyses, design, construction, and commissioning for a number of water resources projects including dams (flood control and hydroelectric); fish passage, nets, or screens; facilities for sorting, trapping, and hauling fish; fully operating fish hatcheries; irrigation systems; water and wastewater systems; and pumping stations. McMillen Jacobs' staff includes leading professionals in dam safety; environmental permitting and licensing; management of natural resources; and the development or rehabilitation of spillways, powerhouses, intakes and outlets, and water conveyance systems. We have experience designing for, and working on streams, reservoirs, rivers, ponds, and lakes. Our biologists are experts in preserving the health of the habitat and fish that may be impacted.

Hydropower

Our participation at hydropower facilities has included the feasibility, development, repair, or renovation at over 150 facilities over the past 10 years. Our work has included enhancements to pumped storage facilities, spillways, flashboards, and gates; installation of fish ladders and entrainment structures; and construction of diversion structures, intakes, outlets, gates, penstocks, or pipelines. We have also developed upgrades to pump stations and turbine/generator units (Pelton, Kaplan, and Francis turbines) for micro, small, and large hydroelectric dams and pumped storage facilities. Much of our work is executed at existing hydroelectric facilities requiring modification, however, we also have assisted in developing projects on greenfield sites.

Water and Wastewater Conveyance

Our team brings years of experience in the design and construction of projects containing water supply and treatment systems. We provide a comprehensive array of technical services to the water and wastewater conveyance market, with an emphasis on large diameter tunnels and pipelines, for raw water, treated water, storm sewers, combined sewer overflows (CSOs), ocean outfalls and sanitary sewers. Drop shafts, consolidation conduits, control structures, settling chambers, and de-aeration basins are a core part of our tunnel and pipeline work. Our team brings extensive experience in the design of water supply systems including raw water and finished water pumping stations. This includes planning, design, and construction of pump stations ranging from 14,000 horsepower (HP) at a flow rate of 175 million gallons per day (mgd) to 66,000 HP and 600 mgd.

Transportation

McMillen Jacobs has an integrated transportation group to serve the needs of rail mass transit, highway, and railroad clients. We have been providing engineering and construction services to the U.S. freight rail market for 25 years and our mass transit projects date back to the planning, design and construction of the BART and WMATA systems from the 1960s to 1980s. We employ experts in tunnel design and station design, with disciplines such as structural engineering, geotechnical engineering and architecture, to provide responsive and comprehensive solutions to clients' needs. We understand the integration of space-proofing, roadway design, mechanical/electrical design, and ventilation/fire-life safety. We have developed industry-recognized expertise in tunnel clearance, rock and soil embankment stability, drainage, deep foundation systems, stormwater control and retention, and retained cuts and fills.

Our Services

Feasibility and Alternatives Analysis

McMillen Jacobs has conducted over 50 studies regarding the feasibility or safety of various facilities. We have performed evaluations and developed alternative analyses for spillway and outlet works performance, aquaculture and fisheries programs, embankment and structure stability, hydrology and hydraulics, dam inundation mapping, and seismic hazard analysis. We have also provided siting studies, evaluation, cost/benefit analyses, and development of alternatives to create new facilities.

Permitting and Regulatory Services

Our regulatory and permitting specialists have many years of experience managing FERC-directed compliance activities and obtaining local, state and other federal permits and approvals for the construction of water resource and hydroelectric projects. During construction, we oversee and direct environmental monitoring and permit compliance associated with impacts to the environment.

Design, Engineering Services, and Inspections

McMillen Jacobs offers comprehensive engineering expertise to maximize the full potential of existing or new facilities. We have a long history in managing multi-discipline teams providing design of civil, structural, mechanical, electrical, hydraulic/hydrology, geotechnical underground engineering. We have prepared plans and specifications for a wide range of facilities, including, hydropower plants, new flood control, hydraulic structures, earthen and concrete dams, tunnels, bridges, culverts, spillways, intake and outlet structures, fish bypass systems, fish hatcheries, and more.

Self-Perform Construction

While McMillen Jacobs has provided Construction Management services, we are unique in that we also have self-performed the construction on numerous dam-related projects. To use the industry term, we own "yellow iron" with a full complement of equipment selected to support our construction projects. We maintain full service in-house construction staff including equipment operators, concrete crews, excavation crews, and laborers, as well as project managers, cost estimators and project controls experts, superintendents, and safety personnel. McMillen Jacobs self-performs 50 to 80 percent of the work associated with our projects including site development, demolition, concrete excavation, utilities, piping, and equipment installation. Because of our years of experience in the field, our construction staff also provides realistic scheduling, sequencing, and cost estimates. McMillen Jacobs has self-performed construction at over 80 locations in North America.

Startup, Commissioning, and O&M Support

Our team has extensive experience with the startup, testing, and commissioning of facilities, working closely with industry-recognized vendors. In addition to the development of detailed O&M manuals, we train the owner's operations staff. We have personnel that have managed the operations and maintenance of various facilities and can provide analysis for repairs or improvements to stand-alone structures or provide suggestions on how to optimize the entire facility.

Feasibility/ Alternatives Analysis → Regulatory & Permitting → Detailed Design → Self-Perform Construction → Startup & Commissioning → Operations & Maintenance Support

Our Delivery Methods

McMillen Jacobs has successfully completed hundreds of projects using a variety of project delivery methods including the traditional design-bid-build and alternative delivery methods including design-build, progressive design-build, and engineering-procurement-construction (EPC). In addition to performing work under a variety of contracts, clients who are trying to choose the best contracting mechanism for their specific needs, can rely on us to help them through the decision and procurement process.

Design-Bid-Build

Under the standard design-bid-build contracting method, we have executed stand-alone contracts for early planning services and natural resources studies, alternatives analysis or feasibility studies, final design, pre-construction planning, procurement, construction, and maintenance support.

We have a long history in managing multi-disciplined teams providing design of civil, structural, mechanical, electrical, hydraulic/hydrology, and geotechnical works. We have prepared plans and specifications for a wide range of facilities in the water resources, hydroelectric, and transportation markets. Our engineers are committed to providing designs focused on solutions that will provide decades of trouble-free service with lower operational costs and efficient and safe maintenance for the operators. We have been able to save our clients valuable budget dollars, increase the safety of projects, and lower operation costs by performing value engineering, constructability reviews, and operability analysis.

McMillen Jacobs brings an exceptionally experienced staff providing construction and installation services. Our key team members have been involved in every aspect of construction from supervision and purchasing to detailed project management, estimating, and construction management. Our construction staff provides realistic construction support services for scheduling, sequencing, and cost estimates during the preliminary design phases which can be relied upon in developing project budgets and economic analysis. Our construction team is comprised of construction managers and professionals with hands-on experience in the industry. Because we self-execute a large percentage of our projects, we employ field superintendents, foreman, equipment operators, concrete crews, and laborers.

Design-Build / Progressive Design-Build / EPC

McMillen Jacobs has led over 50 design-build projects. Our approach to alternative project delivery methods is founded on the belief that a truly integrated team requires both the design and construction to be provided within one organization. We maintain multi-discipline engineering services including, structural, mechanical, civil, transportation, hydraulic, electrical, geotechnical, fisheries, aquaculture, regulatory, and natural resources. We have developed our construction division with construction managers and professionals with hands-on experience. McMillen Jacobs typically performs 60 to 80 percent of the work effort associated with our design-build projects. Our self-executing model allows us to control the project schedule exerting an even firmer control of the project budgets.

Program Management / Owner's Engineer

McMillen Jacobs assists owners from the onset of their project to develop developing plans, establishing estimated budgets, and helping them make decisions on programs that are vast in their size or geographical footprint. By combining knowledge and resources, McMillen Jacobs Associates is able to initialize, develop and implement every aspect of program. We apply or experience working with hundreds of agencies around the county to capture lessons learned from the past, and apply to the future. We work closely with clients to anticipate and evaluate potential risks and develop cost-effective and robust solutions to eliminate or minimize their occurrence and impact. From the development of formal risk registers to contract packaging for bid-build, or bridging documents for design-build and EPC, we deliver for our clients.

Hydroelectric Dams

McMillen Jacobs' foundation began in the hydropower and water resources industry and remains one of our foremost business lines today. Whether you are investigating the feasibility of a new hydroelectric dam or optimizing existing operations, we can contribute to the success of your project. With experience on over 150 facilities, from micro, small, and large hydroelectric dams, our creative engineers can assist projects to meet its full potential. Our teams have created viable solutions for the rehabilitation of existing hydro facilities that have enhanced safety, mitigated environmental impacts, lowered the overall capital cost, increased the energy output, and decreased the operation and maintenance costs.

We have worked on both low-head and high-head facilities, conducting evaluations of existing systems to resolve operation problems or increase efficiency, developing design alternatives, and preparing plans and specifications, and self-performing construction, including start-up, commissioning, and operator training.

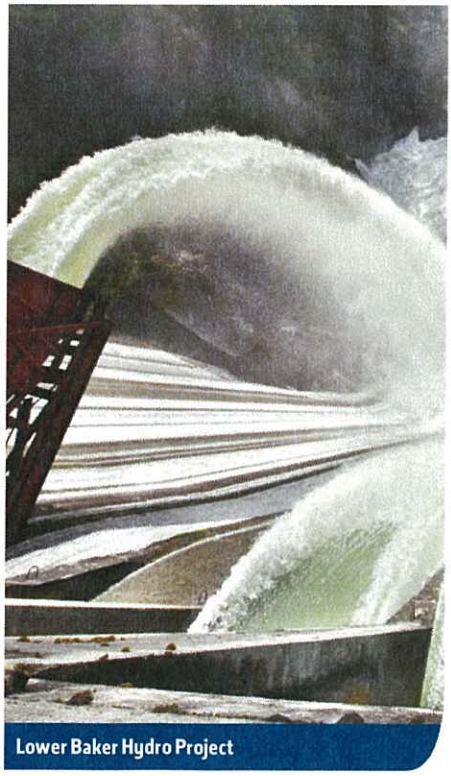
Many of our projects have contained new or repairs to spillways, stilling basins, flashboards, outlet valves, and gates; installation of fish ladders and entrainment structures; construction of diversion structures, intakes, outlets, gates, and valves; penstocks and large-diameter pipelines; and excavations and/or tunnels. We have also developed upgrades to pump stations and turbine/generator units (Pelton, Kaplan, and Francis turbines) and designed transmission and interconnection systems and remote operating technology. In short, we provide complete water-to-wire design and construction services for your project.

Our experience includes challenges unique to hydroelectric projects including in-water and near-water work, difficult access, a limited construction footprint, environmentally sensitive locations, complex dewatering systems, hard rock excavations, and coordination with numerous project stakeholders and agencies.

McMillen Jacobs' Relevant Experience:

- Experience planning, designing and/or constructing over 150 hydroelectric facilities.
- Early planning including feasibility or alternatives analysis.
- Regulatory, permitting, and environmental plans.
- Design of all components including mechanical, electrical, civil, structural, and geotechnical.
- Cost estimating and implementation schedules.
- Installation, development, and construction components including pipes, pumps and generators, gates, spillways, intakes/outlets, energy dissipater valves, excavations and/or tunnels, transmission lines, and instrumentation and controls.
- Self-perform construction or construction management

Long Lake Dam Rehabilitation D-B Project



Lower Baker Hydro Project

McMillen Jacobs has developed new hydroelectric dams or renovated existing facilities for the following clients:

- Sacramento Municipal Utility District
- Copper Valley Electric Association
- Avista Utilities
- Chugach Electric
- Pend Oreille PUD
- Northwest Energy
- Puget Sound Energy (PSE)
- U.S. Army Corps of Engineers (USACE)
- Freshwater Fisheries BC
- PacifiCorp
- Absaroka Energy
- Sacramento Municipal Utility District

Long Lake Hydroelectric Dam

Long Lake Dam is an 83.3 MW, 100-year old, 200-foot-tall concrete gravity dam owned and operated by Avista Corporation. The dam contains an overflow spillway consisting of 8 bays, which channel spill waters into a plunge pool at the base of the dam. During spill events, the plunge pool becomes supersaturated with total dissolved gases (TDG) due to the force and angle of the water entering the pool. As part of the overall relicensing efforts for the Spokane River Projects, Avista agreed to mitigate the TDG conditions below the dam.

Initially, McMillen Jacobs participated in an alternatives analysis including preliminary civil and structural engineering, cost estimates, and constructability reviews. The alternatives were compared using a matrix evaluation approach that identified 8 options. As a result of additional computation fluid dynamic analysis, including physical model construction and testing, Avista and agency regulators agreed that the best approach to reducing TDG conditions was to add spillway deflectors on the downstream face to reduce the entry angle of spillway flows into the plunge pool.

After the alternative was selected, McMillen Jacobs was awarded the design contract for the new deflectors. The design included installation of two deflectors below spillway bays 3-8 and removal of a protruding rock outcrop below bays 7 and 8. In addition to the design work, McMillen Jacobs also developed construction approach logic and a project description describing anticipated construction means and methods to support Avista permitting efforts. An alternative means of construction access and staging was developed and a construction cost estimate and schedule were developed. Throughout the design process, McMillen Jacobs provided pre-construction services to develop the budget cost estimate, project schedule, site-specific plans, and risk management strategy.

Early in 2016, McMillen Jacobs was awarded the construction contract for the above-described improvements. In addition to modifying the spillway, our crews reduced the plunge pool depth and removed a portion of a rock outcrop with explosives and heavy equipment. Controlled blasting was required only 15 feet from the face of the dam and less than 100 feet from the powerhouse that was in operation. This resulted in the removal of 15,000 cubic yards of material and elevated flow channel downstream of Bays 7 & 8. Substantial coordination effort was required to move equipment and materials along the single lane access road to the spillway plunge pool.

The addition of the two deflectors required approximately 7,000 dowels to be installed by drilling anchors into the spillway, surface preparation of the old concrete to create a coarse bond with the new concrete, and concrete framework. In total, McMillen Jacobs' crews placed 5,000 cy of reinforced concrete within a small work footprint. Most notable was the placement of 910 cy to a remote location within a single 8 hour shift—all performed in compliance with quality and safety standards. Our crews also placed an additional 1300 yards of grout as part of the plunge pool grouted riprap.

Our crews developed a 1-mile temporary access road, temporary construction signage, staging/stockpiling area, and temporary cofferdam construction and dewatering. Scope also included spillway toe repair, construction of platform/plunge pool backfill, removal of temporary road from the riverbed and shoreline, reshaping of the former construction disturbance area with excess fill materials to create a more natural streambank, and revegetation of the construction site and impacted areas. Scope included the planting of 3,000 bushes and trees and 4 acres of hydroseeding.

In total, we managed approximately 40 personnel onsite during construction. Through effective sequencing and skilled construction crews, the ongoing operations were not disturbed during construction. A unique fall protection system was implemented due to the dam's narrow walkway and the need to remove handrail protection. With extra safety precautions, our team was able to complete over 31,500 total hours without a single lost time incident. Work was completed within schedule and under budget.

LOCATION

Spokane River 30 miles NW of Spokane, Washington

OWNER

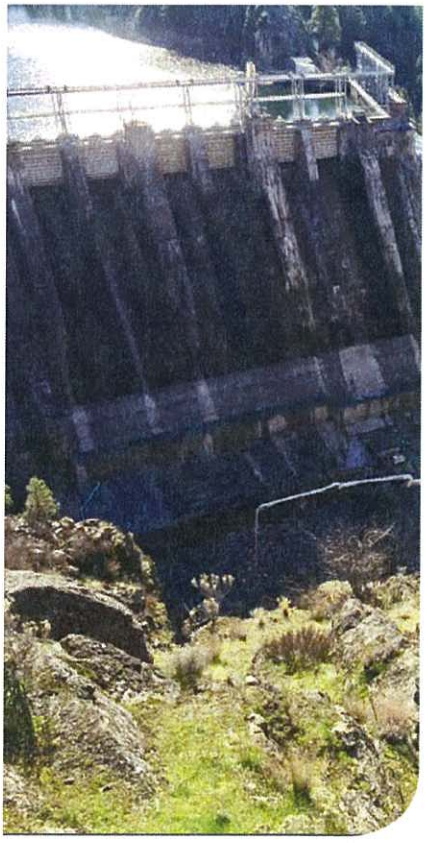
Avista Corporation

ROLE

Lead Designer and Contractor

SCOPE OF WORK

Alternatives Analysis, Design, Permitting, Construction, Maintenance Repairs



Box Canyon Hydroelectric Dam Turbine Upgrades 90 MW

McMillen Jacobs served as Engineer-of-Record and managed the procurement and installation of generating systems at this 90 MW project. The project consisted of upgrades to 4 units in the same powerhouse. Each of the four units received a new Kaplan runner, stator, rotor spider, governor exciter, control system, and reconditioned rotors and poles.

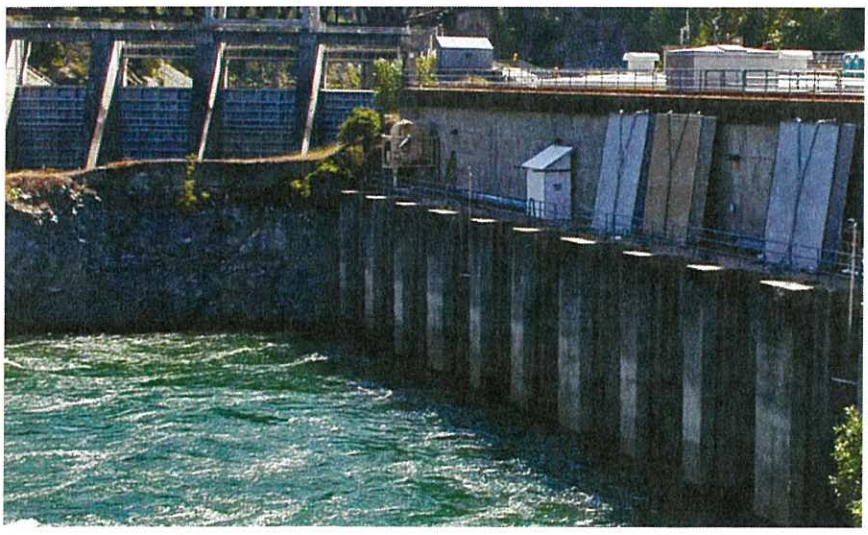
The new turbines have 4 runner blades instead of the original 5-bladed turbines, providing a more fish friendly feature. Each unit was supplied with new local unit control panels for operation and new cooling water pumps and shaft seal water injection pumps. Modifications to the powerhouse building included refurbishment to the equipment foundations including the stator soleplates, renovated draft tube and 108-inch diameter discharge ring (weld overlay), and machining with a boring bar.

We also managed the construction and assisted with the testing and commissioning of the 4 units. The units increased annual generation capacity by approximately 18 MW and are now online and generating power. Test results confirmed increased efficiency levels that exceeded engineering expectations. These upgrades increased the generation capacity from 72 to 90 MW.

LOCATION
Pend Oreille County, Washington
OWNER
Pend Oreille County PUD No. 1
CONSTRUCTION COST
$1M (total cost $106M)
ROLE
Engineer-of-Record
SCOPE OF WORK
Design, Procurement, Installation Support, Startup & Commissioning

PROJECT FEATURES:

- 90 MW hydroelectric facility
- Designed, specified, and procured turbine/generator package upgrades
- Managed installation, startup, and commissioning
- Physical hydraulic model testing to confirm selection of the new turbine runner/wicket gate/draft tube design
- Coordination with several state, federal, and local agencies
- New control system



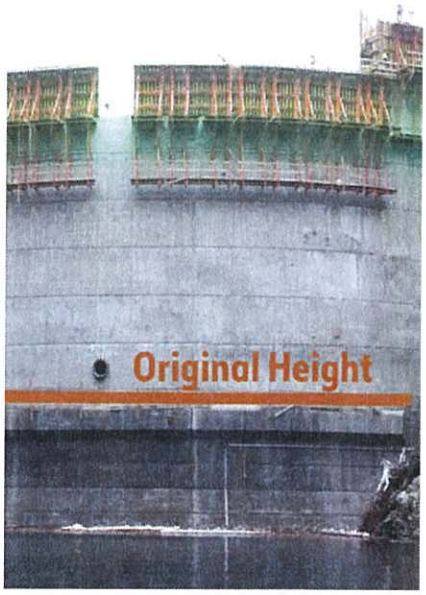
Blue Lake Hydroelectric Expansion

McMillen Jacobs provided construction management services, engineering support during construction, and final design of specific elements to the City of Sitka. We provided the full field construction management team, office engineering team, QA/QC, FERC coordination support, and contractor bid evaluation. Our engineering support and coordination for critical construction activities included dam and powerhouse foundation excavation, dam foundation grouting, tunnel and shaft support, and access roads.

The project included the dam raise, a new 12-foot-diameter intake tower, a new 270-foot-tall, 10-foot-diamter surge shaft, a new 10-foot-diameter adit tunnel, a new 200-foot-long, 8-foot-diameter drainage tunnel, and improvements to the existing dam plunge pool. It also included a new reinforced concrete intake tower in the Blue Lake, an extension of existing steel tunnel liners in the existing conveyance tunnels, a new 3-unit powerhouse, and upgrade of the fish valve unit powerhouse. Despite several challenges, our team was able to deliver this project 3 months ahead of schedule

To address the geologic challenges from the highly jointed rock, our rock engineers were on site during the access road construction to evaluate the rock kinematics and provide design support methodologies to address the structures encountered. Large rock cuts were required for certain project elements, including a 200-foot-deep (61 m) rock cut for the intake tunnel portal. As part of our work coordinating and inspecting the dam foundation grouting, we used our rock grouting expertise to adjust the original design based on field observations.

LOCATION
Sitka, Alaska
OWNER
City of Sitka
ROLE
Owner's Engineer, Construction Manager
SCOPE OF WORK
Construction Management, FERC Licensing Support, Environmental Compliance, Geotechnical Characterization



SouthFork Powerhouse and Boating Flow Release Facility Design-Build Project - 2.68 MW

McMillen Jacobs was selected as the Design-Build firm to execute this project. The purpose of this project is to increase water releases to enhance fish habitat and accommodate recreational boating in compliance with the new FERC license to operate the Upper American River Hydroelectric Project. The addition of a powerhouse will allow the generation of energy from that increased flow. McMillen Jacobs developed the full project design and specifications, solicited bids and selected from a variety of vendors for the turbine-generator, BFRF cone valve, electrical control enclosure, auxiliary equipment supply and transmission line with interconnection hardware. A horizontal Francis-type turbine with a direct-coupled synchronous generator, rated at 2.680 MW was selected. Our team developed the specifications and design drawings, led the procurement process, began construction in 2017, and will manage the installation, commissioning, and testing.

LOCATION

El Dorado County (north of Camino, California)

OWNER

Sacramento Municipal Utility District (SMUD)

ROLE

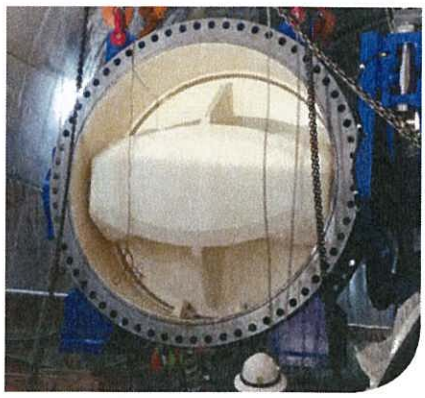
Design-Build Lead

SCOPE OF WORK

Permitting and Regulatory Support, Design, Construction, and Startup and Commissioning

Project Highlights include:

- FERC compliance and development of a 401 Certification amendment
- Extensive permitting with multiple state and federal resource agencies (applications and monitoring for compliance)
- Environmental training and monitoring during construction
- Geotechnical investigation and design
- Boating Flow Release Valve with up to 1300 cfs capacity and innovative energy dissipation chamber to ensure whitewater boater safety
- Installation of 78-inch butterfly valve
- Clearing and installation of a 12-kV, 1,000-foot-long electric distribution line
- New boater day-use parking area, access road improvements and boater put-in site
- New bridge over Iowa Canyon Creek (ICC) to access the powerhouse and BFRF
- Stream realignment and restoration of ICC
- 400 feet of steel penstock (78-inch and 54-inch diameter)
- 150 feet of tunnel demolition and new tap construction
- Thrust blocks at bifurcation and along penstock alignment
- Boating flow release facility (cone valve and baffle ring arrangement)
- Temporary cofferdams and dewatering for both the
- Design and construction of new powerhouse building (60'x40'), with procurement of turbine/generator, switchgear and transmission facilities
- Electrical and mechanical engineering
- Culverts, concrete work, and excavation/backfill site work
- Supervisory Control and Data Acquisition (SCADA)



This project is located in a deeply incised canyon with river levels approximately 1600 feet below the canyon rim. The site access consists of a narrow primitive gravel road that is cut into the steep slope for most of its length. The primary project access road was developed during dam construction in the 1960's and consists of a degraded concrete surface with up to 27% slope as it descends to the Adit 3 portal location. There is virtually no open area for construction staging and laydown, necessitating that all equipment and material is delivered to a remote staging area approximately 5 miles from the site. The site footprint is so small the construction activities need to be intricately staged and sequenced to allow it to be built within the 30-month timeline.

McMillen Jacobs has been working with SMUD to develop and adopt value engineered solutions to the specific site challenges. For example, the original concept envisioned a 2000-ft long transmission line and interconnection at the existing White Rock Tunnel gatehouse. McMillen Jacobs rerouted the transmission alignment, cutting 1000 feet from its length and designed a new interconnection that performs the same function.

Nine Mile Dam Sediment Bypass Improvements

The Nine Mile HED, initially constructed in 1908, includes a 364-foot-long, 58-foot-high concrete gravity dam; a 225-foot-long spillway at the crest of the dam, a 120-foot-long, 5-foot-diameter sediment bypass tunnel; four intake chambers; a powerhouse integral to the dam with four horizontal Francis turbine-generator units with a nameplate capacity of 37.6 MW, and appurtenant transmission facilities. Nine Mile Dam is operated as a run-of-river facility. The sediment bypass system (SBS), to mitigate sediment passing through the turbine intakes and damaging the turbines became inoperable.

McMillen Jacobs participated in a collaborative effort to advance the design, advance the schedule, and optimize construction costs. We provided final drawings and specs, and self-performed the construction. We managed the diving crews, provided procurement support, and prepared the FERC packages. We also provided the analysis for Hydraulics/Hydrology on flow conditions through the new system and plunge pool scour and a geotechnical report with the capacity of the west abutment and support for the Scour Technical Memorandum. Our accomplishments in the upgrades included the following:

- Developed a stamped, signed desk study showing that the existing abutment would be able to sustain the new loading condition including an evaluation of the existing loads verses the new loads on the west abutment.
- Replaced the existing access bridge with a steel bridge instead of a pre-cast bridge. A steel bridge didn't require the lead time needed to procure the pre-cast bridge, thereby reducing the construction schedule.
- Improved the design to support the bridge on the existing intake tunnel and included a steel structure to support the load. The revised framing significantly reduced the amount of in-water work by divers and reduced the cost.
- Installed a new Kunz trash rake rails at the intake deck. The rails, as located in the 2016 design, were moved upstream 13 inches during the collaborative effort. This design revision required squaring off of the parking area of the access bridge where the Kunz rake will be stored. This revision enabled Avista to use its National Crane on the parking area. In addition, moving the trash rake rails upstream eliminated relocation of an existing electrical cabinet and hydraulic fluid tank currently installed on the intake deck.
- Modified the design of the SBS intake geometry to include adding an elliptical steel roof panel downstream of the trash rack at the entrance to the tunnel to improve flow characteristics and reduce the potential for cavitation.
- Designed a new intake to attach directly upstream of the existing intake. The new intake consisted of tubular steel members that are more efficient to fabricate than the proposed design. The structure was designed to minimize the amount of in-water work by divers.
- Designed a bulkhead that could be installed within the rails of the new trash rack. The revised design provided rails to the top of the existing intake structure so that the trash rack and bulkhead could be placed and removed from above the water, therefore, mitigating the need to have divers do this work.

LOCATION
16 miles NW of Spokane, Washington
OWNER
Avista Utilities
CONSTRUCTION COST
$7.2M
ROLE
Engineer and General Contractor
SCOPE OF WORK
VE, Design, Self-Perform Construction

Hebgen Dam Spillway Replacement Project

The Hebgen Dam is a 300-foot-long earthen embankment dam constructed with an interior concrete core-wall. The Hebgen Dam acts as flood control and reservoir storage. The existing spillway was constructed in 1960. The existing gate structure was seismically deficient, and the gate structure and chute did not have the hydraulic capacity to safely route the probable maximum flood. The spillway gate consisted of six timber vertical slide gates and a bridge across the rectangular channel section.

McMillen Jacobs performed the demolition of an existing cofferdam at the intake location. Also, in preparation for the spillway replacement, our team executed a Design-Build contract for the cofferdam at the spillway location. The cofferdam dewatering system was installed and tested, then put in operation to dewater the construction site. After the dewatering was complete, McMillen Jacobs' crews demolished the existing concrete spillway gate structure and the entire chute from the dam to the river below. Scope of work also included demolition of the existing bridge and constructing an access walkway and vehicle / pedestrian bridge consisting of cast-in-place concrete girders.

Our crews installed four 11-foot x 11-foot spillway slide gates with screw stem activators and a flip bucket. McMillen Jacobs' crews also constructed a discharge chute (6,000 cy of reinforced concrete) and placed a small portion of additional concrete construction at the intake structure across the dam from the spillway. After construction was complete, we performed excavation and removal of the spillway cofferdam and the cofferdam material. The work included more than 23,000 cy of excavation, which was re-conditioned for backfill use. Our team also assisted with the control room operation during startup and commissioning.

LOCATION

27 miles from West Yellowstone, Montana

OWNER

NorthWestern Energy

ROLE

Prime Contractor

SCOPE OF WORK

Design and construction of the cofferdam; Self-perform construction on spillway replacement

Allison Creek Hydroelectric Design-Build Project

This project demonstrates McMillen Jacobs' ability to self-perform all facets of a $53 million hydro project using the Design-Build method. Our team was involved in the early planning through design, construction, startup and commissioning, and operations support. McMillen Jacobs led the FERC coordination, permitting and environmental support, all civil, structural, mechanical, electrical, and hydraulic engineering, and site layout, and served as Engineer-of-Record. Our internal staff self-performed or directly managed 90% of the design and construction on this new 6.7 MW hydroelectric facility. In our role as Prime Contractor and Owner's Representative for CVEA, we were responsible for the entire project including:

- Alternatives analysis to optimize the project arrangement and operation
- FERC licensing and permitting (applications and compliance)
- Equipment selection and procurement
- Detailed geotechnical investigations and hydrological and hydraulic analysis
- 2 miles of access roads in steep, remote terrain
- Installation of the 6.7 MW generator and Pelton wheel turbine
- In-stream diversion and intake structure requiring approximately 1,200 cubic yards (1,560 m3) of cast-in-place concrete
- Access tunnel through solid rock: 780 feet long x 16 feet wide (221.0 x 4.9 m) x 16 feet tall (4.9 m) (design and managed construction)
- 7,000 feet (1.25 miles or 2,130 m) of 36-inch (915 mm) and 40-inch (1,015 mm) large-diameter steel penstock
- 60 x 70 foot (18 x 21 m) powerhouse building with a 70-foot-long concrete tailrace
- New substation
- 60,000 cy earthwork and grading as well as blasting
- Procurement support
- 3.5 miles (5.6 km) of high voltage transmission line connecting new power generated from Allison Creek to existing Dayville Substation
- Developing and implementing programs for safety, employee training, and security
- Development building operational manuals and trained operators
- Environmental compliance, fish sampling, and water testing
- State, local, and federal permitting
- Cost estimates and scheduling support

LOCATION
Valdez, Alaska
OWNER
CVEA
ROLE
Design-Build Lead
SCOPE OF WORK
Design, Permitting/FERC, Self-Perform Construction, Startup

Town Creek Micro-Hydro Project - .15 MW

The City of Akutan constructed hydroelectric projects with Alaska Power Systems in 1993. In 2009, they were awarded grant funding from the Alaska Energy Authority to investigate upgrades to the original projects. After the initial feasibility study and design, McMillen Jacobs was awarded the construction in which they self-performed in this remote area of Alaska. To enable the desired amount of generation of .15_MW, 3 diversion dams were used to guide water to main dam. Items needing improvements to be compliant with Dam Safety regulations included retrofitting an overflow spillway and repairing the face of a dam to slow seepage. This project was comprised of the following scope of work:

- Feasibility study and design including hydrology and hydraulics
- Supported permitting efforts for the main intake dam from the Alaska Department of Natural Resources' Office of Dam Safety
- Procured the necessary equipment
- Installed a maintenance storage facility
- Repaired the existing access road
- Dewatering the reservoirs
- Installed riprap embankment
- Installed trash racks on intakes
- Replaced diversion piping, mud sluicing gates, valves, and valve boxes
- Installed slide gates
- Installed liners in the reservoir
- Restored powerhouse including new control panel programming, turbine rebuild, and integration with diesel generation
- Refurbished crest on the main impoundment dam
- Constructed an emergency spillway with a concrete lining
- Improved the side protection at the v-shaped weir
- Replaced penstock and valves
- Installed screening for both the penstock intake and spillway
- Inspected and provided maintenance to the hydro turbine
- Provided the operation and maintenance manual and training for the upgraded hydropower system
- Repaired the main intake dam and the three associated diversion structures. Repairs for the diversion structures included the replacement of three 5-8-foot tall earthen impoundments with gated diversion dams along with clearing and repairing pipelines. Repair of the main dam included the installation of an overflow emergency spillway and an impervious barrier on the upstream face of the dam along with repair of the upstream intake gate.

LOCATION
Akutan, Alaska
OWNER
City of Akutan (funded by Alaska Energy Authority)
CONSTRUCTION COST
$1M
ROLE
Design-Build Lead
SCOPE OF WORK
Feasibility Study, Design, Construction, and Startup

Okokele Hydroelectric Project - 7.5 MW

We are currently replacing a 1 MW hydroelectric facility that was built in 1921. The new facility will generate approximately 7.5 MW of power, with an annual generating capacity of 20,000 MW/h. During the design, McMillen Jacobs served as a subcontractor to EES, providing mechanical design engineering, equipment procurement and bidding assistance, and contributing to the layout of the turbine in the powerhouse. Upon completion of that contract, McMillen Jacobs was selected by G&R as the General Contractor. McMillen Jacobs is self-performing the construction with our concrete crews, pipe crews, excavation foreman, etc. and managing local specialty subcontractors. This project includes the following elements:

- The new intake structure is being constructed on the irrigation ditch below the existing powerhouse with sluice and slide gates.
- An automatic trash rack (14' x 15') installed w/ debris deck. Also includes a Turbine Inlet Valve (TIV) and 12" bypass to tailrace.
- Spillway construction at the intake structure (20' wide x 13' high).
- 4,000+ feet of a pressurized pipeline (2,543 LF of 40" steel penstock and 1,432 LF of 42" HDPE penstock).
- Procurement of 42-inch HDPE penstock (40-inch steel penstock was furnished by client), 30/5 ton bridge crane, oil water separator (OWS), and intake steel to HDPE transition.
- Turbine/Generators/Pumps: Mechanical design, procurement support, and installation of two-jet horizontal Pelton turbine and generator. (7.5 MW) The 6,720 kW generator is being provided by Canyon Hydro. Also includes sump pump at the turbine invert and oil-water separator pump system.
- Implementation of erosion and sediment control plan.
- The powerhouse is a CMU block building and has a concrete foundation (66' L x 48' 8" W x 40' H) The power-block concrete consists of foundations for the TIV, generator, and a turbine invert, tailrace walls, cut off wall, and slab concrete. The new powerhouse will include a 35-ton bridge crane for servicing the equipment.
- Construction of switchgear, controls, TIV, and HPU.

PROJECT HIGHLIGHTS:

- Hydro project on Kauai in an environmentally sensitive area
- New and rehab aspects
- Involvement from the design, procurement, construction, and through to start-up
- Installation of 48-inch steel pressurized pipeline and horizontal Pelton turbine
- Challenges with terrain, soil, & remote area

LOCATION
North of Waimea; Kauai, Hawaii
OWNER
Gay & Robinson (G&R)
CONSTRUCTION COST
$15M (total cost $30M)
ROLE
General Contractor
SCOPE OF WORK
Construction

McMILLEN JACOBS ASSOCIATES

Dietrich Drop Gate Installation

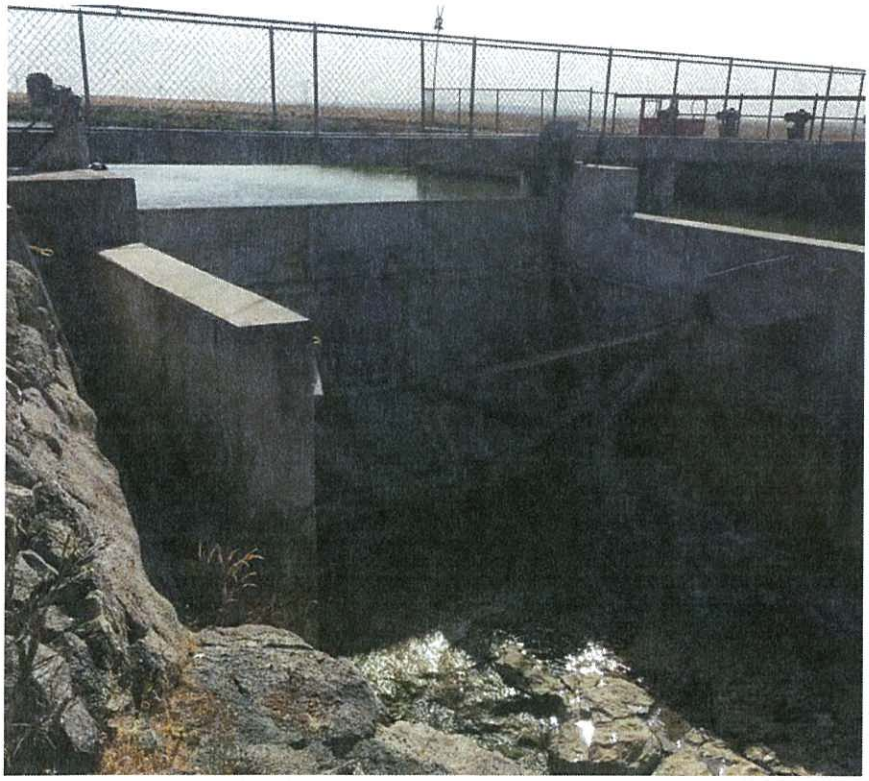
ENEL Green Power's Dietrich Drop hydro facility suffered successive failures to an intake tainter gate, then to a bypass tainter gate. The hydro facility is located on irrigation canal approximately 14 miles southeast of Shoshone Idaho. The intake gate isolates the main unit for maintenance purposes. The bypass gate is required to be closed in order for power to be generated. The loss of the intake gate caused water to flow uncontrolled around the hydro facility.

McMillen Jacobs' role was to assess the damage and determine if a fix was possible prior to the conclusion of the Dietrich Drop generating season, which ends mid-October. McMillen Jacobs sent a team to assess the damage on 7/28. A proposal was created and a notice to proceed granted August 14.

The scope included constructing a coffer dam in the intake canal, inspecting the turbine conduit to retrieve debris from the failed gate, and dive inspecting the turbine to retrieve any additional debris. On the bypass side, the gate was damaged and required repairs to align the pivot points, design and fabricate new bearings, and install new bearings and the gate overwater with flow rushing through the bypass.

The timeline was very tight and the initial estimates for return to service was September 11. McMillen Jacobs' engineers and construction group worked diligently to perform this challenging project, quickly and safely, and were able to return to service 2 days ahead of schedule on September 9th.

LOCATION
Dietrich, Idaho
OWNER
ENEL Green Power
CONTRACT VALUE
$414,877
ROLE
Design-Build Lead
SCOPE OF WORK
Design and Construction



Interlake Tunnel and San Antonio Spillway Modification Projects

The Nacimiento and San Antonio reservoirs are managed for the combined goals of flood protection, water conservation, Salinas Valley Water Project operation, and recreation. The Nacimiento Reservoir has a more productive watershed and fills about three times faster than the San Antonio Reservoir. This often leaves the San Antonio Reservoir partially filled when the Nacimiento Reservoir reaches capacity and spills, with excess water flowing to the ocean without the benefit of a timely conservation release. Capturing high Nacimiento River flows and diverting those flows through the proposed Interlake Tunnel to the San Antonio Reservoir would increase the overall storage capacity of the system and ensure that more precipitation can be used for agriculture and conservation measures. This project will also reduce the number of spill events and peak downstream flood flows. Upon completion, the San Antonio Dam Spillway will be capable of storing up to 60,000 acre-feet of additional water.

For the Interlake Tunnel component, McMillen Jacobs will prepare approximately a 60% level of design completion and design-build bid documents, then assist MCWRA in selecting a design-build firm to execute the final design and construction. As part of the preliminary design development, McMillen Jacobs is coordinating with the environmental consultant, has prepared detailed cost estimates and schedule, and is providing the engineering documents required for a funding analysis.

- The Interlake and Spillway Modification projects consist of:
- An inlet structure in Nacimiento Reservoir equipped with 1400 cfs exclusion fish screen, debris racks, and an 12x12 wheel intake gate to facilitate tunnel maintenance.
- A concrete-lined, 10-foot-diameter, gravity-flow water conveyance tunnel, approximately 12,000 feet long, between Nacimiento Reservoir in San Luis Obispo County and San Antonio Reservoir in Monterey County.
- An outlet gate control structure in San Antonio Reservoir equipped with a 9-foot diameter spherical discharge control valve and an energy dissipation structure.
- The existing overflow crest spillway at the San Antonio Reservoir will be replaced with a gated spillway. The modified spillway will provide up to a 10-foot increase in the maximum reservoir elevation, increasing the storage capacity of the reservoir by approximately 60,000 acre-feet.

LOCATION

San Luis Obispo and Monterey Counties, CA

OWNER

Monterey County Water Resources Agency (MCWRA)

CONSTRUCTION COST

$68.5M (est)

ROLE

Consultant

SCOPE OF WORK

Alternatives Analysis, Preliminary Design, Desiggn-Build Bid Documents and Procurement Support

Interlake Project:

- Site survey
- Geotechnical investigation program
- Design criteria memorandum
- Preliminary engineering and report (30% design level)
- Preparation of design-build documents (including PS&E)
- Engineer's report
- 218 funding support
- Bidding phase services to select design-build firm
- EIS support
- Construction support

San Antonio Spillway Project

- Evaluate spillway alternatives
- Spillway hydraulic design
- Embankment stability evaluation
- Preliminary & design (mechanical / electrical)
- DSOD review & approval
- EIR Permitting support
- Construction procurement support

Nacimiento Reservoir

San Antonio Reservoir Spillway

McMILLEN JACOBS ASSOCIATES

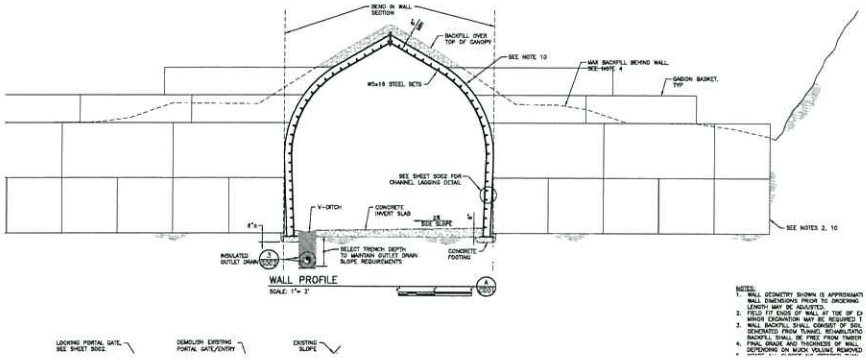
Eklutna Adit Tunnel Rehabilitation

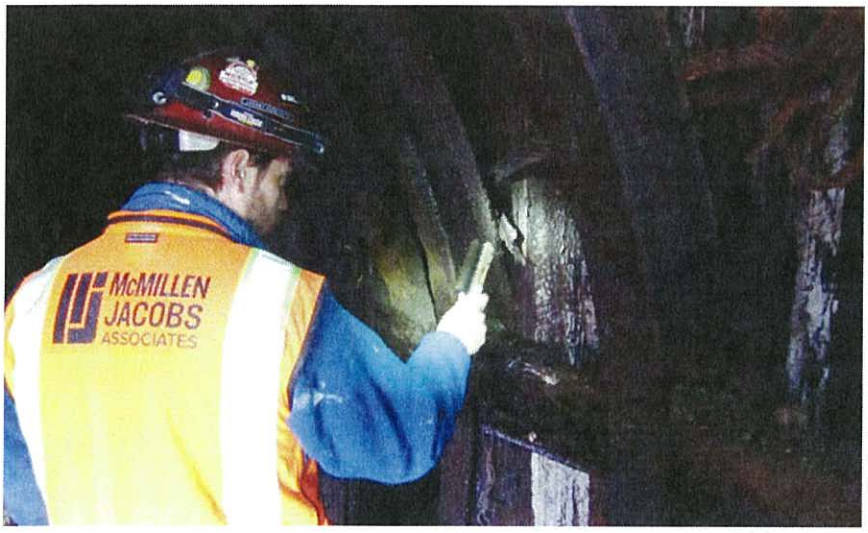
The Eklutna Power Project is a 47 MW hydroelectric project located near Wasilla, Alaska. The project includes a 26-foot tall earth dam, a 4.5-mile-long power tunnel, and powerhouse. The Eklutna Adit Tunnel provides inspection and maintenance access to the main power tunnel. The adit tunnel is approximately 300 feet long and has a lining consisting of primarily of steel ribs and timber lagging that were constructed in the mid-1950s. Portions of the tunnel lining have degraded significantly during its lifespan. Much of the timber lagging has decayed with rot, and has locally collapsed. Steel components have exhibited heavy rusting and scale. The tunnel invert is covered with rotten timbers and rock debris from localized cave-ins along the sidewalls. The tunnel is currently not accessible by CEA due to safety concerns and debris buildup.

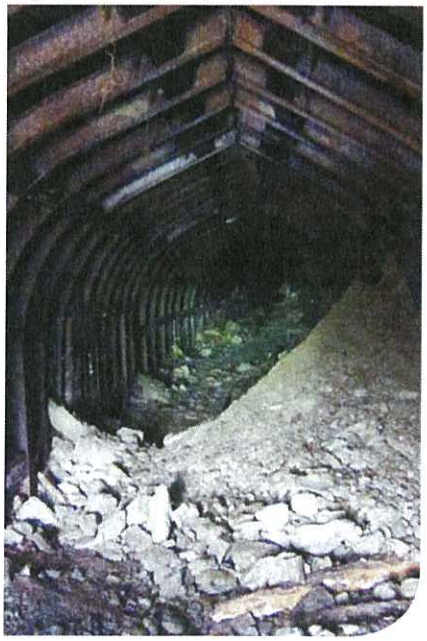
Chugach Electric retained McMillen Jacobs for remediation of the adit tunnel such that it will regain its intended use for manned-access to the power tunnel. McMillen Jacobs completed the design and will fabricate, procure, and construct a new permanent tunnel lining. Scope of work includes:

- Condition assessment of existing tunnel
- Detailed design of new lining system
- Removal of debris inside tunnel
- A new tunnel lining and a new portal structure extending 20 feet beyond existing
- Removal of all timber lagging and replacement with galvanized steel
- Replacement of damaged steel sets
- Concrete backfill of lining up to rock line
- A new concrete invert slab

LOCATION
Near Wasilla, Alaska
OWNER
Chugach Electric Association, Inc.
ROLE
Design-Build Lead
SCOPE OF WORK
Design, Geotechnical, Structural, Construction







Lower Baker Unit 4 Powerhouse Project

To maximize use of water resources for power generation, Puget Sound Energy (PSE) is building an additional powerhouse at Lower Baker Dam. The project consists of new construction of an approximately 1,000-foot-long (305 m), 12-foot (3.6 m) internal diameter power tunnel, an underground connection to an existing power tunnel, and a new 30 MW powerhouse along the east shoreline of the Baker River, downstream of the Lower Baker Dam—a 285-foot-high (87 m) concrete arch structure. The Baker River originates in the North Cascades and flows southward along the east flank of Mt. Baker to join the Skagit River at Concrete, WA. The dam and existing power tunnel were constructed in 1925 to generate hydroelectric power for northwestern Washington and provide flood-control storage for Skagit Valley.

PSE selected a design-build (DB) form of contract for the project. McMillen Jacobs Associates performed preliminary design of the new tunnel and powerhouse excavation. Our services also included geologic mapping and drilling explorations to characterize the rock mass for tunnel and powerhouse design, preparation of DB plans and performance specifications, preparation of a geotechnical baseline report, cost estimating, review of DB proposals, and services during construction.

LOCATION

Concrete, Washington

OWNER

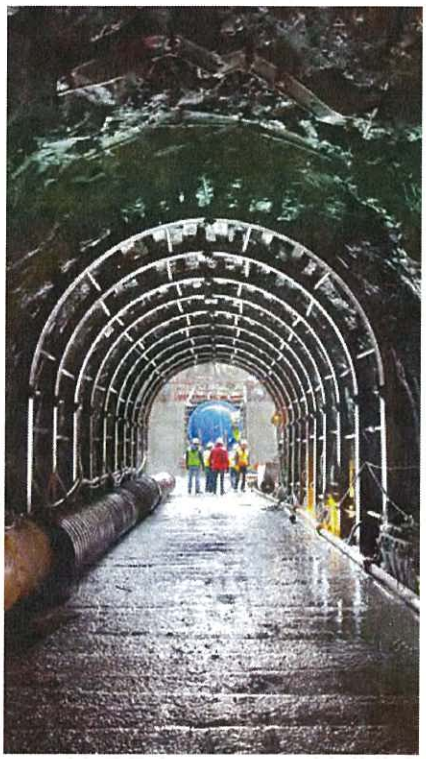
Puget Sound Energy

ROLE

Designer, CM

SCOPE OF WORK

Planning/Feasibility, Preliminary Design, Construction Management, Geotechnical Characterization

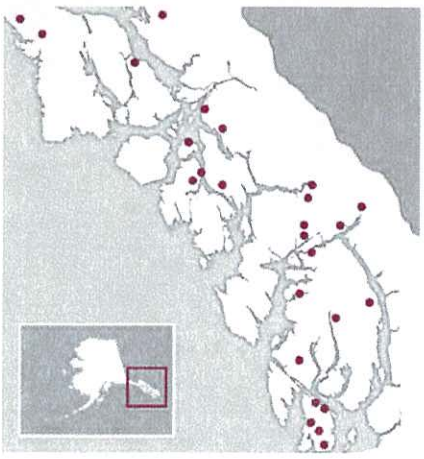


Southeast Alaska Hydropower Site Evaluations and Planning Services

LOCATION
Communities of Petersburg, Wrangell, and Ketchikan
OWNER
Southeast Alaska Power Agency (SEAPA)
CONTRACT VALUE
$1.5M+
ROLE
Engineering Services and Design Lead
SCOPE OF WORK
Feasibility Evaluations for new hydro facilities, Licensing/FERC support, Design, Construction support

In a mandated effort to minimize use of diesel generation, has been seeking additional hydropower opportunities to address projected load growth over the next 15 to 25 years. McMillen Jacobs identified potential hydroelectric projects with storage capabilities that would provide a low-risk system integration. During this Southeast Alaska region-wide work effort, we have accomplished the following:

- Evaluated approximately 300 potential sites in Southeast Alaska to identify potential hydropower sites. After initial screening, our team thoroughly reviewed 24 new hydropower sites, ranging from 300 kW to 20 MW, in Southeast (SE) Alaska Transmission Control Area;
- Performed additional assessment on the top 4 viable sites;
- Conducted site visits and collected baseline data to support the feasibility analysis;
- All field related activities including logistics, safety, transportation, survey, fish habitat assessments, and stream gage installation;
- Developed database presenting full range of collected data as well as an engineering, natural resources, regulatory, construction, power generation, transmission, and associated alternatives;
- Supported permitting effort;
- Considered potential environmental impacts on natural resources;
- Hydraulic and Hydrology modeling;
- Reviewed electrical load generation, rehabilitation of existing hydropower, and development of new hydropower generation;
- Power Generation Modeling, Hydrologic Analysis Technical Memorandum, and GIS data structure;
- Identified and evaluated regulatory and FERC issues;
- Determined transmission and substation requirements;
- Developed detailed construction cost estimates, construction sequencing, and schedules for each of the 24 advanced sites considering remote locations, challenging access, extreme environments, and challenging subsurface conditions;
- Prepared summary feasibility report summarizing the analysis and recommended alternatives;
- Performed existing dam condition assessment and stability analysis;
- Considered aspects such as construction access, maintenance access, impacts to hydropower production, impacts to natural environment, and cost and schedule implications;



An example, of our continued work after the initial analysis for SEAPA, is at the Swan Lake Dam. It experienced spill conditions that, if captured, could offset at least a portion of the diesel generation requirements. Swan Lake Dam is a 22 MW hydroelectric facility that is 430 feet long and 174 feet tall with a spillway across 100 feet of the dam. The spillway was 15 feet lower than the dam and was restricting the overall volume in the lake.

McMillen Jacobs prepared the feasibility study and preliminary design to increase the active storage. Our team also assisted with the FERC amendment to enable the dam raise. We developed the design to 100% ready for construction. Our team also provided engineering support during construction and coordination of FERC requirements and compliance. This modification raised the spillway by 15 feet to a height of 174 to match the height of the dam on each side. It also increased the maximum pool elevation from 330 to 345 feet. The improvements allowed more storage resulting in a longer generation period—thereby reducing dependence on diesel generation.

Boundary Dam Re-Licensing Project

Through several contracts, McMillen Jacobs assisted Seattle City Light (SCL) with the re-licensing of the 1,040 MW Boundary Project (FERC No. 2144) as their lead strategic consultant, using the Integrating Licensing Process (ILP). Our activities included strategic support, project and budget management, coordination of agency and stakeholder involvement efforts, and maintaining the consultation record. McMillen Jacobs provided facilitation and technical support to settlement negotiations, which culminated with the signing of a comprehensive Settlement Agreement in March 2010 and issuance of a new license in March 2013.

As the licensee's strategic advisor, McMillen Jacobs helped Seattle City Light address a number of challenging resource and technical issues related to total dissolved gas (TDG) concentrations, fish passage and protection, and preservation of load following operations. Among McMillen Jacobs's roles were budget and project management assistance, including development of budget and project status tracking tools, which were essential to ensuring that this high-profile ILP—including the intensive study planning and implementation effort and settlement negotiations—stayed on schedule and within budget.

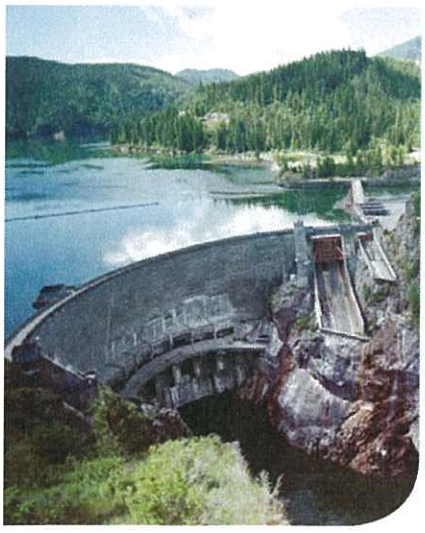
LOCATION
Pend Oreille River, Washington
OWNER
Seattle City Light
CONTRACT VALUE
$250,000
ROLE
Lead Consultant
SCOPE OF WORK
FERC Re-licensing

Project Highlights:

- Integrated Licensing Process
- International boundary issues
- Multiple tribal interests
- Fish passage/protection
- Total dissolved gas abatement
- Mining history and associated effects

Key tasks in McMillen Jacobs' scope of work included:

- Coordinating the effort to identify existing information relevant to the project
- Review of gathered information and identification of supplemental baseline information needs
- Outreach support to re-licensing participants to further identify potential resource issues and study needs
- Management of the drafting and production of all ILP documents (Pre-Application Document (PAD), study plans and reports, Preliminary Licensing Proposal, and License Application)
- Development of a compliance tracker and other compliance related planning
- Regulatory consulting, process support, and document preparation services associated with the concurrent development of TDG and temperature TMDLs
- Application for certification under Section 401 of the Clean Water Act, and management and drafting of the biological assessment needed to complete Section 7 consultation under the Endangered Species Act
- Evaluated and provided concept or preliminary designs for various Proposed Mitigation and Enhancement (PM&E) measures such as an upstream and downstream fish passage, a new bull trout production hatchery, Mill Pond Dam removal, gravel augmentation, etc.
- Assisted with Design-Build contract and procurement regarding the Mill Pond Dam removal



PacifiCorp Sample Projects

McMillen Jacobs has performed several Design-Build and Design-Bid-Build projects for PacifiCorp. Examples are shown below.

LOCATION
Washington and Oregon

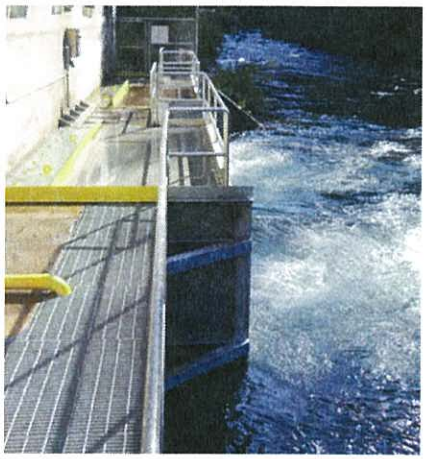
OWNER
PacifiCorp Energy

ROLE
Design-Build Lead

SCOPE OF WORK
Design, Installation, and Construction

Yale Lake/Dam Debris Net Design-Build Project - McMillen Jacobs was responsible for the design, fabrication, permitting, and installation of the net systems to exclude bull trout entrainment in the powerhouse intake and over the spillway. The project consisted of two separate net systems. 1) a 700-foot-long x 110-foot-deep net installed in front of the powerhouse intake, and 2) a 400-foot-long x 50-foot-deep net installed in the approach channel to the spillway. During the net installation, McMillen Jacobs was able to decrease the scheduled install from 10 days to 3—saving the client money and minimizing outages.

Toketee Intake Trash Rack/Debris Handling Design-Build Project - This project was a modification for the trash rack to exclude adult bull trout and provide automated debris handling systems. Early in the process, McMillen Jacobs proposed a modular expansion module that could be placed into the existing intake trashrack guide to minimize the powerhouse shutdown to 14 days. Standard construction methods proposed by other contractors were to dewater the lake and modify the existing intake resulting in a significant outage and lost generation revenue for an extended period of time and fish habitat issues. We self-performed major elements including dredging support, excavation, and installation. McMillen Jacobs oversaw the subcontractor fabrication of shop welded frame and trash rack sections, and debris handling system. Our crews completed all field installation of metal structures and debris handling systems. This new structure was installed in-the-wet by divers and required underwater fitup and welding. Despite the technically challenging elements of this project, our team was able to complete the project within the required 14-day scheduled outage.



Prospect PRV Flow Deflector Design-Build Project - Prospect PH1was originally constructed in 1911 and PH2 was constructed in 1928. During a load rejection, the PRV discharges into the tailrace releasing water into the atmosphere in a large plume which shoots across the river and onto the far bank. When the powerhouse was built in 1928, recreational whitewater boating was practically non-existent due to the remoteness and the extreme nature of the rapids immediately upstream of the powerhouse. However, boating activities increased and this plume could pose physical danger to boaters crossing in front of the powerhouse. Direct impact from the plume could create injury and the violent discharge could capsize a boater. McMillen Jacobs was retained to provide engineering for new flow deflectors at the Prospect Powerhouse No. 1 (PH1) and Powerhouse No. 2 (PH2). PacifiCorp later retained McMillen Jacobs to make construction modifications to the completed PH2 deflector following construction and start-up testing.

USACE Omaha District Design-Build MATOC Projects

McMillen Jacobs Associates (McMillen Jacobs) was awarded a MATOC to provide design-build and construction only task orders within the Omaha District. Sample projects include the following:

LOCATION
North Dakota

OWNER
USACE Omaha District

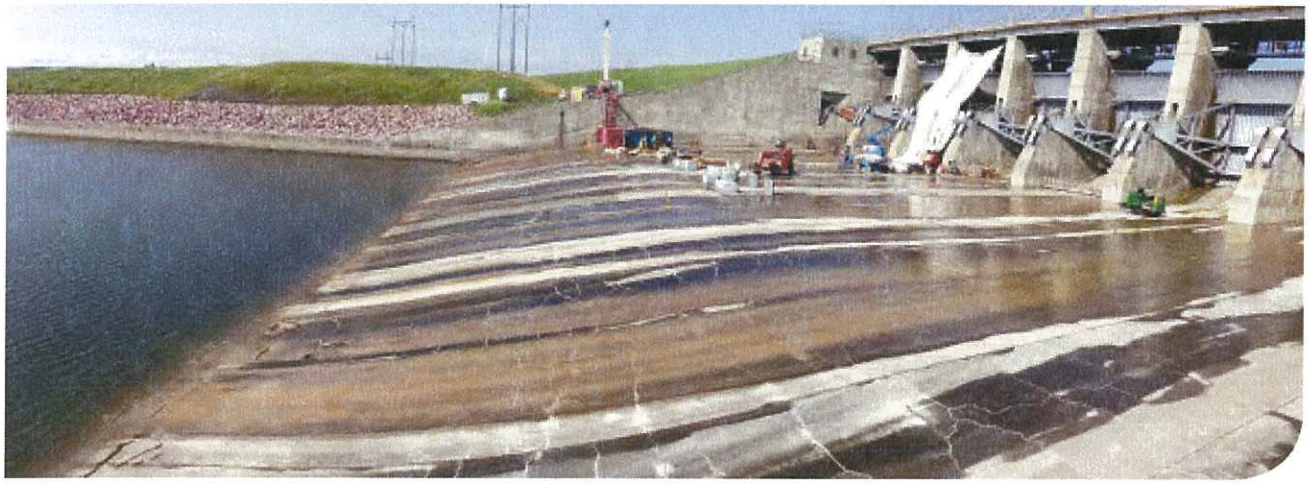
ROLE
Design-Build Lead

SCOPE OF WORK
Design and Construction

Big Bend Spillway Structure Chute & Basin Slab Repair; South Dakota. This project included vital repairs to a drain line deep under the spillway slab. McMillen Jacobs removed and replaced concrete slabs at damaged pipe locations, replaced 12-inch VCP with 12-inch HDPE pipe, removed and replaced old frost blanket, drainage, and graded filter material layer material, and performed a remote camera inspection of section of the 12-inch VCP. The project was completed a month ahead of schedule and before multiple snow fronts passed over the job. Additionally, due to a value-engineering effort, McMillen Jacobs was able to save the Corps $40,000.

Emergency and Permanent Repairs to Garrison Dam Bridge Pier; North Dakota. A large crack was discovered beneath one of the girder bearings on the Garrison Dam Spillway Bridge pier 32. McMillen Jacobs was hired to perform an emergency inspection and repair. Within two weeks of the discovery, McMillen Jacobs performed a site visit, oversaw a ground penetrating radar (GPR) inspection, and executed emergency repairs to shore up the bridge. We fabricated and installed an external reinforcing repair to provide a clamping force on the spalled section of concrete. In addition to the temporary repairs, McMillen Jacobs completed the permanent repairs on 60 piers. Our team lifted the bridge deck by installing "jacking brackets" on the east face of each pier directly beneath the bridge girders on the expansion bearing ends. Our team proposed a unique approach to the replacement of the expansion bearing devices, which minimized the impact to the existing structure, minimized the height the bridge needs to be lifted, and provided a cost effective approach to the work.

Garrison Dam Intake Structure Roof Replacement, North Dakota. McMillen Jacobs completed a structural analysis of the existing steel structure and new roofing system. Our crews demolished the existing roof in stages to maintain a weathertight seal between the existing roof and the newly installed roofing system. The demo included the EPDM membrane, insulation, flashings, roof drains, 2,000 each pre-cast concrete roof deck panels, and galvanized steel hold-down clips. Crews installed a new steel roof deck, primary and overflow roof drains, underlayment board, vapor barrier, insulation, cover board, EPDM membrane, and flashings. The existing steel roof framing remained in place. We were responsible for the testing, containment, and removal of lead paint coatings on existing steel framing members, and the testing, containment, and subcontracted removal of asbestos containing mastic coatings in the existing roof underlayment. The building is 60 feet tall, 50 feet wide, and 520 feet in length and needed to remain open for operation during construction. Access to the building was limited to a single lane bridge and only one side of the building was accessible for all equipment, material, and personnel.



USACE Walla Walla Projects

The U.S. Army Corps of Engineers (USACE), Walla Walla District has awarded several projects to McMillen Jacobs via an Architect-Engineer (A-E) Indefinite Delivery/Indefinite Quantity (IDIQ) contract and also Design-Build contracts.

LOCATION
Northwest U.S.

OWNER
USACE Walla Walla District

ROLE
Lead Designer and Design-Build Lead

SCOPE OF WORK
Design, Engineering Services, Analysis, Studies

McNary Lock and Dam, Potable Water System (PWS) Upgrade - This project was to provide a feasibility-level design and final plans and specification for the PWS upgrade. Our team performed all hydraulic, structural, mechanical, electrical, geotechnical, and civil engineering necessary to produce the design package. Design included all drawings to show the overall system layout and a description of how the system will function. McMillen Jacobs coordinated with the different agencies governing potable water and ensured that the design complied with fire protection regulations and all federal, state, and local laws. The upgrade reconfigures the PWDS layout to simplify and improve the operations and maintenance (O&M) reliability of the system. The new distribution system was hydraulically modeled with EPA's H2O-Net software to determine appropriate size of the new yard and distribution piping. McMillen Jacobs was also hired to design a new liquid chlorination system and address water discharge issues. We also provided engineering support during construction.

McNary Lock and Dam, Top Spillway Weirs Permanence Feasibility Analysis and Design- To explore new fish passage technologies, Top Spillway Weirs (TSWs) were designed and prototype tested at McNary Lock and Dam on the Columbia River beginning in 2008. The TSWs were initially developed to gather fish passage information prior to implementing major retrofits, were portable, and consisted of two different configurations. The fish passage benefits provided by these structures created the requirement to make the TSWs permanent, which required additional work. USACE issued a task order to McMillen Jacobs to prepare feasibility-level design plans and specifications that will ultimately lead to construction of two new hoist stands for raising the spillway gate, installation of two new easy-to-remove sealing structures attached to the bottom of the upper gate leaf, and repair of a previously modified concrete parapet to provide adequate fall protection for McNary staff and visitors. Final design included construction documents for two new hoist stands for raising the spillway gate, installation of two new easy-to-remove sealing structures attached to the bottom of the upper gate leaf, and repair of a previously modified concrete parapet to provide adequate fall protection for McNary staff and visitors.

Ice Harbor Lock and Dam, Downstream Navigation Lock Gate Machinery Replacement Final Design - McMillen Jacobs designed the replacement/upgrade of the navigation lock downstream lift gate hoist machinery and associated electrical and control equipment at Ice Harbor Dam. The downstream lift gate hoist machinery is the original machinery installed when the lock was placed into service in the 60s. The electrical and control systems for the downstream lift gate are over 50 years old, with spare parts unavailable for many of the components. Mechanical upgrades for the project include replacement of the gate hoist gear boxes, brakes, repair or replacement of the friction sheave ring gear and pinion spur gear, corresponding pinion shafting and bearings, sheave bearings, and replacement of the hydraulic motors with electric, Variable Frequency Drive (VFD) controlled motors. The scope also includes replacing the equipment hoist with a 4 ton, 2-speed electric hoist with single speed motor controls on the bridge and trolley axes. Electrical upgrades for the project include replacement of motor control centers, installation of new motors, VFD motor starters and controls, and control modifications to incorporate a modern PLC control system. The building and roof will also require extensive upgrades to meet current standards.

Paradise Creek Ecosystem Design-Build Restoration - The project objective was to restore 1,100-ft of Paradise Creek, a covered channel, to a stream channel flowing through the University of Idaho. For McMillen Jacobs, the project included three main elements: 1) Construction of a new 1,100-foot channel that connects to the existing channel, 2) channel shaping, and 3) vegetation in the downstream and upstream sections. The new channel and floodplain were designed to maximize the environmental benefits, while maintaining the capacity to contain a 1% flood event.

Idaho Power Sample Construction Projects

McMillen Jacobs was awarded a contract from Idaho Power Company for construction services throughout Idaho. This contract is utilized for the execution of a broad range of construction projects. Typical projects included emergency repairs to spillway structures, bridges, and recreational facilities. Sample projects include the following:

Upper Salmon Spillway Repairs - This work fixed significant cracking and failures to the entire shell of the concrete piers of the spillway, near the embed trunnion pins, and the overhead bridge column supports. Work also included removal and replacement of limit switches on the existing radial gates. Access was limited to work from a floating barge at the upstream face of the spillway, and from a narrow, single lane access road which limited the size of equipment that could access the work area. Despite challenges, this project was delivered to the client on budget and ahead of schedule.

Thousand Springs Snowbank Bridge - McMillen Jacobs reconstructed the existing bridge that needed to remain open to traffic throughout the construction period. Our team provided traffic control to ensure public safety throughout the construction period. We installed two 40-ft long, 2-ft diameter heavy walled HDPE pipe to divert the stream flow around the disturbed streambed during the work in order to comply with permitting requirements along with the necessary energy dissipation required for discharge at the end of the diversion pipe.

Upper Salmon Emergency Intake Canal Concrete Repairs - Our team performed emergency repairs to the crest of the intake canal which was in a state of disrepair The structure was experiencing spalled and crumbling concrete, full-depth cracking that had led to extensive leaking, and considerable erosion and loss of backfill. Logistics required that concrete be pumped over an active 120' canal. The power plant remained operational during construction. This project required significant safety measures for work above an active waterway. Deteriorated concrete was removed down to sound conditions and new reinforcing steel was drilled and anchored into the walls to accept the new concrete. Much of the formwork was installed from boat.

LOCATION
Various Locations in Idaho
OWNER
Idaho Power
CONSTRUCTION COST
$1M+
ROLE
Prime Contractor
SCOPE OF WORK
Construction

McMILLEN JACOBS ASSOCIATES