



Blair,
Church
& Flynn

ENGINEERING HYDROPOWER SOLUTIONS

CIVIL | MECHANICAL | STRUCTURAL | ELECTRICAL | LAND SURVEY | ENVIRONMENTAL



A NATIVE AMERICAN
OWNED COMPANY

www.bcf-engr.com

The logo for Blair, Church & Flynn features the company name in a serif font. 'Blair,' and 'Flynn' are in white, while 'Church' is in red. A red ampersand connects 'Church' and 'Flynn'.

Blair, Church & Flynn

We are a **diverse group**
of engineers, architects, land
surveyors, environmental specialists,
and design technicians coming
together to design the unseen and
build a safer, stronger tomorrow.

Firm OVERVIEW



ENGINEERING • ARCHITECTURE • LAND SURVEYING • PLANNING • ENVIRONMENTAL • CONSTRUCTION MANAGEMENT



Blair, Church & Flynn is a nationally recognized, multi-discipline consulting group delivering hydropower and power generation infrastructure solutions safely, sustainably, and efficiently.

We have provided engineering and design services for over 64 years. Blair, Church & Flynn is a professional consulting firm offering comprehensive services including land surveying, planning, engineering, environmental, landscape architecture and construction management. Since 1958, we have been a trusted advisor to utility providers, public agencies, private developers, and special districts throughout California.

Today, Blair, Church & Flynn is a nationally recognized, award winning, multi-discipline professional consulting firm serving utility companies and public agencies companies throughout the Western United States.

The firm's corporate culture is rooted in service, quality and integrity to position the firm as a trusted advisor to its clientele. Each successful project laid the foundation for satisfied and loyal clients which in turn led to more opportunities. In the past five years, the firm has successfully completed more than 1,000 projects.

Our firm has successfully served California utilities throughout the state. We have offices in San Francisco, Sacramento, Clovis, and Pomona, California, as well as Las Vegas, Nevada. Also, we are professionally licensed in Washington, California, Arizona, Nevada and Hawaii.

MBE

Blair, Church & Flynn is a Native American-Owned CPUC Certified Minority Business Enterprise

CPUC Supplier Clearinghouse MBE (Native American)VON# 12020053

Southern CA Minority Supplier Development Council MBE (Native American) #8577

As a highly-specialized part of our firm's focus for **decades**, we have successfully supported a variety of planning, engineering and construction projects for **California's hydropower & power generation facilities.**



Blair, Church & Flynn's hydropower assignments have been throughout California's many watersheds, from performing hydrologic studies and modernizing gauging stations to new headworks structures, dam evaluations, powerhouse modifications, road and bridge evaluations, water flume and penstock repairs. Beyond the hydroelectric infrastructure, we have supported Federal Energy Regulatory Commission (FERC) and Division of Safety of Dams (DSOD) regulations, and key support facilities, such as substations, machine shops, heliports and employee housing.

Blair, Church & Flynn's engineers also have delivered consulting services to hydropower groups with traditional heavy civil infrastructure like water storage, treatment and distribution; wastewater collection, treatment and reuse; drainage systems and Storm Water Pollution Prevention Plans (SWPPP); and transportation elements including roadways, bridges, culverts and parking lots.



WE HAVE THE HISTORY,
EXPERIENCE AND CAPACITY
TO SUCCESSFULLY SUPPORT
**HYDROPOWER &
GENERATION FACILITIES.**



PROFESSIONAL SERVICES We Provide Internally Include:

Planning

- Alternatives Analyses
- Constructability Reviews
- Cost Estimates
- Due Diligence Reports
- Expert Witness
- Feasibility Studies
- Master Plans
- Peer Review
- Program Management
- Regulatory Agency Coordination
- Site Selection Studies
- Staff Augmentation
- Sustainability
- Value Engineering
- Water Conveyance Studies

Environmental

- CEQA / NEPA Compliance
- Environmental Licensing
- Erosion & Sediment Control Plans
- FERC Licensing
- NPDES Permitting
- SPCC Development & Certification
- SWPPP Development

Land Services

- Acquisition Support
- ALTA
- Boundary Surveys
- Centerline Surveys
- Dam Settlement Surveys
- Easements
- High Definition Scanning
- Land Surveying
- Legal Descriptions
- LiDAR
- Record of Surveys
- Right of Ways
- Subsidence Surveys
- Subsurface Utility Engineering
- Title Report Analysis
- Topographical Maps

Architecture

- Programming
- Site Optimization
- Space Planning & Facility Development
- Tenant Improvements
- Remodeling / Reuse
- Code Review & Implementation
- Facilities Condition Assessments

Engineering

- ADA Accessibility
- Bridges
- Buildings
- Canals & Waterways
- Civil Engineering
- Electrical Engineering
- Electrical Transmission & Distribution
- Flood Control
- Grading & Drainage
- Hydraulics & Hydrology
- Hydro Power Generation
- Irrigation Systems
- Lift Stations
- Mechanical Engineering
- Natural Gas Transmission & Distribution
- Parking Lots
- Pavement Maintenance
- Pipeline Inspection & Evaluation
- Pipeline Rehabilitation
- Pumps Stations
- Recycled Water Distribution
- Recycled Water Mains & Distribution
- Reinforced Concrete Structures
- Roadways
- Runways & Taxiways
- SCADA & Automation
- Site Plans
- Structural Engineering
- Transportation
- Wastewater Collection
- Wastewater Treatment
- Water Mains & Distribution
- Water Storage
- Water Treatment
- Water Wells

Landscape Architecture

- Booster Pumps
- Hardcourts
- Hardscape
- Irrigation Systems
- Pedestrian Trails
- Plant Materials
- Playfields
- Recycled Water Conversions
- Restoration
- Sports Turf
- Storage Tanks
- Sustainability
- Synthetic Surfaces
- Water Conservation

Construction Services

- As-Built Preparation
- Construction Management
- Construction Staking
- Dispute Resolution
- Inspection
- Operations & Maintenance
- Owners Representation
- Start-up & Commissioning
- Value Engineering

Blair,
Church
& Flynn



Our **PROJECT EXPERIENCE**



PG&E TULE RIVER WOOD STAVE PIPE REPLACEMENT

Location: Tulare County, California

Owner: Pacific Gas & Electric Company

Start Date: 2016

End Date: 2018

Contact: Francisco Sanchez-Zamora – Project Engineer

Contact Telephone: (559) 855-6029



The Tule River powerhouse is owned and operated by PG&E. The powerhouse is located approximately 25 miles northeast of Porterville, California on the Middle Fork of the Tule River (MFTR) near the confluence of the Middle and South Forks of the Tule River.

Water is directed to the powerhouse conveyance system by a diversion off of the MFTR approximately 4 miles upstream near Camp Wishon. The water is then directed into an aqueduct consisting of concrete lined flumes and unlined tunnels. The final leg of the aqueduct was a 72-inch diameter redwood stave pipe, 1,020 feet in length, that was built in 1958 and was supported on concrete saddles. Sun exposure caused decay of the wood planks and deterioration of the pipe to a point that required replacement. The pipeline had to be constantly kept full of water in order to keep the planks from drying out and the pipe collapsing. Leakage from the pipeline had caused areas of erosion and slope stability failures.

Blair, Church & Flynn prepared an alternatives analysis; the outcome of the analysis was replacement of the existing wood stave pipe with a 72-inch diameter steel pipe with lap welded joints supported on concrete saddles. Improvements at the site also included installation of slope stabilization and rock fall mitigation as the site is located on a steep hillside subject to slope failure and rock fall hazards.

Following completion of the alternatives analysis, Blair, Church & Flynn provided design services which included design; preparation of construction drawings, procurement, and technical specifications; and support of PG&E with the Federal Energy Regulating Commission (FERC) review. In addition to design services, Blair, Church & Flynn provided pipe procurement support, and construction support.



Photo: Existing site conditions.

ADDITIONAL PROJECT DATA:

- 1. DISCUSS SAFETY PERFORMANCE:** Pre-project fall protection training and certifications; daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- 2. CONTRACTING METHOD USED:** Design / Bid / Build
- 3. DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Access to the site was very difficult; designed all of the components so they could be flown in with a helicopter
- 4. PERCENTAGE OF PROJECT ENGINEERED BY BC&F:** 90%
- 5. TOTAL PROJECT COST: Construction Cost -** \$2.34 Million

Civil Engineering

Land Surveying

PG&E KERCKHOFF DAM FISH RELEASE VALVE AUTOMATION

<i>Location: Fresno County, California</i>		
<i>Owner: Pacific Gas & Electric Company</i>	<i>Start Date: 2016</i>	<i>End Date: 2019</i>
<i>Contact: Nick Stephens – Project Manager</i>		<i>Contact Telephone: (559) 855-6006</i>



Kerckhoff Dam, located off the Kerckhoff Reservoir near Auberry, California, has a fish water in-stream flow release system that consists of a 20-inch steel pipeline that receives water from a tunnel through a steel bulkhead that discharges into the downstream river. The pipeline has a throttling valve that controls the volumetric flow rate of water.

The valve is currently adjusted manually to meet the required amount of downstream flow release that is required, determined by the pool surface elevation at the dam. PG&E has no way to accurately measure the amount of flow being released, resulting in extra release and lowering the amount of stored water used for generating electricity.

Blair, Church & Flynn was tasked with producing an Alternatives Analysis report for analyzing the available options for replacing the existing throttling valve and making the water release system automated. The report includes descriptions of valve, actuator, flow meter, and air vent configurations available to automate the water flow release system.

Advantages, disadvantages, and cost estimates, and a weighted decision matrix were given to assist PG&E in making a decision on how to proceed. The alternative chosen includes replacement of the of the existing butterfly valve with a throttling knife age valve assembly and vacuum relief / air inlet valve. Other improvements in the project consist of pipe replacement of deteriorating pipe, installation of an ultrasonic flow meter assembly, installation of a new elevated steel access path along the pipeline, and installation of a new access gate and fencing at the tunnel portal.

Blair, Church & Flynn is currently in the design phase of the project, which includes correspondence with the valve

manufacturer, assistance with equipment procurement, establishing design criteria, producing design drawings, hydraulic calculations, and technical specifications. Engineering services include civil, mechanical, electrical, and control components.



Photo: Existing site conditions.

ADDITIONAL PROJECT DATA:

- 1. DISCUSS SAFETY PERFORMANCE:** Daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- 2. CONTRACTING METHOD USED:** Design / Bid / Build
- 3. DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:**
Existing butterfly valve cavitation at varying pressures and flows; researched various valves and consulted with Michael Johnson, PhD, PE consulting engineer and professor at Utah State to determine appropriate valve installation
- 4. PERCENTAGE OF PROJECT ENGINEERED BY BC&F:** 100%
- 5. TOTAL PROJECT COST: Construction Cost - \$350,000**

Civil Engineering

Mechanical Engineering

Electrical Engineering



PG&E TIGER CREEK POWERHOUSE FOREBAY TRASH RAKE IMPROVEMENTS

<i>Location: Pioneer, California</i>		
<i>Owner: Pacific Gas & Electric Company</i>	<i>Start Date: 2017</i>	<i>End Date: 2020</i>
<i>Contact: Chirag Mehta – Project Manager</i>		<i>Contact Telephone: (530) 889-6455</i>



Tiger Creek Powerhouse is owned and operated by PG&E. It is located at the Tiger Creek Reservoir, approximately 17 miles northeast of Jackson, California. Water is supplied to the powerhouse from the Tiger Creek Regulation Reservoir, approximately 3 miles to the northeast of the powerhouse. Large debris is filtered from the water at the Regulation Reservoir by way of a trash rack installation. The water then flows to the Tiger Creek Forebay, where the debris is filtered a second time, before traveling in the penstock to the Tiger Creek Powerhouse. The trash rake system that is currently installed at the intake has been having numerous issues that result in system shutdown and manual cleaning of the trash screen. The system consists of a 20-foot wide by 30-foot tall steel bar trash rack with a Duperon rake system. Blair, Church & Flynn was tasked with producing an Alternatives Analysis report for new trash rake system alternatives. The report included a summary of the current issues, an analysis of potential trash rake system alternatives, and a recommended alternative. A detailed description, advantages, disadvantages, and costs estimates for each alternative, as well as a weighted alternatives evaluation matrix was included to assist PG&E in making a final selection of a new trash rake system. The system chosen includes removal of the existing trash rake and replacement with an Atlas Polar trash rake system. Also, included are modifications to the existing trash removal conveyor system. Blair, Church & Flynn is currently working on the design which includes structural, electrical, and control components.



Photo: Existing site conditions.

Blair, Church & Flynn is currently in the design phase of the project, which includes correspondence with the trash rake manufacturer, assistance with equipment procurement, establishing design criteria, producing design drawings, structural calculations, and technical specifications. Engineering services include structural, mechanical, electrical, and control components.

ADDITIONAL PROJECT DATA:

- 1. DISCUSS SAFETY PERFORMANCE:** Pre-project fall protection training and certifications; daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- 2. CONTRACTING METHOD USED:** Design / Bid / Build
- 3. DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Determining new location of conveyor system discharge due to site constraints; providing an additional alternatives analysis for the conveyor system that was not within the original scope of work
- 4. PERCENTAGE OF PROJECT ENGINEERED BY BC&F:** 100%
- 5. TOTAL PROJECT COST: Construction Cost - \$550,000**

Structural Engineering

Mechanical Engineering

Electrical Engineering

PG&E LAKE VALLEY LOW LEVEL OUTLET

<i>Location: Placer County, California</i>		
<i>Owner: Pacific Gas & Electric Company</i>	<i>Start Date: 2018</i>	<i>End Date: 2019</i>
<i>Contact: Jack Ryan Naylor – Project Engineer</i>		<i>Contact Telephone: (530) 889-6471</i>



Lake Valley Dam is part of PG&E’s Drum-Spaulding hydroelectric project (FERC No. 2310) and is located on the North Fork of the American River in Placer County, about three miles west of Cisco Grove, California.

The dam impounds approximately 7,000 acre-feet of water for downstream domestic and irrigation use and average generation of about 23 GWH annually as the water passes through seven downstream powerhouses in PG&E’s and Nevada Irrigation District’s (NID) hydro systems. The dam is a 75-foot-high by 1,035-foot-long earth fill embankment. The 30-inch-diameter Low Level Outlet (LLO) pipe is located in a 360-foot-long unlined rock tunnel located in the left abutment

The pipe has deteriorated and is need of replacement.

The project is under the jurisdiction of the FERC and the Division of Safety of Dams (DSOD). Blair, Church & Flynn is currently assisting PG&E with design efforts and permitting support to replace the pipe. The design includes the replacement of the existing steel pipe with steel pipe with lap welded joints, and replacement of the existing guard valve to outside of the tunnel. In addition, the tunnel is to be backfilled with cellular grout following completion of installation of the steel pipe. The backfill eliminates the need for inspections of the pipe within the tunnel, greatly reducing the safety risks associated with personnel entering the tunnel.



Photo: Existing site conditions.

ADDITIONAL PROJECT DATA:

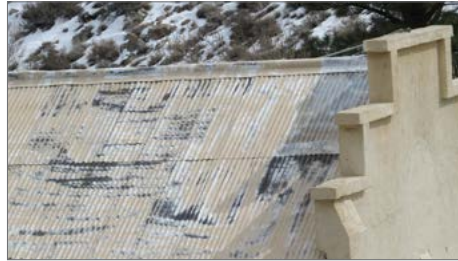
1. **DISCUSS SAFETY PERFORMANCE:** N/A
2. **CONTRACTING METHOD USED:** Design / Bid / Build
3. **DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** A site survey within the tunnel was not performed due to access constraints; the design included varied pipe lengths that could be utilized during construction in order to install the pipe within a curved alignment within the tunnel
4. **PERCENTAGE OF PROJECT ENGINEERED BY BC&F:** 100%
5. **TOTAL PROJECT COST: Construction Cost -** \$600,000

Civil Engineering

Mechanical Engineering

SCE BISHOP TRANSFORMER BUILDING ROOF REPLACEMENT

<i>Location: Inyo County, California</i>		
<i>Owner: Southern California Edison, Eastern Hydro</i>	<i>Start Date: 2017</i>	<i>End Date: Est. 2018</i>
<i>Contact: Frank Dunn – Project Engineer</i>		<i>Contact Telephone: 626-302-0382</i>



Southern California Edison owns and operates the Bishop Creek Plant 2 and Transformer House buildings located at Bishop Creek in Inyo County, California.

The building's roof systems were originally constructed in the early 1900's. SCE proposes to replace the roof panels like-in-kind to comply with the regulatory requirements of the State Historic Preservation Office (SHPO).

The roof system was structurally analyzed using a 3D structural modeling software and it was determined the existing framing requires structural improvements to support the design loads required by current building codes.

Design documents include structural improvement drawings as well as roof improvement drawings. The proposed panel is the Spanish Tile manufactured by Berridge Manufacturing company. Construction was completed in 2018.



ADDITIONAL PROJECT DATA:

- SAFETY PERFORMANCE:** Daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- CONTRACTING METHOD USED:** Design / Bid / Build
- DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Analysis and calculations showed the existing roof system to be structurally inadequate to support the roof loading; prepared retrofit drawings that brought the system into compliance with current building code
- PERCENTAGE OF PROJECT ENGINEERED BY BIDDER (BC&F):** 100%
- TOTAL PROJECT COST: Construction Cost -** \$260,000
- BC&F'S FEE FOR PROJECT:** \$38,000

Structural Engineering

SCE AGNEW LAKE TRAM IMPROVEMENTS FEASIBILITY STUDY

<i>Location: Inyo National Forest, California</i>		
<i>Owner: Southern California Edison</i>	<i>Start Date: 2013</i>	<i>End Date: 2014</i>
<i>Contact: Wayne Yarnall – Project Engineer</i>		<i>Contact Telephone: 670-873-0748</i>



The Angew Tram is located near Rush Creek on the Eastern Side of California’s Sierra Nevada Mountains and is used by Southern California Edison (SCE) to carry personnel, equipment, and materials to a series of dams serving the Rush Creek Powerhouse. The tram is over 100 years old and has been maintained as an important means of accessing SCE’s dams, penstocks, power distribution facilities and intake structure. The existing tram is essentially a mining car that has been modified numerous times to provide accommodations for varying numbers of people; different supplies and material needs; and ongoing maintenance and serviceability.

Re-evaluation of the overall use of the tram, the cost of improvements, life cycle costs, and safety were the primary considerations for the feasibility study Blair, Church & Flynn assisted SCE with. One of the leading concerns was safety, as the existing tram’s alignment had been compromised by landslides and was prone to hazards from falling rock. Additionally, portions of the rail bed foundation had been compromised due to poor soil conditions, aging soil retaining walls and inadequate surface drainage. The functionality of the tram had also suffered due to these conditions and there had been numerous derailments. After a thorough assessment of the existing conditions, we provided three options to SCE to improve the existing track, address the functionality, and improve safety.

Option 1 was to restore functionality to the 120 feet of rail previously removed as part of a prior construction project. Options 2a, 2b, and 2c consist of “like-in-kind” improvements of the track beyond the minimum to regain functionality and were based on a rating system used to identify the most critical sections of track. Option 3a greatly improved the safety of the system with a complete replacement of track and

implementation of a tram with electromagnetic brakes. Option 3b further improved safety with an automated hoist system that would communicate with the new tram and eliminate the need for manual operation. Each option was presented with an associated cost for SCE to take into consideration.



ADDITIONAL PROJECT DATA:

1. **SAFETY PERFORMANCE:** Daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
2. **CONTRACTING METHOD USED:** Design
3. **DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Remote location; as-builts for the tram were not available. Used aerial photomapping to prepare study.
4. **PERCENTAGE OF PROJECT ENGINEERED BY BIDDER (BC&F):** 100%
5. **TOTAL PROJECT COST: Construction Cost -** N/A
6. **BC&F’S FEE FOR PROJECT:** \$30,000

Civil Engineering

Mechanical Engineering

Electrical Engineering

SCE FLORENCE LAKE & MAMMOTH POOL IMPROVEMENTS

<i>Location: Big Creek, California</i>		
<i>Owner: Southern California Edison</i>	<i>Start Date: 2016</i>	<i>End Date: 2017</i>
<i>Contact: Frank Dunn – Project Engineer</i>		<i>Contact Telephone: 626-302-0382</i>



Blair, Church & Flynn assisted Southern California Edison’s Eastern Hydro with design services for the installation of vertical staff gage systems at Florence Lake and Mammoth Pool Dam, both sites located within the Big Creek watershed in the Sierra Nevada Mountains.

The project intent is to provide a safe, convenient way of determining the water elevation within the reservoir as required per United States Geological Survey (USGS) standards, from the high water elevation to the minimum pool elevation.

The staff gages are Stevens Style C mounted to a steel vertical support and anchored to the supporting foundation. Design accounted for a wide range of foundation conditions anticipated at the site: reinforced concrete foundations, rock boulder foundation, and a helical anchor as recommended by the project’s Geotechnical Evaluation Report.

The vertical staff gages are arrayed perpendicular to the bank with the height of the gages staggered to allow water level to be measured from one gage to another as the reservoir water level fluctuates.

Control surveying, topographic surveying, and High Definition Scanning were performed to determine the specific elevations for construction. Gages were constructed to provide the reading accuracy of 1/100 of a foot per USGS standards.

Construction was completed in Fall of 2017.



ADDITIONAL PROJECT DATA:

- SAFETY PERFORMANCE:** Daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- CONTRACTING METHOD USED:** Design / Bid / Build
- DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Unknown sub-surface material properties; designed a range of foundations that could be utilized based on varying types of materials encountered
- PERCENTAGE OF PROJECT ENGINEERED BY BIDDER (BC&F):** 100%
- TOTAL PROJECT COST: Construction Cost -** \$400,000
- BC&F’S FEE FOR PROJECT:** \$86,000

Civil Engineering

Land Surveying

SCE DAM CORPORATE SECURITY IMPROVEMENTS - QCIP SUPPORT

<i>Location: Fresno County, California</i>		
<i>Owner: Southern California Edison</i>	<i>Start Date: 2021</i>	<i>End Date: Ongoing</i>
<i>Contact: Mario A Cardona – Project Engineer</i>	<i>Contact Telephone: (626) 302-0357</i>	

Blair, Church & Flynn is helping Southern California Edison’s Corporate Security group with security improvements at Big Creek Dam 4, Dam 7, and Shaver Lake Dam. Security improvements include cameras and equipment boxes at various locations. SCE has requested Blair, Church & Flynn to prepare construction documents for the proposed installations to support the structural portion of work.

Specific site improvements will include:

Dam 4

- Steel pole and anchorage design for the installation of camera and mounted 36"x30" NEMA box
- Drilled pier foundation design
- Sliding gate support beam and foundation design (gate design by others)

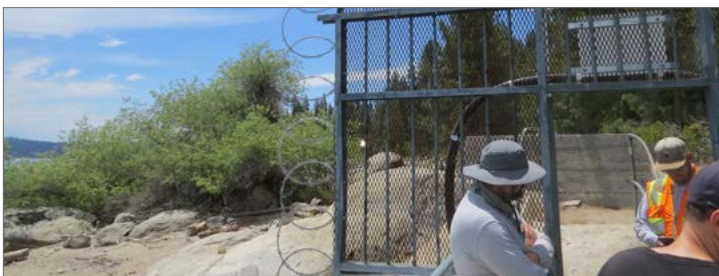
Dam 7

- Steel pole and anchorage design for the installation of camera to existing CMU building at east end of dam

Shaver Lake Dam

- Steel pole and anchorage design for the installation of camera to existing concrete gate house at north end of dam
- Steel pole and anchorage design for the installation of camera to existing concrete structure at middle of dam (top of dam)
- Pole to be mounted at front face of structure and adjustable for access to camera without requiring fall protection.
- Steel pole and anchorage design for the installation of camera to existing concrete structure at middle of dam (bottom of dam)
- Steel pole and anchorage design for the installation of camera to existing concrete wall at south end of dam

Our scope of services include: Engineering Design, Site Investigations, QCIP Support, Construction Support, Project Closeout.



BIG CREEK 1 DAM 4 HYDROELECTRIC PROJECT
FERC Project No. XXXX

BIG CREEK 4 DAM 7 HYDROELECTRIC PROJECT
FERC Project No. XXXX

SHAVER LAKE DAM HYDROELECTRIC PROJECT
FERC Project No. XXXX

DAMS SURVEILLANCE PROJECT

**CONSTRUCTION QUALITY CONTROL
INSPECTION PROGRAM**

DRAFT

Prepared for:
Southern California Edison
Rosemead, California

Prepared by:
Blair, Church & Flynn Consulting Engineers
Clovis, California



All Photos: Existing site conditions.



SCE BIG CREEK PENSTOCK FALL PROTECTION

<i>Location: Big Creek, California</i>		
<i>Owner: Southern California Edison, Northern Hydro</i>	<i>Start Date: 2017</i>	<i>End Date: 2018</i>
<i>Contact: Frank Dunn – Project Engineer</i>		<i>Contact Telephone: 626-302-0382</i>



Blair, Church & Flynn assisted Southern California Edison in assessing worker's access safety within the Big Creek Hydroelectric Project for penstocks at powerhouses 1, 2/2A, 3, 8, and Mammoth Pool.

Site assessments were performed along each penstock and an assessment report was completed by Blair, Church & Flynn to determine which areas were in need of engineered design of fall protection systems. As-built drawings were used to prepare diagrammatic sketches of proposed improvements which included lifeline systems, ladders, platforms, handrails and foundations.

Blair, Church & Flynn has addressed all comments and concerns of the SCE safety team and proceeded with preparation of design drawings. The project has gone into construction and Blair, Church & Flynn is currently providing construction support to ensure ease of constructability of the project.

Following completion of design, SCE has requested Blair, Church & Flynn perform assessments of all the their penstocks system wide including Kern, Tule, Kaweah, Bishop and their East End areas.



ADDITIONAL PROJECT DATA:

- SAFETY PERFORMANCE:** Pre-project fall protection training and certifications; daily Tailboard / JSA when in field; Zero reportable incidences and zero lost hours
- CONTRACTING METHOD USED:** Design / Bid / Build
- DESCRIPTION OF PROJECT COMPLEXITIES & RESOLUTIONS:** Project terrain did not allow for a conventional survey; designed a range of supports that could be adjusted in the field
- PERCENTAGE OF PROJECT ENGINEERED BY BIDDER (BC&F):** 100%
- TOTAL PROJECT COST: Construction Cost -** \$1.4 Million
- BC&F'S FEE FOR PROJECT:** \$300,000

Civil Engineering

SCE Creek Fire Post Assessment Restoration & Prevention Plan



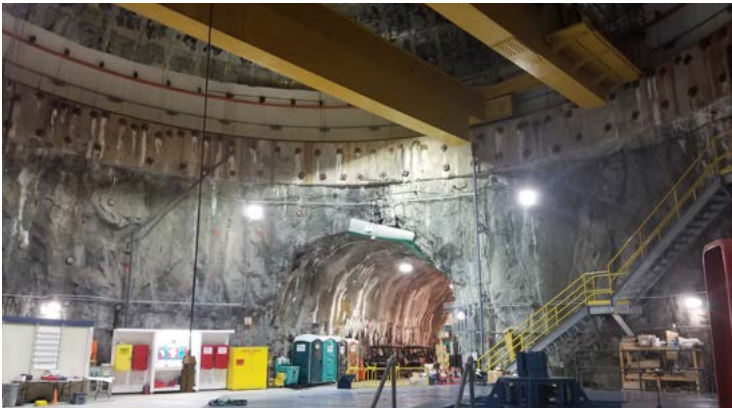
The Creek Fire started on September 4, 2020 in the Big Creek drainage area between Shaver Lake and Huntington Lake in the vicinity of the town of Big Creek. The ongoing Creek wildfire has affected the Big Creek Hydroelectric project; it is unknown the extent of the damages to Southern California Edison's (SCE) assets. Blair, Church & Flynn assisted in assessing the damage and recommendations for mitigation efforts of damaged facilities and preventive measures for conditions to the terrain caused by the wildfire with potential to cause damage to SCE facilities and/or loss of access to facilities. Due to the loss of vegetation on hillsides due to the wildfire, erosion and slope stability is a concern following the wildfire and upcoming rain events. SCE requested to assess and prepare preventative mitigation recommendations for erosion protection and slope stability around essential SCE facilities including but not limited to powerhouses; switchyards; penstocks; and forebays. Additional efforts were also performed to assess and prepare preventative mitigation recommendations for uphill slopes of access roads; drainage culvert crossings; and the change in drainage patterns within the watershed due to the loss of vegetation and increase of flows. Our firm also helped with data collection of readily available as-built drawings, aerial imaging, review of GIS mapping and top information, and performed all site visits and inspections.

Location: Big Creek, California

Owner: Southern California Edison, Northern Hydro



PG&E Kerckhoff Powerhouse 2 Crane Improvement Project



Kerckhoff Powerhouse 2 is located 4 miles west of Auberry, California. The facility was constructed in 1983, and is used for the generation of power through the use of water storage from Kerckhoff Lake. The powerhouse is located approximately 250 feet underground; access to the powerhouse is through a horseshoe-shaped rock tunnel.



Photo: Existing site conditions.

There is a bridge crane supported on a concrete bench located 38 feet above the generator floor and 35 feet below the top of the peak of the rock ceiling. A fused disconnect switch provides power to the crane. The switch and conduits rusted through in some places leading to concerns of water intrusion into the equipment. In addition, the ladder had been damaged and required replacement.



Photo: Existing site conditions.

Blair, Church & Flynn assisted PG&E with the crane improvements. Our work included replacing the disconnect switch with NEMA rated equipment designed for wet locations, evaluating possible relocation of the switch to a drier area, or replacing the existing support structure. We also explored possible replacement of corroded rigid metallic conduit and corroded steel conduit supports. We relocated the existing control pendant and explored possible alternate control pendant locations next to the access tunnel, control room, or disconnect switch. Our team designed for wireless crane control to allow the crane to be operated without using the existing control pendant.

Our scope of services included civil and electrical engineering. Our firm delivered detailed engineering design documents, cost estimates, and post-design support such as construction inspection, testing, and startup services, among other project management services. We also provided all structural calculations.

Location.....Fresno County, California
Owner Pacific Gas & Electric

Civil Engineering

Electrical Engineering

PG&E Helms Powerhouse Ventilation Upgrade



The Helms Pumped Storage Plant is located 50 miles east of Fresno, California in the Sierra Nevada Mountain Range’s Sierra National Forest. The hydroelectric power station uses Helms Creek canyon for off-river water storage and the pumped-storage hydroelectric method to generate electricity. It has an installed capacity of 1,212 MW and is owned by Pacific Gas and Electric Company.

The power plant operates by moving water between two reservoirs, an upper and a lower. When energy demand is high, water is released from the upper reservoir to the plant where electricity is generated before the water is discharged into the lower reservoir. When demand is low at times such as night, water is then pumped back up to the upper reservoir to be used as stored energy for a later time. This is accomplished by pump-generators which serve a dual role as both pumps which can reverse into generators.

The majority of the associated Helms Powerhouse facilities are located below ground requiring an extensive and robust ventilation system to provide temperature controlled clean air for occupancy. PG&E is considering performing upgrades to the existing ventilation system for the Helms Powerhouse after consulting with Mining Ventilation Services Inc (MVS) and New England Sheet Metal Co. (NESM), who reviewed the condition of the existing system as necessary to provide worker safety in the event of a fire or exhaust of any other hazardous gaseous materials. In summary, these reports outline a sub-performing exhaust fan and outlines improvements that would increase worker

safety for ingress and egress routes in the event of a fire or gaseous emergency.

BCF assisted with the design of the following improvements:

- The existing Emergency Exhaust Fan EEF-1 was replaced.
- The existing single-stage AC unit for the control room was replaced with a new 2-stage unit.
- Controls for 2 access shaft dampers were retooled to work in different scenarios depending on if work is being done in the tunnel and if an emergency event occurs. One damper is located on 68” duct downstream of EE-1 and one damper on 42” duct near P-trap of exhaust shaft used during maintenance work.
- Transformer vault dampers and control room dampers were put into working order and programmed into existing control scheme.

Phase 2 of this project kicked off design in 2022 and includes revising the ventilation system to allow for reversal of air flow throughout powerhouse in emergency events.



Location.....Fresno County, California
 Owner Pacific Gas & Electric

Mechanical Engineering

Electrical Engineering



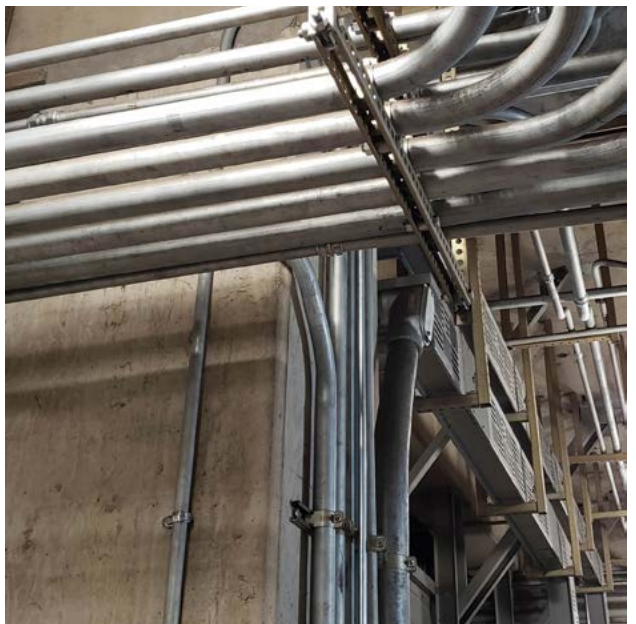
PG&E Haas Powerhouse HVAC System Improvements



Haas Powerhouse, which is owned and operated by PG&E, is located approximately 45 miles east of Fresno, California on the North Fork of Kings River. The HVAC system within PG&E’s Haas Powerhouse has not been operating per the original design requirements and there are concerns the air in the powerhouse is not ideal for the peak performance of its equipment.

There is an oil mist present within the powerhouse that has contaminated the HVAC equipment and ducting, which has resulted in an inability to turn on the heating components of the system due to fire hazard concerns. Blair, Church & Flynn was tasked with producing an Alternatives Analysis report for recommended HVAC system modifications. The report also included a condition matrix of the HVAC system components that listed the component condition and a recommended action of replacement or keep in place.

A system investigation, with the assistance of an HVAC sub-contractor, led to the discovery of multiple components in need of replacement. A design criteria memorandum was produced that outlines the criteria required for the successful design of the HVAC system modifications. Our services also included preliminary engineering, project management, design documents and cost estimates. Our firm managed both the electrical and mechanical engineering for this project, as well as the civil.



Location.....Fresno County, California
Owner Pacific Gas & Electric

Civil Engineering

Mechanical Engineering

Electrical Engineering

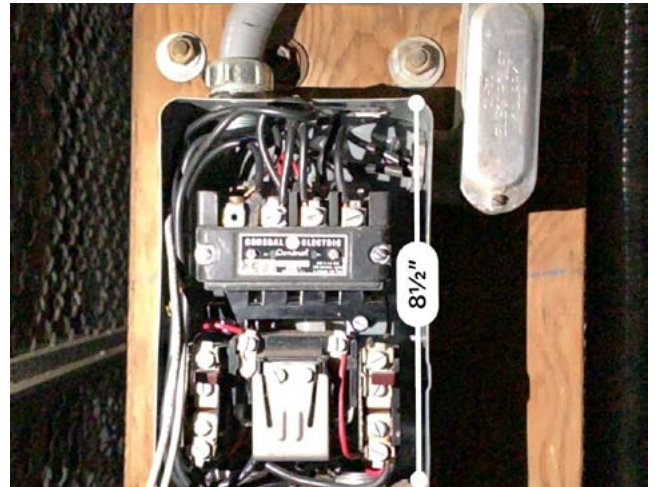
PG&E Haas Powerhouse Replace Domestic Water System



PG&E's Haas Powerhouse is supplied with domestic water via a redwood stave water tank that diverts water from a nearby creek. The elevation of the tank provides the pressure required for the use of hose reels and restrooms in the powerhouse. During dry seasons, the creek dries up, leaving the powerhouse without water. The tank and piping also had leaks and were in poor condition.

Originally PG&E had planned to replace the existing water tank, but after further consideration it was determined that replacement was not a feasible option. PG&E decided to abandon the existing tank and utilize the spare domestic water distribution system for providing domestic water to the powerhouse and surface level access building.

Blair, Church & Flynn helped PG&E with all the design modifications to the existing domestic water system so that they could utilize the cooling water supply pit as the main source of domestic water. Our responsibilities included initial project planning, preliminary engineering investigation and alternative analysis. Our firm also delivered detailed engineering designs documents, managed the quality control inspection program, cost estimates and post design support such as construction inspection, testing and startup services. Our services also included electrical and mechanical engineering for the new system.



Location.....Fresno County, California
Owner Pacific Gas & Electric

Civil Engineering

Mechanical Engineering

Electrical Engineering

PG&E Helms Powerhouse Wastewater Lift Station Improvements



Photo: Existing site conditions.

The Helms Powerhouse is located in the remote area of Sierra Nevada Mountain Range in Fresno County, California. The project involves performing numerous improvements to the existing lift station located in the basement of the powerhouse. The majority of the equipment and piping of the lift pump equipment is of original construction in the 1980s.

The improvements being considered included the replacement of gear boxes and electric motors, replacement of leaking check valves at pump discharge manifolding with a more robust valve configuration, replacement of pump control system, replacement of suction piping and valves with stainless steel, and the replacement of existing corroded steel pipe wall mounts at the septic tank's gravity flow inlet piping.

Our firm's responsibilities for the project included field investigation, evaluation of improvement alternatives, preliminary engineering, including technical specifications, and preparation of construction documents.



Location..... Fresno County, California
Owner Pacific Gas & Electric

Civil Engineering

Mechanical Engineering

Electrical Engineering

SCE Bishop Plant 4 Domestic Water Storage Tank



Southern California Edison (SCE) was considering replacement alternatives of the existing steel tank used to store domestic water for Plant 4 facilities. The Plant 4 facilities contained domestic water service include six residences, administration office, powerhouse and other ancillary support structures.

The existing water tank, located on top of a hill approximately 135 feet above the elevation of the Plant 4 structures, had an estimated water storage capacity of 14,000 gallons. For the purpose of this study, the average daily water demand for the Plant 4 facilities is 10,000 gallons. The existing elevated water storage tank did not have adequate safe access in accordance with Occupational Safety and Health Administration standards for top hatchway required for inspections. Additionally, other modifications were necessary to the piping configurations of the inlet, outlet and drain to meet current California Department of Health Services standards.

Blair, Church & Flynn provided the schematic design and cost estimates for three water domestic water storage alternatives. Those alternatives included: installation of new hydropneumatic tank at/near the location of the existing well, installation of gravity storage tank(s) adjacent to the existing elevated tank, and installation of gravity storage tank(s) with booster pump(s) near the existing wells. We also developed a conduit plan and schedule As-Built, as well as redesigned the levels system and controls, and updated the Operations and Maintenance Manual.



Location..... Bishop, CA
Owner Southern California Edison

Civil Engineering

Mechanical Engineering

Electrical Engineering

PG&E Kerckhoff Reservoir Safety Alarms System Improvements

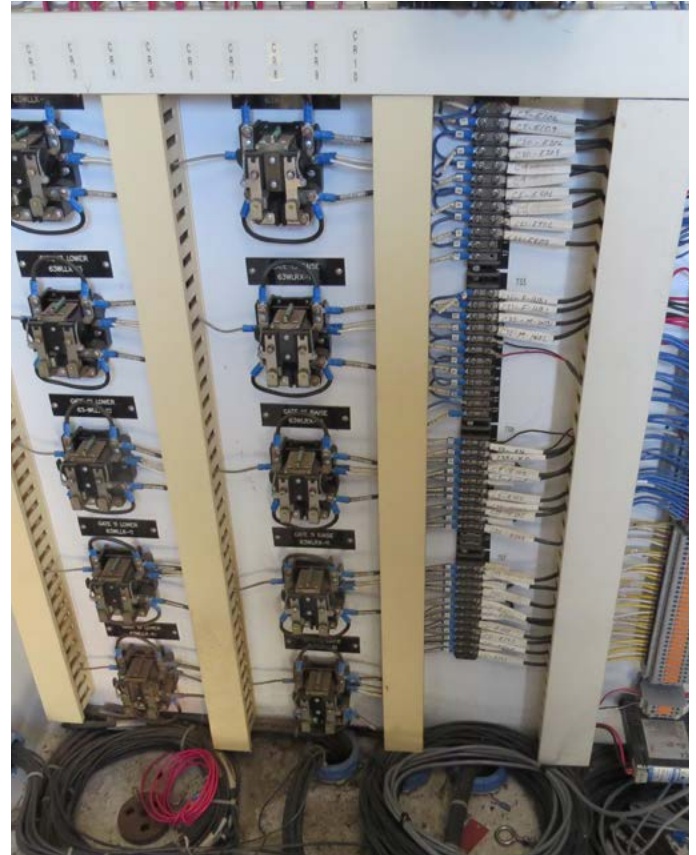


Kerckhoff Reservoir supplies water to Kerckhoff 1 Powerhouse and Kerckhoff 2 Powerhouse. The tailrace water from each powerhouse dumps into the San Joaquin River and feeds Millerton Lake. Kerckhoff Reservoir is fed by the following water sources: A.G. Wishon Powerhouse, Corrine Lake Forebay, Willow Creek and Southern California Edison (SCE) Reservoirs. Kerckhoff Dam, which is owned and operated by Pacific Gas & Electric Company, is located on the southwest end of the Kerckhoff Reservoir.

Blair, Church & Flynn designed a new safety alarm horn system that was installed at Kerckhoff Dam, the K1 PH footbridge area, and the K2 PH discharge area to alert the public of impending water level rise. The PG&E SCADA team and BCF worked together to ensure proper alarm controls programming and communication to the SCADA system during water release events.

Blair, Church & Flynn provided the following in the design of this project:

- Electrical drawings for installation of new alarm horns:
 - ◊ Circuit schedule for new horn circuits
 - ◊ Conduit schedule for new conduits
 - ◊ Arrangements
 - ◊ Elementaries as needed
 - ◊ DOC's or schematic conversion



- BOM for the following:
 - ◊ Horns
 - ◊ Cables
 - ◊ New position feedback devices for radial gates
- As-built drawing revisions

PG&E Pit 6 & 7 Intake Gate Refurbishment



PG&E owns and operates the Pit 6 and 7 Powerhouses located along the Pit River in Shasta County. PG&E would like to refurbish the hoist equipment and controls for the intake gates at the Pit 6 and 7 Dams.

The gates are wheeled gates designed to block water flow to the turbine. In May 2016, ATS CMES performed stroke tests and visual inspections on the gate and prepared a field test report. The report stated that there is a serious issue with the ability of the gate to close under several conditions. PG&E is planning to refurbish the gate hoisting system and upgrade the controls.

The following conditions were been observed according to the report:

1. Corrosion/degradation on the existing control panel, wiring, contacts, intake gate, gate rails, gate motor and braking system, and hydraulic speed control system.
2. Gate vibrates while closing.
3. Gate may not be closing at speed that is required.
4. The hydraulic "cushion" functionality that slows the gate before becoming fully closed engages slowly and too late.
5. The submersible gate limit switches are unwired and inoperable.
6. The cam position sensing and limit switches are unreliable. Gate would on occasion stop prior to being fully closed.
7. Heaters in the control panel are non-functional.

Designs for refurbishment of the Pit 7 Unit 1 and Unit 2 intake gates were completed in 2021 by Blair, Church & Flynn (BC&F). BC&F

anticipates completing the design for the Pit 6 Unit 1 and Unit 2 intake gates in Spring 2022. Construction is expected to begin later in the 2022 calendar year.

The design includes the following items:

1. Replace the 2 submersible position switches on the gate rail (normal open, fully closed).
2. Replace the cam limit switch system on hoist shaft with a digital encoder.
3. Replace gate motor, brakes, and clutch.
4. Refurbish the hydraulic gate braking system.
5. Replace control circuits and control panel according to Pit 7 U1 and U2 PG&E SCADA group recommendations, including new Part-Travel pushbutton functionality to manually release gate brakes.
6. Remove corrosion and refurbish rails, gate, wheels, pulleys, and other applicable equipment.
7. Incorporate changes to control equipment to reflect Pit 7 control design.

Location..... Shasta County, California
Owner Pacific Gas & Electric

Civil Engineering

Mechanical Engineering

Electrical Engineering

SCE Florence Low Level Outlet Improvements



Federal Energy Regulatory Commission (FERC) and California Division of Dam Safety (DSOD) standards mandate that each reservoir is equipped with an acceptable low-level outlet system.

The Low-Level Outlet (LLO) system for Florence Lake Dam is comprised of two 36-inch pipes that pass through the dam. The original pipes were each controlled by a rectangular slide gate on the upstream side of the dam. On the downstream side of the dam, the West outlet pipe was fitted with a 36-inch valve and minimum release piping while the East outlet pipe was left open with no control on the downstream side. The upstream slide gates have reached their end of life and a project (Phase 1) was executed in 2017-2018 installing new 36" gate valves on the downstream side of the dam on both outlet pipes. The upstream gates were abandoned in place, with the slide gates blocked opened and the operating shafts are planned to be removed from the face of the dam in the fall of 2020.

Blair, Church & Flynn was tasked with Phase 2 of the Low-Level Outlet System upgrade, to install secondary outlet valves and provide necessary extensions and access improvements to allow operating the valves in a safe manner year-round in a double block and bleed configuration. The addition of secondary valves will provide independent isolation of the system, which allows for maintenance activities and valve cycling to occur without impacting minimum instream flow releases or unnecessary large water releases that lead to generation loss, potential turbidity concerns, and public safety concerns. Valve cycling is required per DSOD annually, with full



operation performed in their presence every 3 years. Also included in this project are infrastructure modifications necessary to meet the Minimum Instream Flow (MIF) releases per the pending FERC license renewal settlement agreement.

BC&F is anticipating design completion in Spring 2022. Design includes the following items:

1. New 36-inch knife gate valves and LLO pipe extensions, with required thrust blocks and pipe support foundations.
2. New elevated access walkway to provide safe access to LLO valves for year-round operation.
3. Replace existing 18-inch MIF pipeline with new 24-inch pipeline and plunger valve with electrical actuator to increase MIF flow capacity and provide precise flow control of releases.
4. New ultrasonic flow meter on MIF pipeline that transmits analog flow signal.
5. New PLC and telecommunications equipment to transmit MIF analog flow signals and valve control/status to the Big Creek Operations Center.
6. New solar panel array and battery bank to provide power to new mechanical/electrical equipment.
7. New valve enclosure and electrical control building at MIF discharge area.
8. New combination air/vacuum valves on each LLO pipe.
9. New header pipe to connect LLO vent pipe drain and LLO valve freeze-protection drain pipes, with ultrasonic flow meter and orifice plate for flow data monitoring.
10. Quality Control & Inspection Program (QCIP) preparation for FERC approval.
11. Construction specification preparation.

Location..... Fresno County, California
Owner Southern California Edison

Civil Engineering

Mechanical Engineering

Electrical Engineering

SCE Big Creek Vibration Monitor Installation



The Southern California Edison Company (SCE) owns and operates Big Creek Hydroelectric System. SCE wanted to install Bently Nevada Vibration Monitoring System on nine (9) powerhouses within the system spanning three years. Implementation of the vibration monitoring systems are planned at the following powerhouses: Big Creek 1, Big Creek 2, Big Creek 2A, Big Creek 3, Big Creek 4, Big Creek 8, Mammoth Pool, Eastwood, and Portal Powerhouse during the years 2022 and 2023.

Excess vibrations in turbines and electrical equipment can cause damage over extended periods of time. The Bently Nevada Vibration Monitoring System is capable of monitoring vibrations within a system by utilizing probes mounted on the turbine. The probes relay information to the Orbit 60 Series Condition Monitoring Module (CMM). The CMM is rack mounted and pre-wired and will be connected to the Distributed Control System (DCS) for remote monitoring.

Blair, Church & Flynn design includes the following:

- New wiring from vibration probe to CMM at each powerhouse.
- Determination of probe and junction box mounting locations.
- Conduit and wiring routing plans.
- New telecommunications wiring to the DCS for remote monitoring at each powerhouse.
- Define Primary and Secondary Uninterruptible Power Supply (UPS) at each powerhouse.

- Determine Orbit 60 CMM rack location at each powerhouse.
- New analog display of each probe for local monitoring at each powerhouse.

Design includes the following:

- Preliminary Engineering
- Preparation of Construction Documents (Drawings, Construction Specifications, Bill of Materials, Circuit/Conduit Schedules)
- Review of Submittals and Correspondence with Bently Nevada vendor
- Construction and Commissioning Support
- Preparation of As-Built Drawings

SCE Big Creek 4 High Pressure Piping Replacement



The Southern California Edison Company (SCE) owns and operates Big Creek 4 Powerhouse, located on the San Joaquin River approximately 4 miles north of Auberry, CA. Ultrasonic NDT Testing (UT) was performed on piping throughout the powerhouse in March 2019 to identify pipe sections in need of replacement that have experienced wall thickness loss. BC&F accompanied the SCE project team to the Big Creek 4 Powerhouse to complete a site walkdown and observe the condition of the existing piping.



The cooling water (CW) intake system consists of a 12" and 8" pipe, each with an inlet screen on the southwest and southeast walls of the powerhouse, respectively. These pipes are connected to the 12" suction header pipe to the CW pumps and contains a duplex basket strainer. Separate 3" penstock flushing water piping are connected to the 12" and 8" piping within the concrete walls of the powerhouse and are supplied water from the 14" auxiliary penstock water header piping. The purpose of the 3" penstock flushing water piping is to provide backflushing to the CW intake screen using water under pressure from the penstock.

the primary intake system back in service. Blair, Church & Flynn recently provided a design, which will be constructed in early 2022.

BC&F design for this project included the following items:

- Replace 3" penstock flushing water piping.
- Replace 3" fire water pressure regulating/domestic pump suction piping.
- Replace 2" Unit 1 generator thrust bearing oil cooler piping.
- Replace CW inlet strainer with upgraded automatic self-cleaning strainer.
- Provide electrical power to new automatic strainer.
- Specification of new pipe coating for existing piping with damaged coatings.

Location..... Fresno County, California
Owner Southern California Edison

Mechanical Engineering

Electrical Engineering

SCE Big Creek 1 Automation Project



Southern California Edison (SCE) owns and operates the Big Creek Powerhouse No. 1, located on the east side of Big Creek, California in the western Sierra Nevada Mountain Range of Fresno County. SCE has recently installed a pump to provide water to the cooling water piping system.

SCE would like to install a new motor operated valve (MOV) into the cooling water piping that can automatically switch between the pump and the backup penstock supply source piping. The MOV should automatically switch to the backup supply when the cooling water pump fails. This auto-transfer functionality would be designed to switch to the backup supply if the MOV detects pressure loss from the pump side of the piping. When the MOV switches to the backup supply, an indication should be received by the control room.

The backup penstock supply reaches a pressure of 900psi in the cooling water piping room at the bottom of the Big Creek No. 1 Powerhouse. There are two pressure reducing valves (PRVs) in the cooling water piping that step the pressure down twice. The first PRV reduces the pressure from 900psi to 180psi. The second PRV reduces pressure from 180psi to 80psi.



To prevent debris from entering the cooling water piping system, a Y-type strainer is located on the backup penstock supply source piping in the cooling water piping room. When the strainer requires maintenance, the entire cooling water system must be put out of service. To eliminate the need for shutting the system down, SCE would like to install a new duplex strainer in the penstock supply source piping.

In addition to the improvements for the cooling water system, SCE would also like to replace the MOV that controls the amount of water flowing to the Pelton-type water wheel that drives the governor oil pump. The new MOV should be like-in-kind and include a handwheel for manual operation if there is a loss of power to the motor.

Location..... Fresno County, California
Owner Southern California Edison

Mechanical Engineering

Electrical Engineering

CalWater MPS-118 Electrical Switchgear Upgrade & Generator Design



Blair, Church & Flynn was tasked with the design of a backup generator for the MPS-118 Metering and Equipment Improvements project. The generator will be started by an existing automatic transfer switch (ATS). The ATS will detect loss of electrical utility service and transfer to emergency backup generator power. The generator will be located in the MPS-118 yard east of the water tanks. The scope of the design includes relocation of the ATS from the outside wall of the pump building to the inside wall, and tying it into the new switchgear, which is to be installed under a separate design.

Scope of this project also includes replacement of electrical metering and equipment cabinets at Station MPS-118, conduit, power and instrumentation wiring, hydraulic tubing for a new hydraulic enclosure, replacement of B/W level sensing relays with Rosemount level transducers, signal wiring and conduit for Badger flowmeter and flowmeter vault, signal wiring and conduit from two existing valve vaults to SCADA, signal wiring and conduit from ladder and hatch intrusion limit switches to SCADA for both tanks, and signal wiring for alarm dialer and backup radio with SCADA functionality.

This station comprises 3 booster pumps serving as the sole source of supply for multiple areas. The existing electrical power and control equipment for these pumps is 60 years old. Scope includes replacement of existing utility metering and main breaker, motor control center (motor starters), and panelboard. Based on Cal Water design standards, and also on example designs provided by Cal



Water for other sites, scope will include step down transformer, distribution panel, relay section, and RTU section, all integral to the MCC cabinet. New cabinet will be located outdoors, per Cal Water Scope of Work document.

Design also includes the addition of an equipment canopy and concrete foundation design. The canopy will provide cover for the new outdoor switchgear and any personnel performing work on it. The concrete foundation will provide a clear, level working space for the switchgear. Field measurements have shown that the average existing grade of the terrain in this area is 8-10%. The foundation design will include a 6" retaining curb to enable a clear, level working space for the switchgear. The foundation will have a maximum 2% grade for drainage.

Location..... Southern California
Owner California Water Service Company

Structural Engineering	Civil Engineering
Mechanical Engineering	Electrical Engineering



SCE Florence Lake Dam Arches & Spillway Improvements



During the 2010-2011 winter, Florence Lake was held at a higher lake elevation than normal (above minimum pool) to store water on the project while Shaver Lake was drained for the installation of the geomembrane liner. Due to the higher than normal water levels throughout the winter, seepage that typically occurs through the multiple concrete radius arch dam experienced freeze-thaw conditions throughout the winter and resulted in significant concrete spalling on the two buttresses between Arches 52 and 54. During the 2018 annual FERC inspection, a small section of spalled concrete was identified under the dam crest walkway of Arch 34. Our scope was to provide engineered design drawings for all repairs. This included assisting with agency permits/approvals (USFS, FERC, DSOD, and potentially USFW & Water Board) and providing concrete coating repairs to all areas with spalled concrete (total approximate repair area is 6500 square feet). We also recoated two 51' wide radial drum gates, and all exposed steel components of the gates. Additionally, the downstream concrete surface of the spillway, spillway chute from the gates to the discharge, had significant surface erosion that needed repair. For the spillway we managed lead paint removal/abatement from all exposed steel components, installed Carboline epoxy coating system to steel components, prepped the downstream concrete surface, and applied high strength concrete coating to the downstream concrete surface.

Civil Engineering

Location: Florence Lake, California
Owner: Southern California Edison, Northern Hydro

SCE Conceptual Design Study for Modifications to Existing In-Stream Small Water Diversions



SCE is in final negotiations of a settlement agreement with the Federal Energy Regulatory Commission (FERC) for the relicensing of the Big Creek Project. As part of the relicensing agreement, seven existing sites require modifications to provide for the regulation of in-stream relief flows. This includes seven sites:

- Rock Creek
- Ross Creek
- Lower Balsam Creek
- Bolsillo Creek
- Camp 62 Creek
- Warm Creek

Blair, Church & Flynn assisted SCE with the preparation of a report to perform conceptual engineering analysis to determine the most effective means of regulating and maintaining the average and instantaneous flow rates as required under the agreement. Consideration has been given to the cost of improvements in contrast to the cost of decommissioning the diversions. Decommissioning the diversions would include removal of all existing structures, piping, and channel improvements permanently reverting the site to before original construction conditions. The regulatory release improvements generally involve modifications to existing facilities, and cost estimates were prepared for each site. Our firm also provided conceptual design of facilities for reliability and consistently maintaining accurate in-stream flows as required under the settlement agreement. This Big Creek ALP Settlement Report was completed and provided to SCE in August 2020.

Civil Engineering

Location: Big Creek, California
Owner: Southern California Edison, Northern Hydro



SCE Huntington Dam 1 Service Spillway Refurbishment

Southern California Edison (SCE) owns and operates the Big Creek Hydroelectric Project on the upper San Joaquin River system which provides power to Southern California. Recent inspections by FERC and DSOD of the Huntington Lake Dam 1 Service Spillway have identified several components in need of repair. SCE is requesting a proposal to perform engineering services to meet refurbishment requirements. The inspections identified several components in need of repair, including gate coatings, concrete coatings, leakage through the concrete gravity blocks, cracking and freeze-thaw damages to gate piers, and other concrete spalling. Our scope of work is to develop construction drawings per the SCE drafting standards and construction specifications for repairs and improvements at the Huntington Lake Dam 1 Service Spillway based on the findings and recommendations from the Big Creek Dam 1 Focused Spillway Assessment report. Construction is anticipated to take place in summer 2021 once permits are obtained.

The construction documents will address:

1. Leakage repairs to reduce/eliminate potential leakage paths through the concrete monolith, including injection repairs and/or surface applied repairs
2. Resurfacing to concrete surfaces protecting from future freeze-thaw damages
3. Repaint and recoating of the spillway gates. Remove lead paint coatings from steel components (gates, embeds, frames, operators, etc.) and recoat with epoxy paint system
4. Replace gate sealing materials (packing) and replacing damaged sealing surface components. Potentially modify design of sealing surfaces, install steel liner to select gates or modify the gate design, to select gates, to allow incremental spill without long term damage to sealing surfaces or excessive leakage

5. Repair cracking concrete at gate piers as needed

6. Install OSHA approved guards and confirm all access equipment (stairs, guardrails, etc.) are compliant with current standards

7. Other spillway deficiency found during the engineering design not stated in the original report and approved by SCE



Civil Engineering

Location: Huntington Lake, California

Owner: Southern California Edison, Northern Hydro

Our **AWARDS & RECOGNITION**



**2022 SOUTHERN CALIFORNIA SUPPLIER OF THE YEAR
AWARD CLASS III - WINNER**

Southern California Minority Supplier Development Council
(SCMSDC)

2022 GWEN MOORE DIVERSITY AWARD WINNER

Southern California Edison

**2021, 2020, 2019, 2018, 2017 & 2016 BEST ENGINEERING
FIRM, BEST OF CENTRAL VALLEY BUSINESS - THE
BUSINESS JOURNAL**

**2018 SOUTHERN CALIFORNIA SUPPLIER OF THE YEAR
AWARD CLASS III - RUNNER UP**

Southern California Minority Supplier Development Council
(SCMSDC)

**2017 SOUTHERN CALIFORNIA EDISON SUPPLIER OF THE
YEAR AWARD CLASS III - WINNER**

Southern California Minority Supplier Development Council
(SCMSDC) / Western Regional Council

**2014, 2015 & 2016 SOUTHERN CALIFORNIA EDISON
SUPPLIER OF THE YEAR AWARD CLASS II - NOMINEE**

Southern California Minority Supplier Development Council
(SCMSDC)

**2016 PG&E'S RICHARD A. CLARKE ENVIRONMENTAL
LEADERSHIP AWARD**

Stockton Regional Office Project

**2015 SUPPLIER DIVERSITY ANNUAL REPORT TO THE
CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC)
FEATURED SUPPLIER**

California Water Service Company

**2015 PG&E HYDRO MASTER SERVICE AGREEMENT (MSA)
#1 RATED SUPPLIER**

**2014 #1 RATED SUPPLIER / 2015 #3 RATED SUPPLIER FOR
SOUTHERN CALIFORNIA GAS PSEP PROGRAM**

Sempra Energy

**2013 SUPPLIER DIVERSITY ANNUAL REPORT TO THE
CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC)
FEATURED SUPPLIER**

Southern California Edison

2013-2016 SUPPLIER DEVELOPMENT PROGRAM

Pacific Gas and Electric Company

**2007 ENGINEERING EXCELLENCE NATIONAL HONOR
AWARD WINNER**

American Council of Engineering Companies (ACEC)

**2004 ENGINEERING EXCELLENCE NATIONAL HONOR
AWARD WINNER**

American Council of Engineering Companies (ACEC)



Blair, Church & Flynn

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