

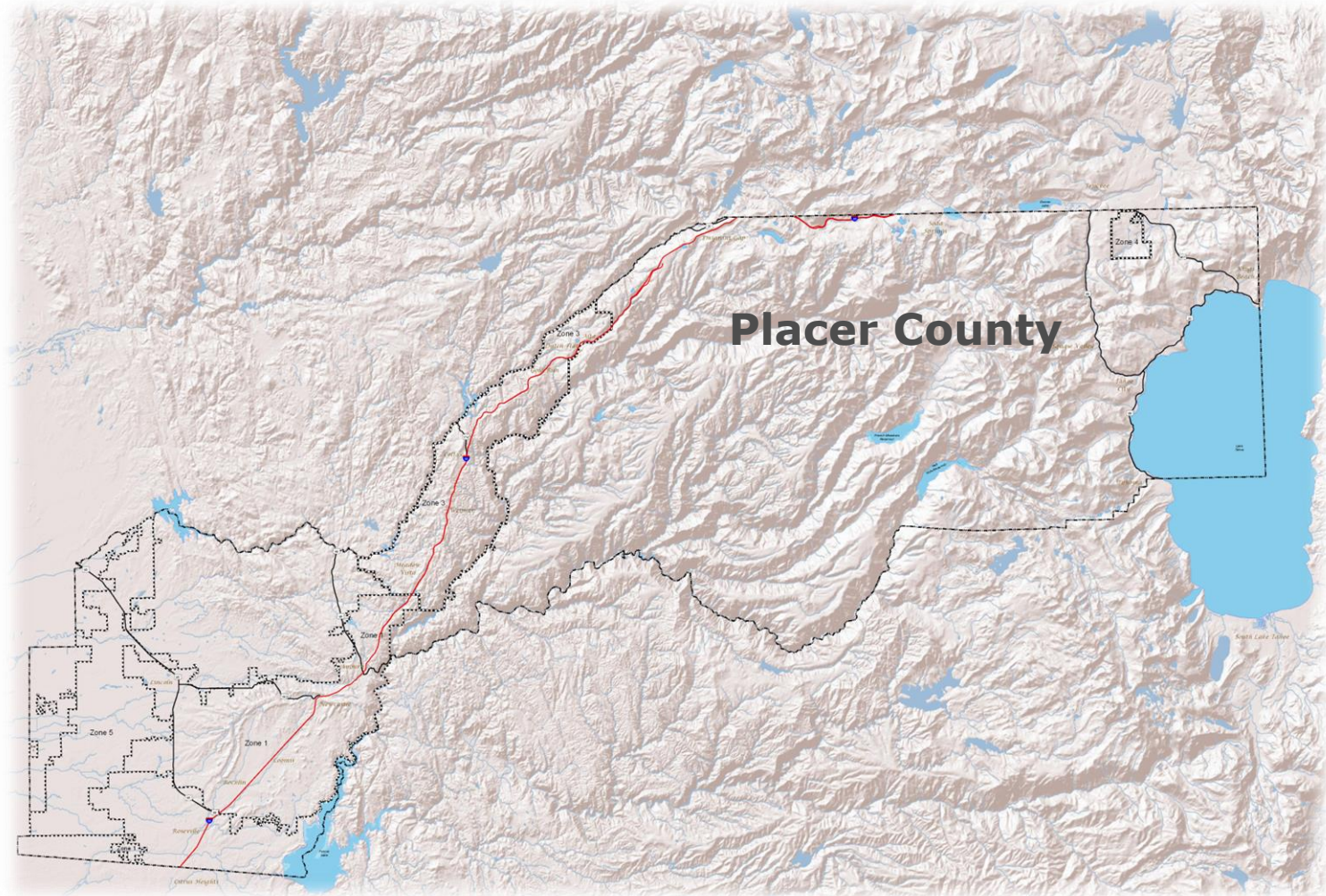
In-Conduit Hydroelectric Generation

Placer County Water Agency

Brent Smith, Deputy Director of Technical Services

Heather Trejo, Environmental Specialist

The setting...



Water System Development



Hydraulic Mining



Historic Water Delivery Systems

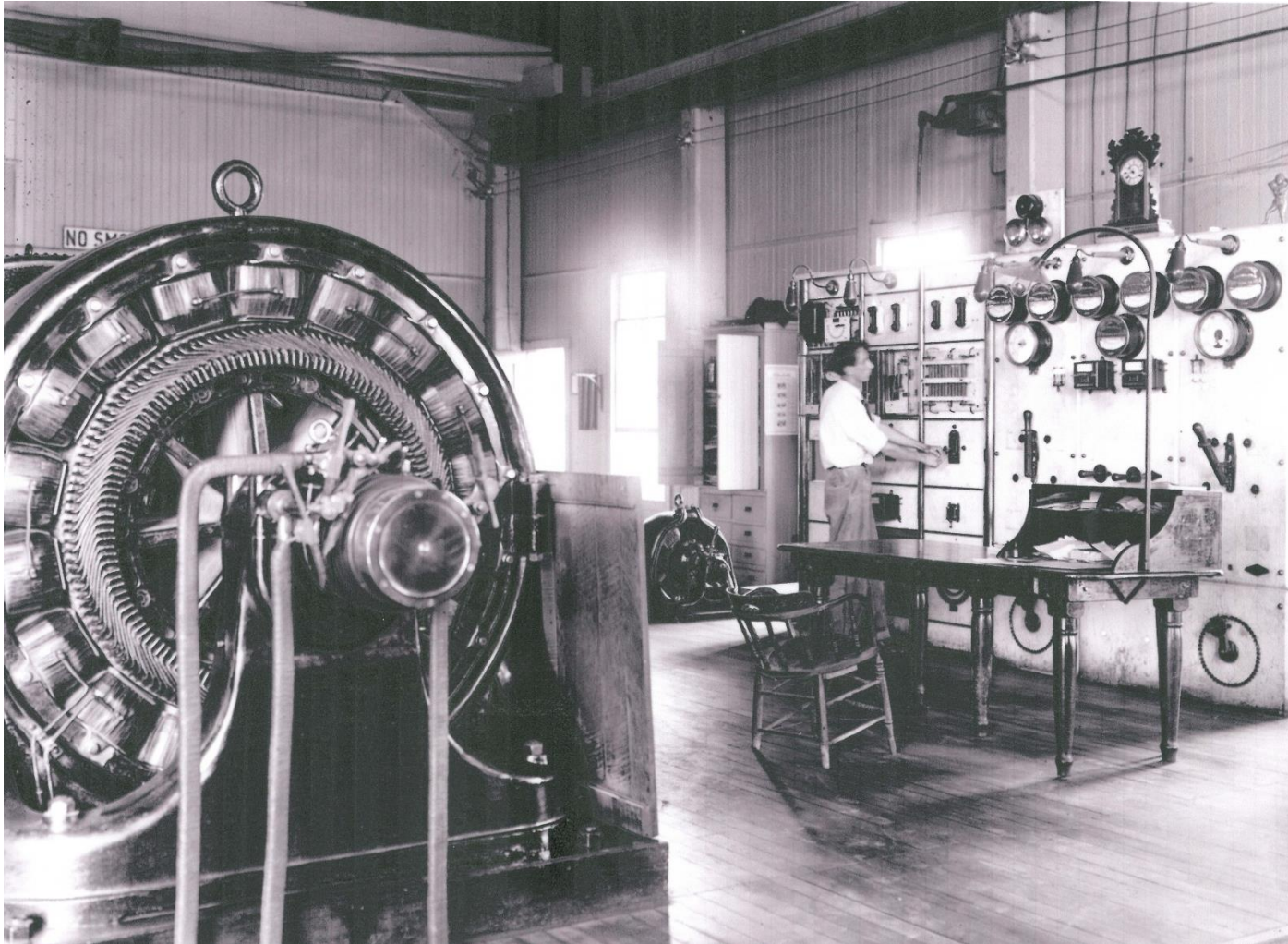


Development of Hydropower, 1895

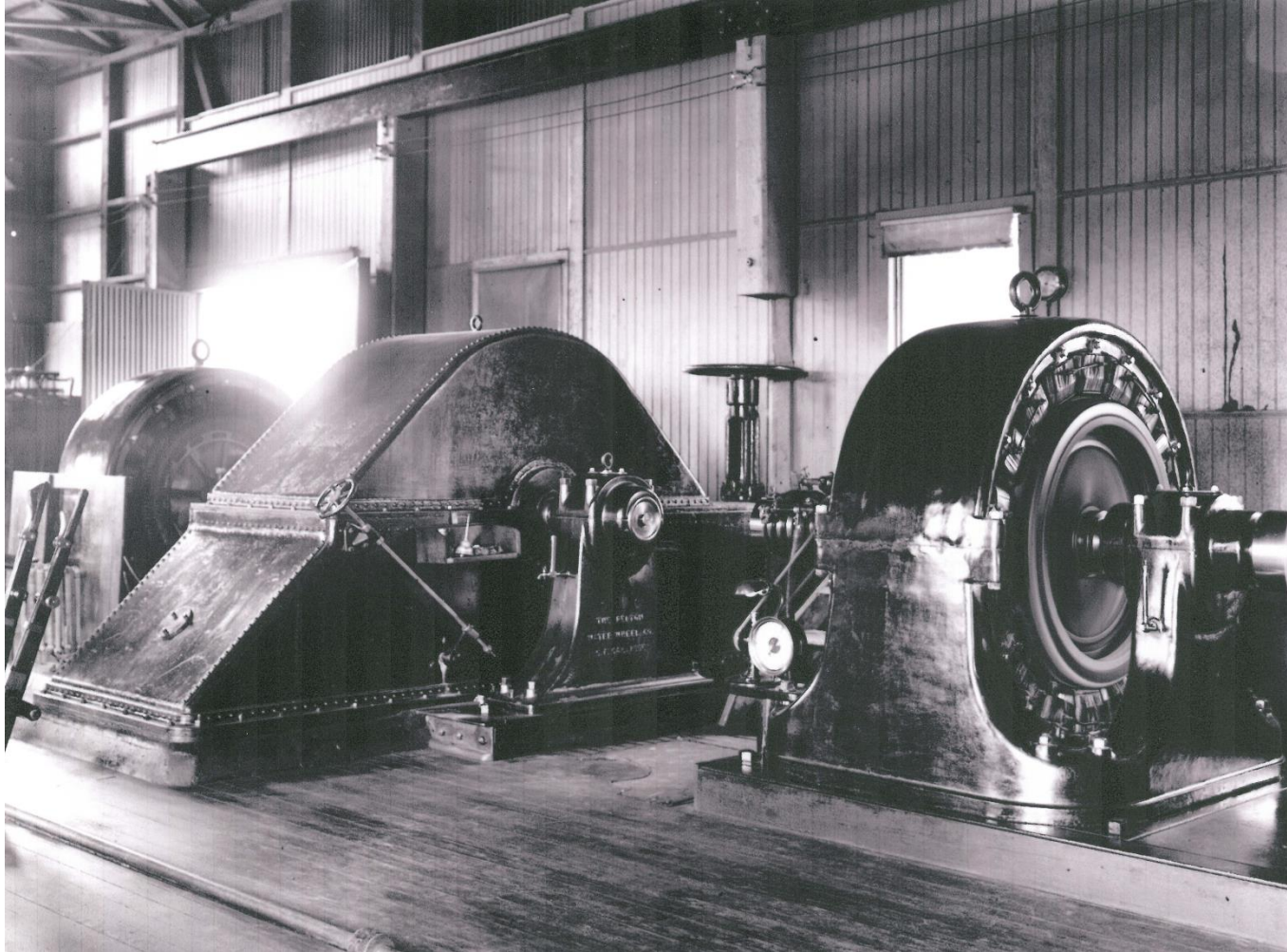


Folsom Powerhouse, c. 1915

Foothill Hydropower



Foothill Hydropower



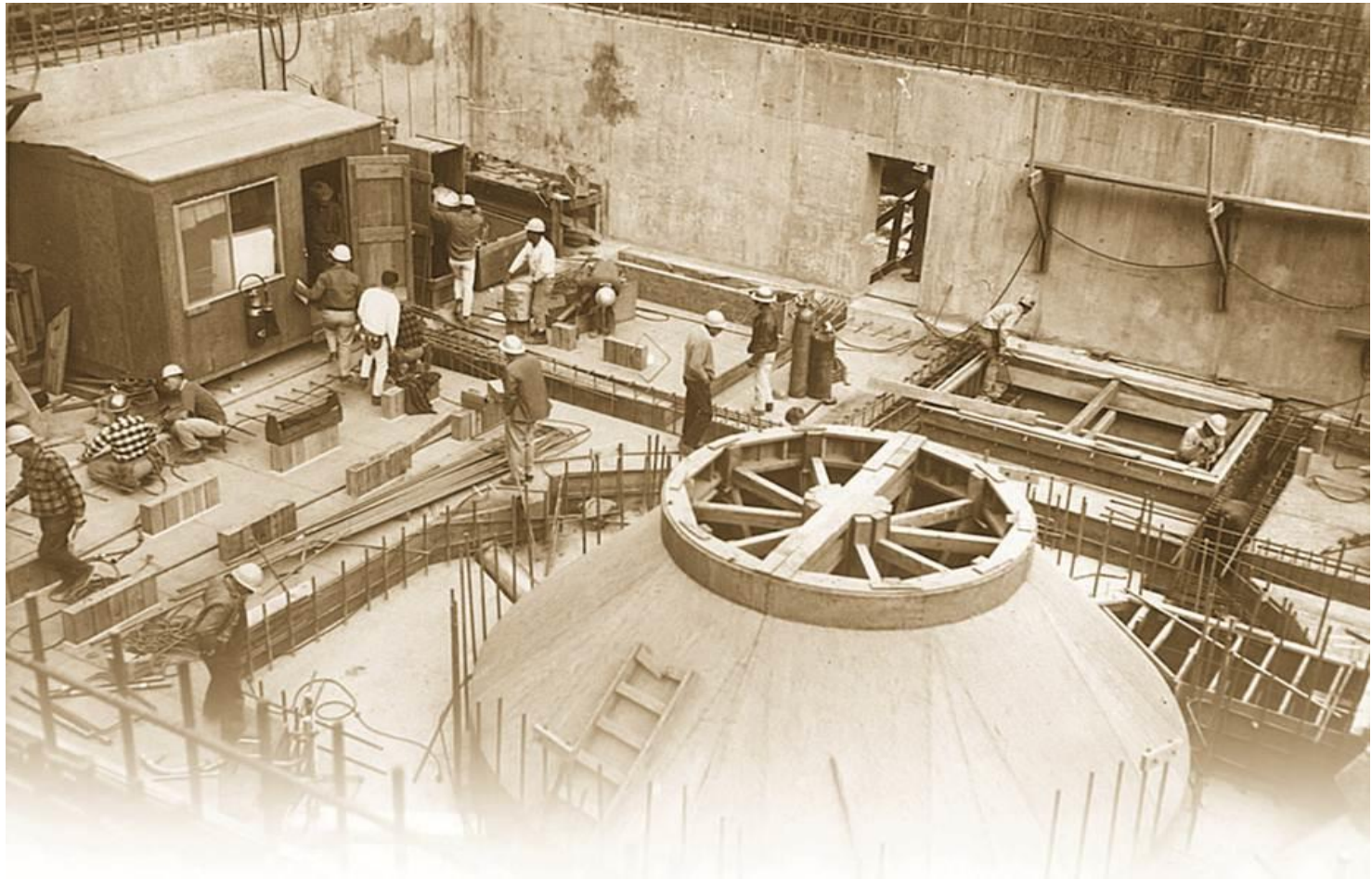
PCWA Emerges

- 1940's, Congressman Clair Engle urged Placer County Supervisors to "preserve local water rights".
- 1948, Resolution of Placer County Supervisors to develop the Upper American River Project
- 1957, Placer County Water Agency Act
- 1957 – 1960, MFP project design and negotiations
- 1961, Voters approve \$140 million bond measure 25-to-1
- 1963 – 1967, Construction of the Middle Fork Project
- 1968, Project dedication ceremonies

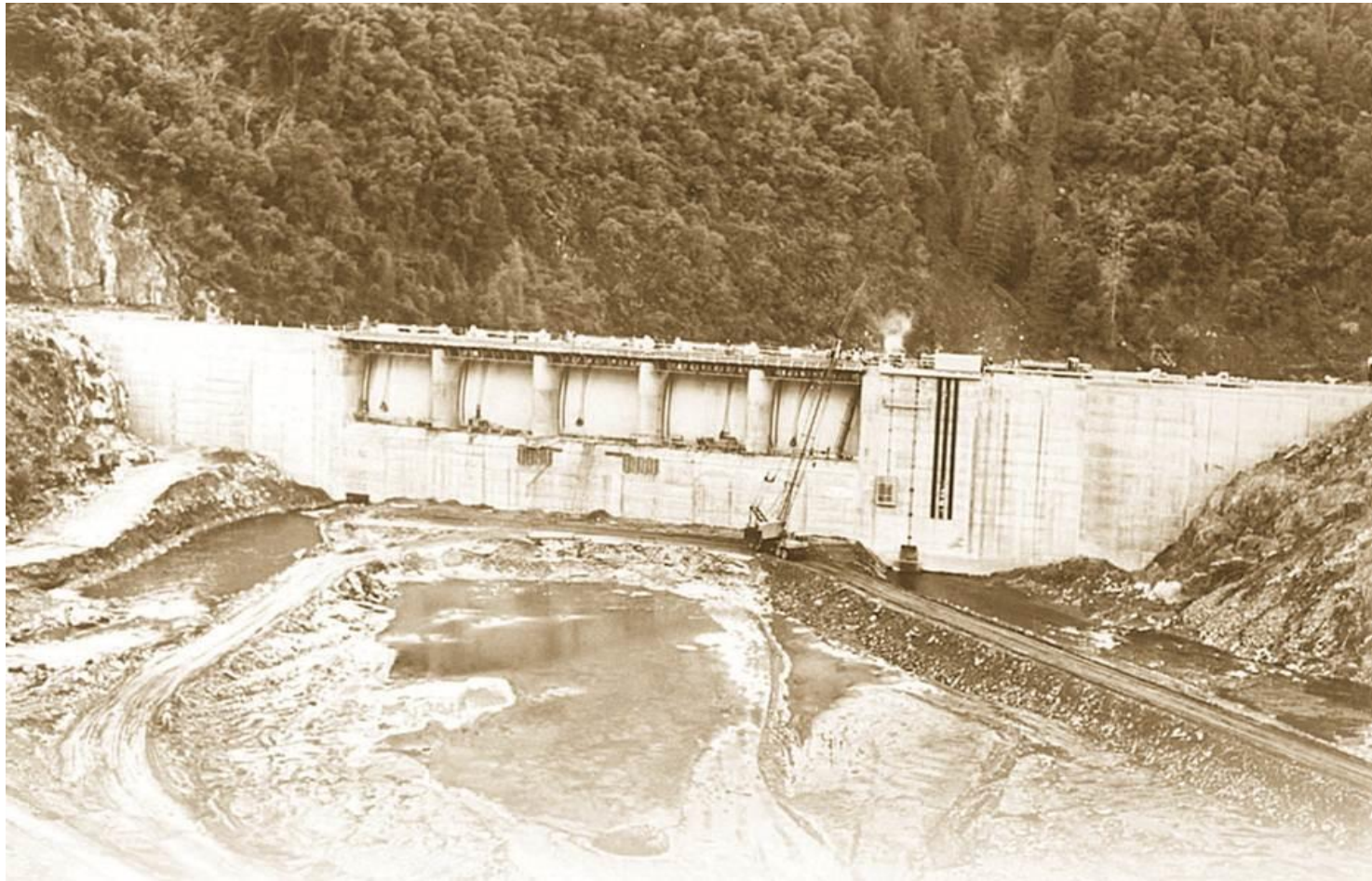
PCWA Middle Fork Project



PCWA Middle Fork Powerhouse



PCWA Ralston Afterbay Dam



PCWA Middle Fork Project



Ralston Powerhouse and Penstock

Hell Hole Reservoir



PCWA Enters the Water Business

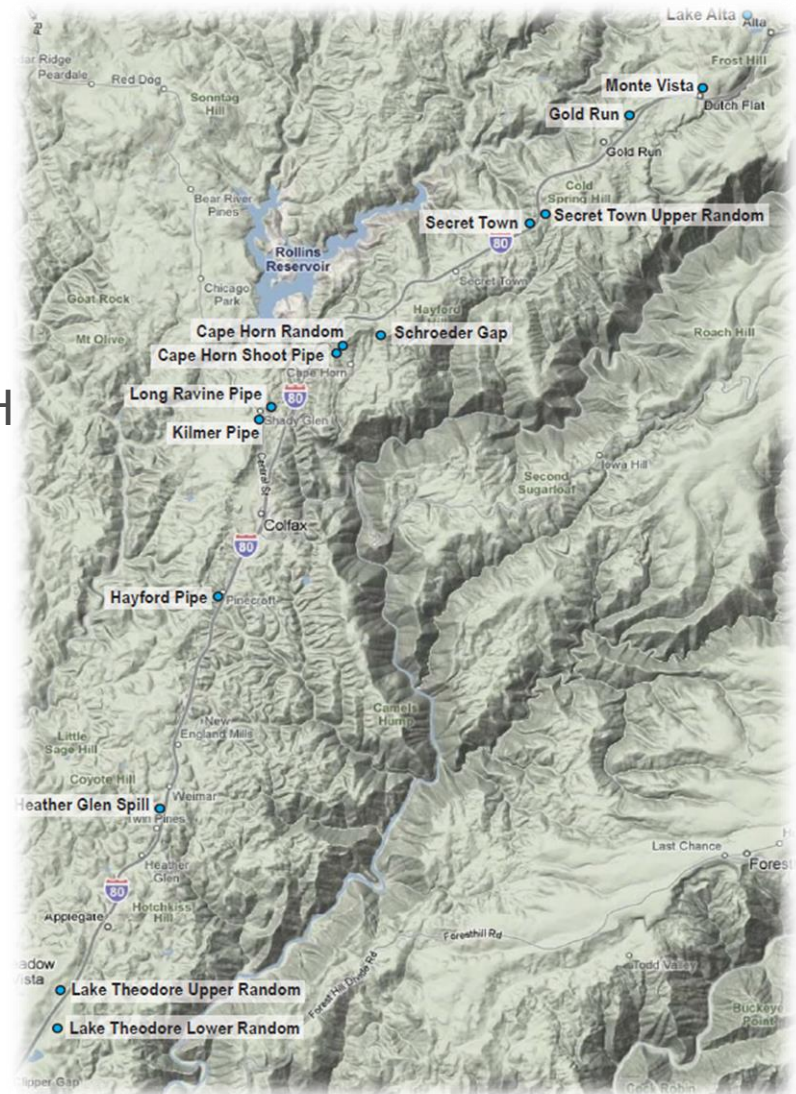
- 1963, Placer County Waterworks District #1 established by resolution of the Placer County Board of Supervisors
- 1968, PCWA purchases the South Placer Water System from PG&E for \$1.2 million
- 1984, PCWA purchases the Upper Placer Water System from PG&E for \$512,000

In-Conduit Hydroelectric Generation Interests

- 1982, Applications for 16 small hydro sites submitted to FERC
- 2002, Brief study completed on 4 sites
- 2007, PCWA Board has discussions on energy efficiencies and cost containment
- March 2008, PCWA approves contract for *Energy and Greenhouse Gas Benchmark Study*
- July 2009, PCWA's *Energy and Greenhouse Gas Benchmark Study* completed
- July 2009, PCWA approves contract for *Small Hydroelectric Feasibility Study*

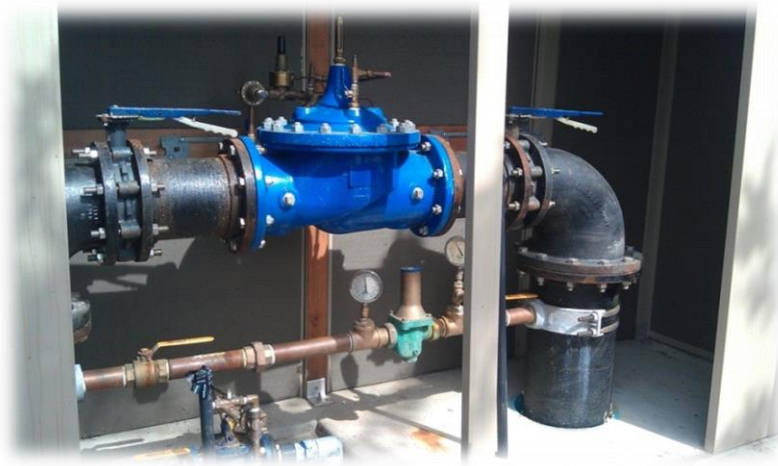
Relevant Findings from the Energy and Greenhouse Gas Benchmark Study

- 29 Canal Sites Considered
 - 5 Sites Looked Economically Feasible
 - Potential Capacities, 87 to 182 KW
 - Total Capital Cost = \$2.2M
 - Total Annual Power = 2,865,500 KWH
 - Total Annual Revenue = \$315,000



Relevant Findings from the Energy and Greenhouse Gas Benchmark Study

- 61 PRV Sites Considered
 - 7 Sites Over 100 KW
 - Top Treated Water Site: Lincoln Metering Station, 329 KW
 - Total Annual Power = 9,794,543 KWH
 - Total Annual Revenue = \$1,077,400



Current PCWA In-Conduit Hydroelectric Generation Projects

- **Lincoln Metering and Hydroelectric Station**
 - Domestic Water Supply for City of Lincoln
 - Construction planned for 2013
- **Gold Run Pipeline and Hydroelectric Station**
 - Major pipeline replacement project
 - Hydroelectric station included in project to replace PSV
- **Secret Town Pipeline and Hydroelectric Station**
 - Major pipeline replacement project
 - Hydroelectric station is a future project
- **Long Ravine Pipeline and Hydroelectric Station**
 - Major pipeline replacement project
 - Hydroelectric station is a future project

Lincoln Metering and Hydroelectric Station



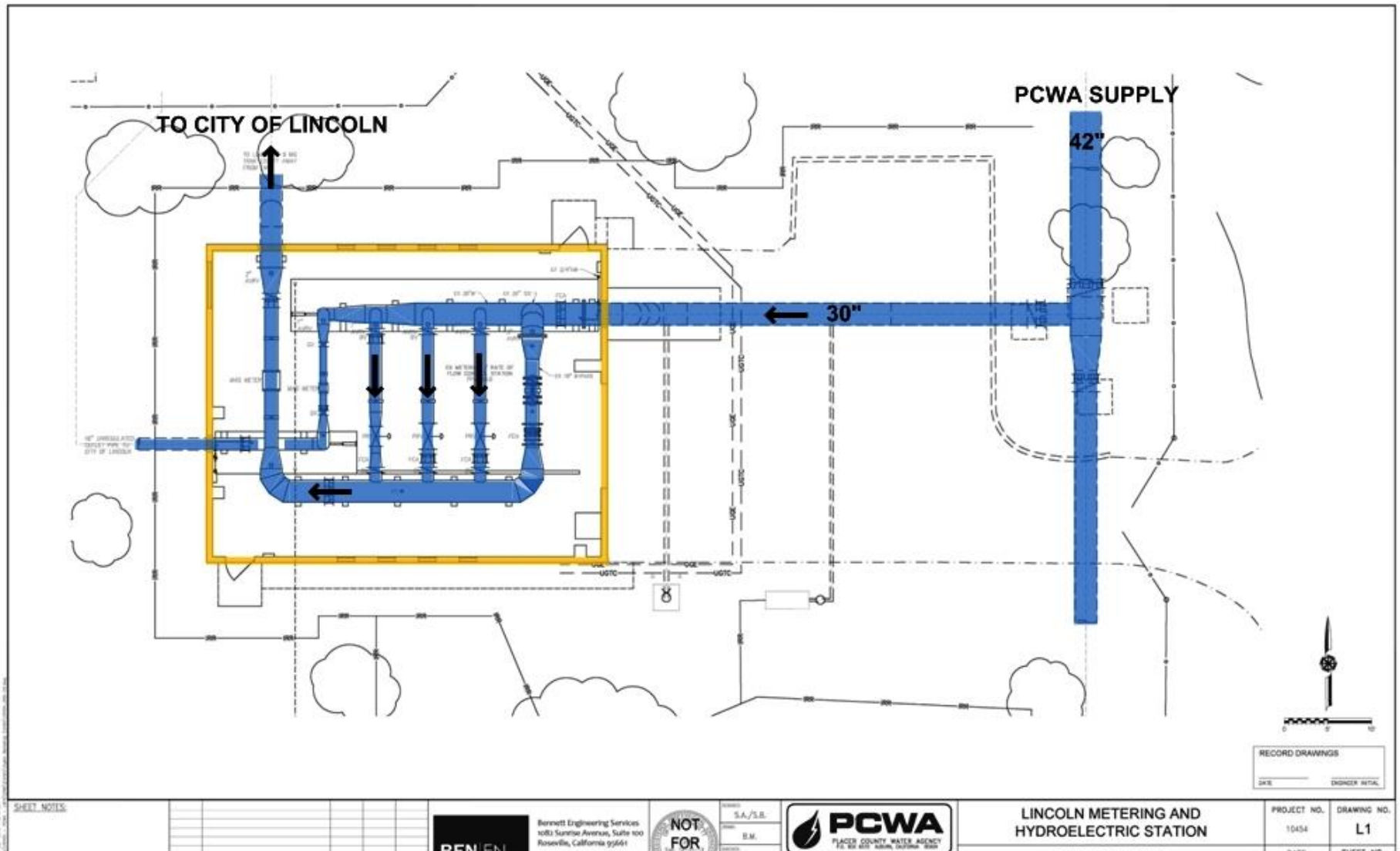
Lincoln Metering and Hydroelectric Station



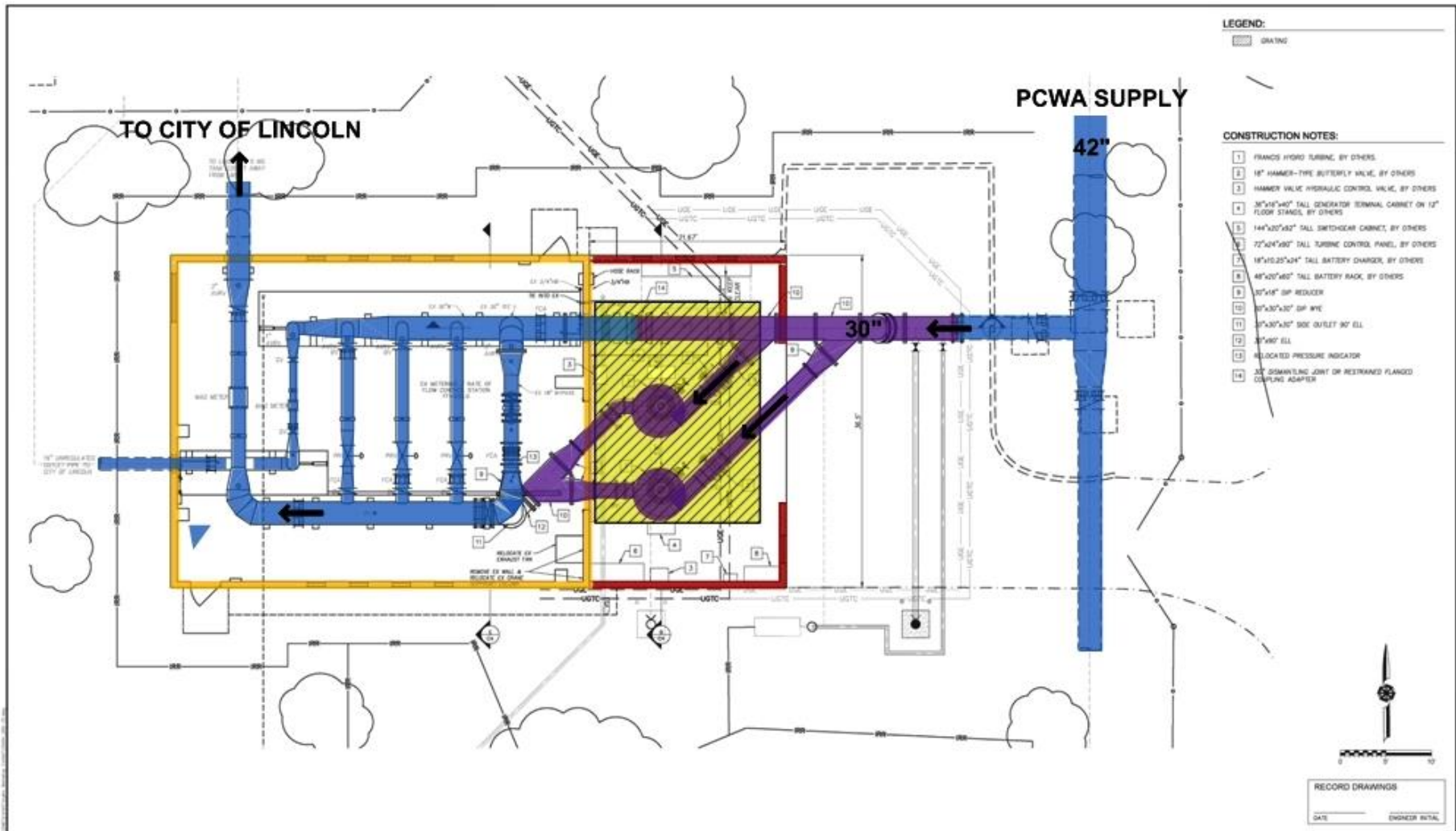
Lincoln Metering and Hydroelectric Station



Lincoln Metering and Hydroelectric Station



Lincoln Metering and Hydroelectric Station



SHEET NOTES:



Bennett Engineering Services
1012 Sunrise Avenue, Suite 100
Roseville, California 95661



S.A./S.B.
S.M.

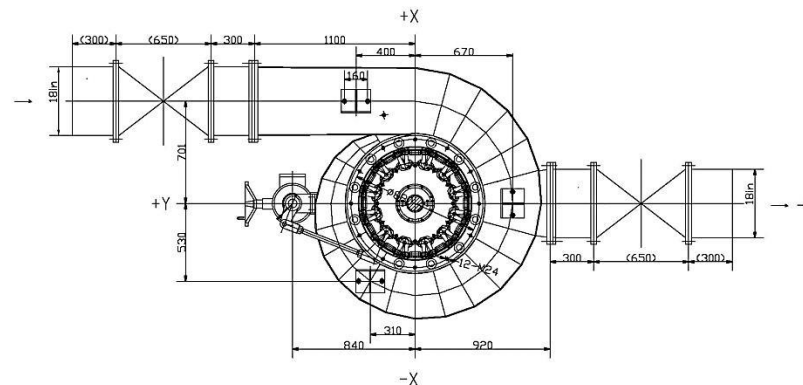
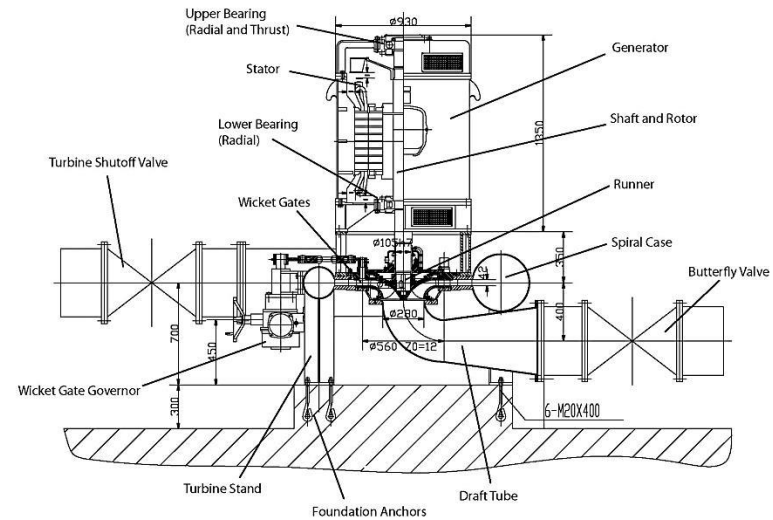


LINCOLN METERING AND
HYDROELECTRIC STATION

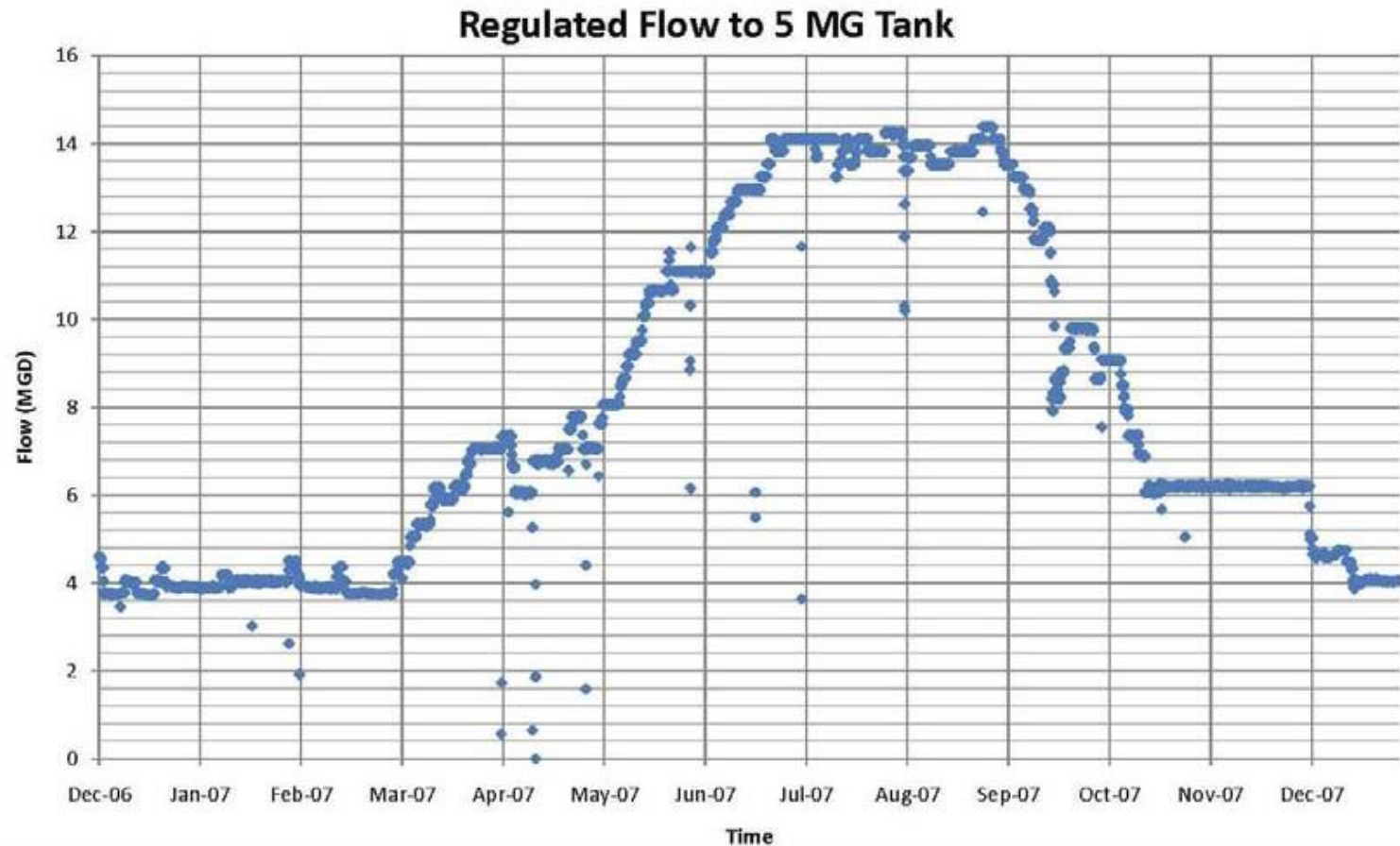
PROJECT NO.
10434

DRAWING NO.
L2

Lincoln Metering and Hydroelectric Station

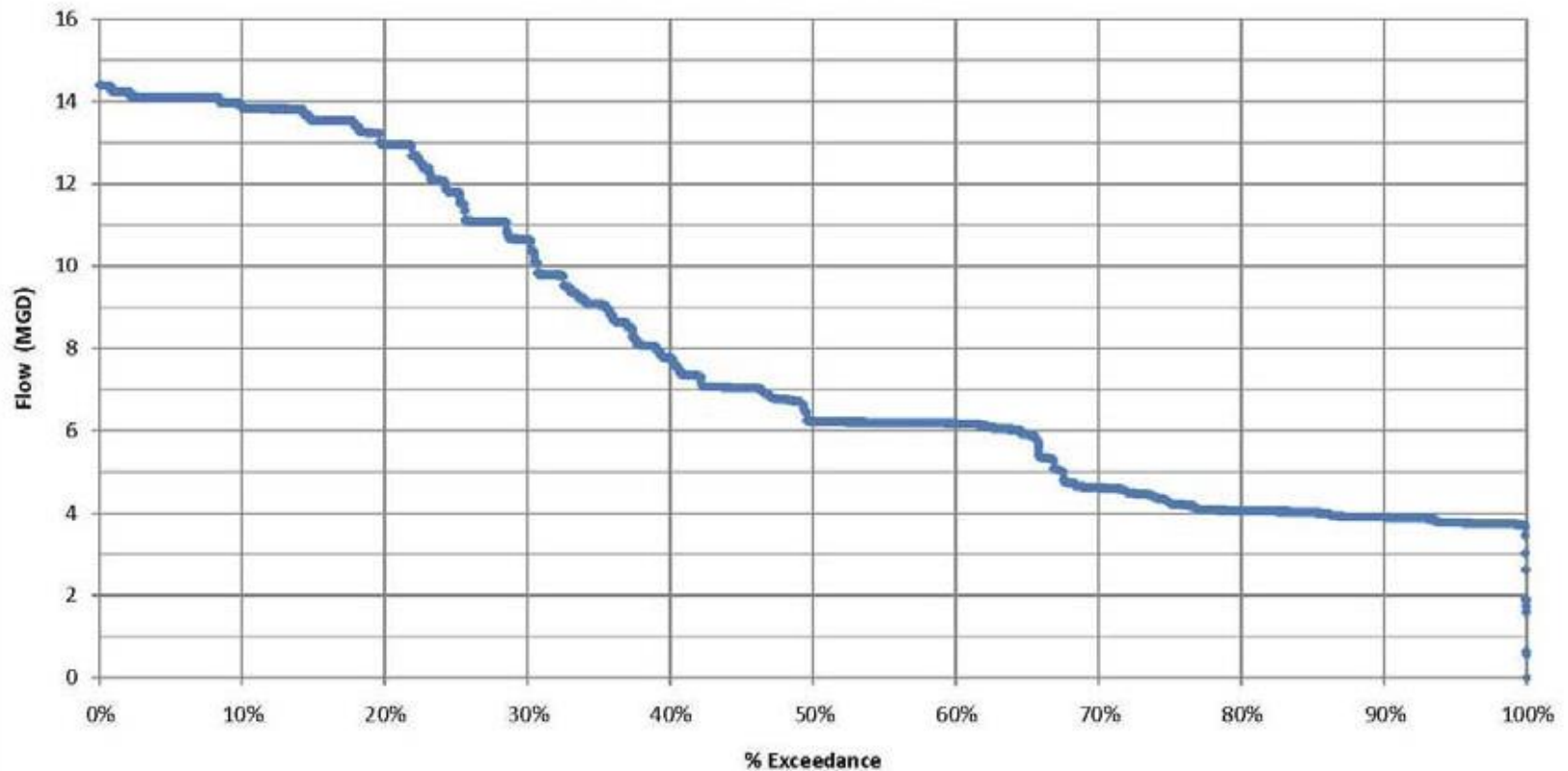


Lincoln Metering and Hydroelectric Station

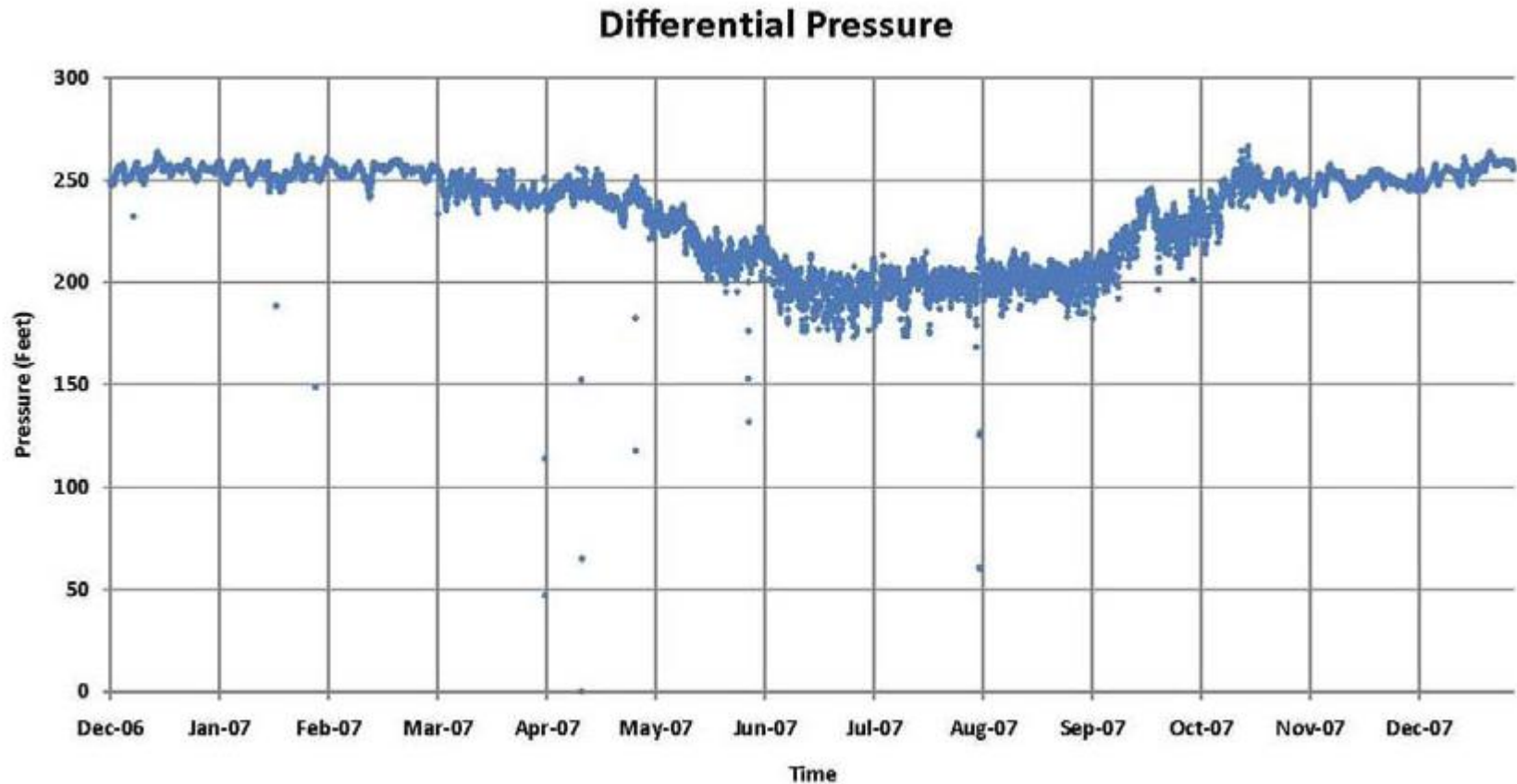


Lincoln Metering and Hydroelectric Station

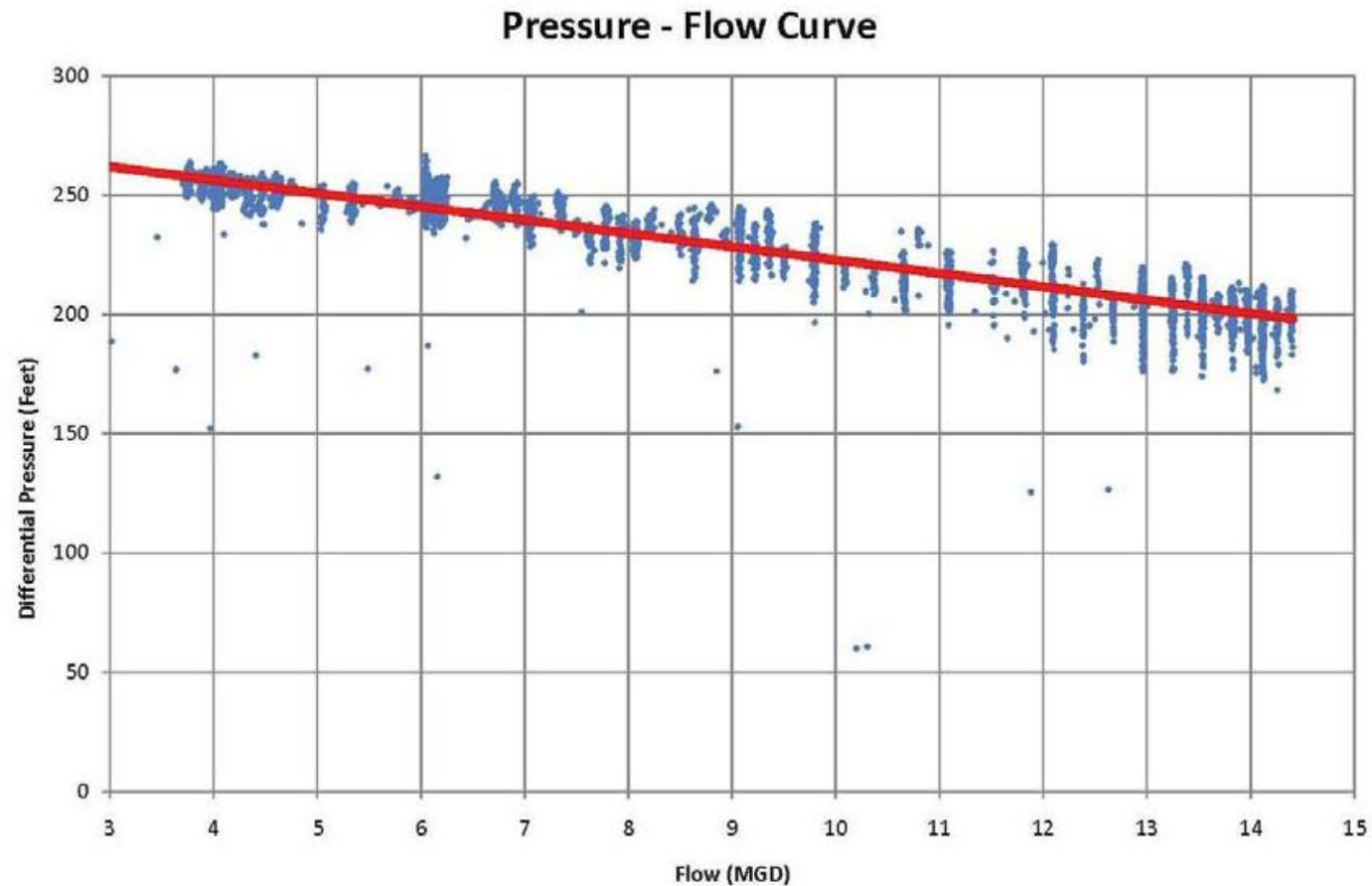
Flow - Duration Curve



Lincoln Metering and Hydroelectric Station



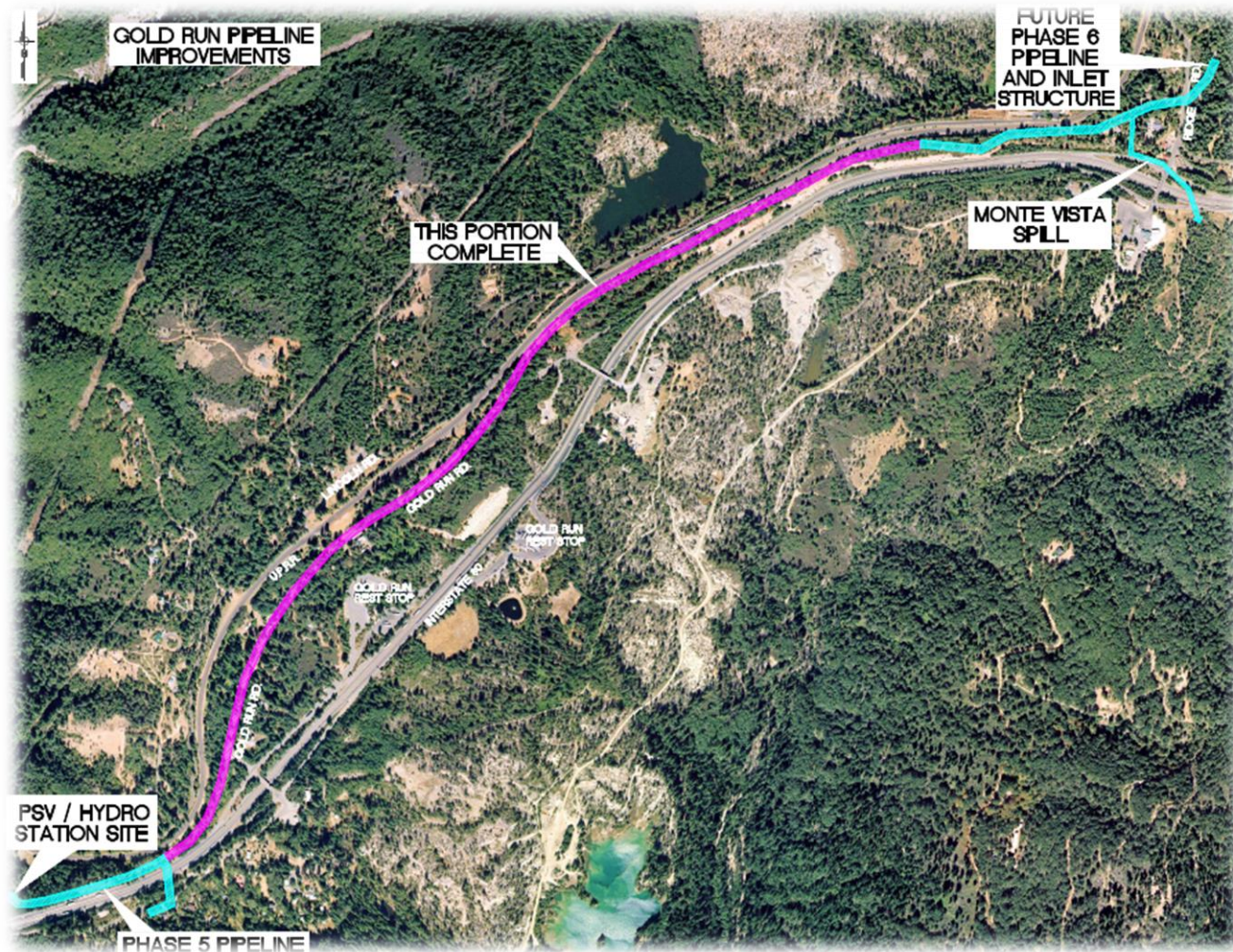
Lincoln Metering and Hydroelectric Station



Lincoln Metering Hydroelectric Summary

- Average Flow = 2400 gpm (5.4 cfs)
- Peak Flow = 10,000 gpm (22.3 cfs)
- Average Head = 225 ft
- Plant Rating = 320 KW
- Annual Generation = 1,739,265 KWH
- Turbine Type = Francis (2 units)
- Annual Revenue = \$173,200
- Capital Cost = \$1,675,000
- Simple Payback = 9.7 yrs

Gold Run Pipeline and Hydroelectric Station Project



Gold Run Pipeline and Hydroelectric Station Project

Inlet to Gold Run Pipeline



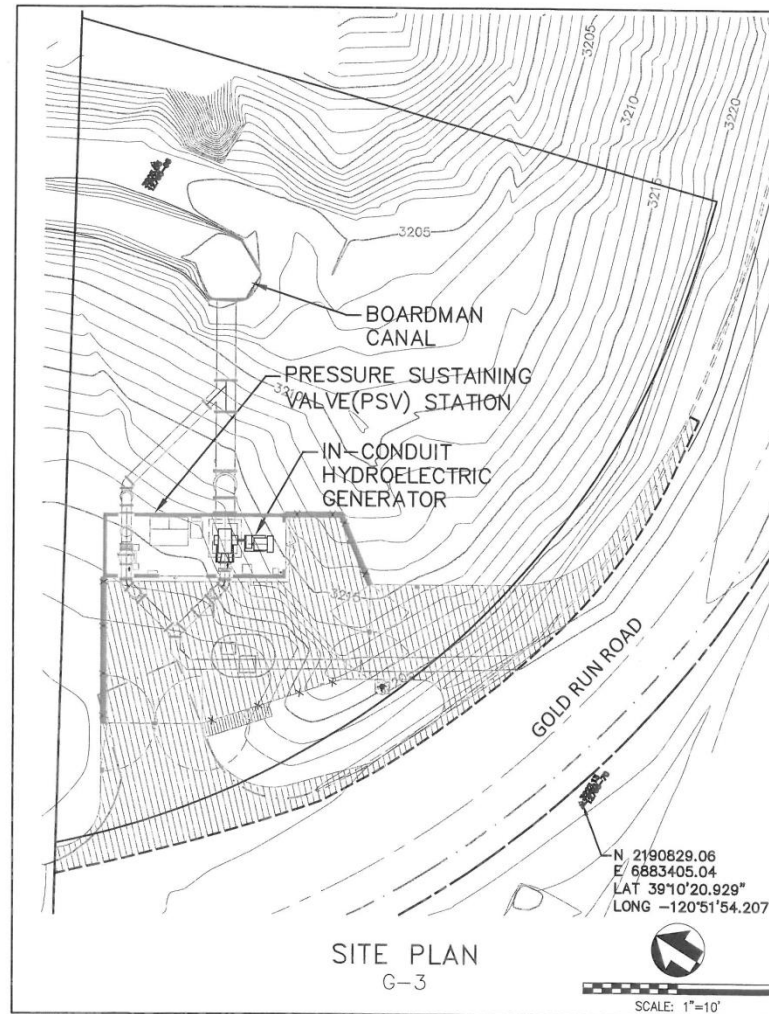
Terminus of Gold Run Pipeline (PSV)



Gold Run Pipeline and Hydroelectric Station Project



Gold Run Pipeline and Hydroelectric Station Project



Gold Run Pipeline and Hydroelectric Station Project



Crossflow Turbine

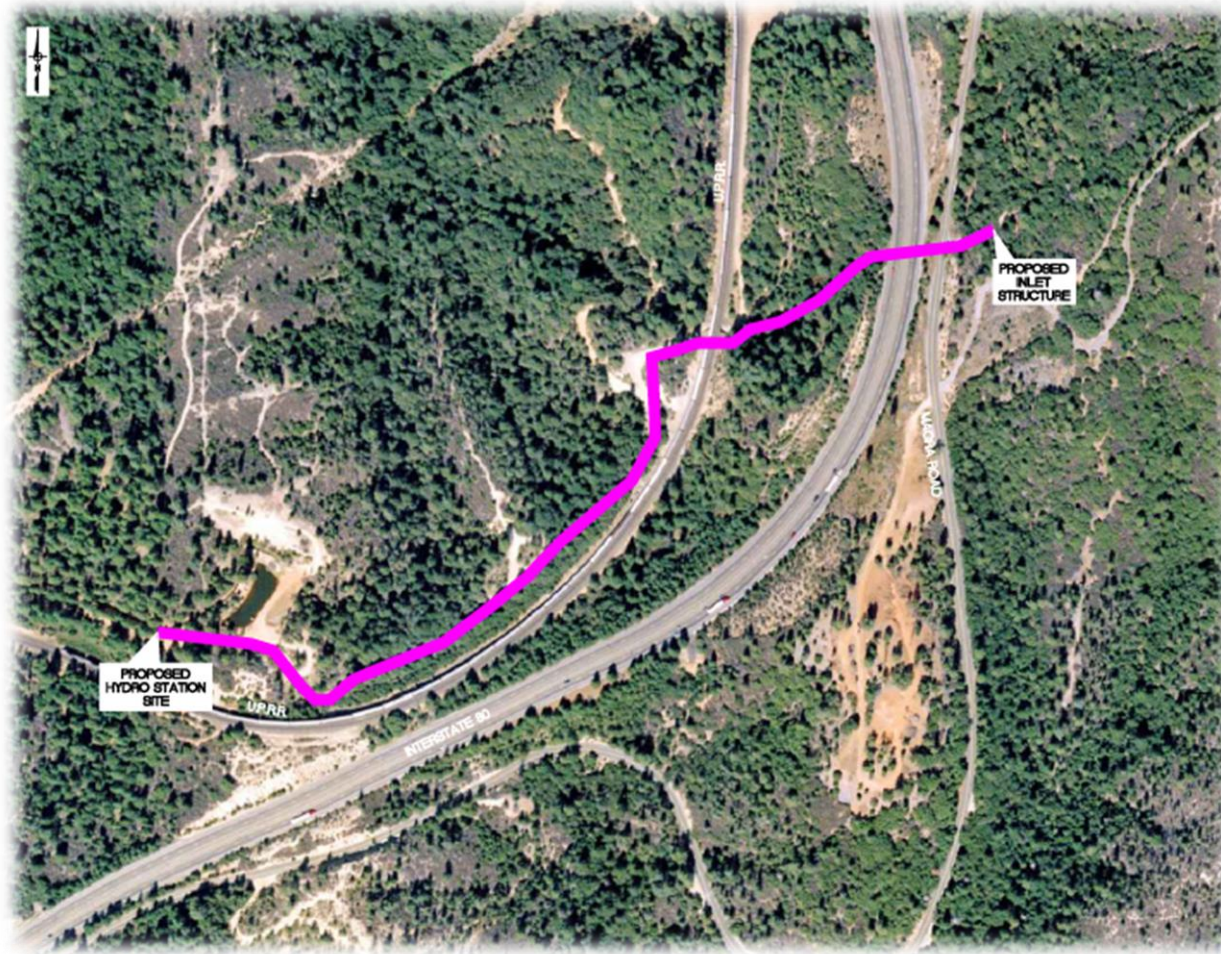
Gold Run PSV and Hydro Building



Gold Run Hydroelectric Summary

- Average Flow = 13.8 cfs (peak = 26 cfs)
- Average Head = 195 ft
- Plant Rating = 300 KW
- Annual Generation = 1,062,000 KWH
- Turbine Type = Crossflow (1 unit)
- Annual Revenue = \$116,800
- Capital Cost = \$611,000
- Simple Payback = 5.6 yrs

Secret Town Pipeline and Hydroelectric Project



Secret Town Pipeline and Hydroelectric Project

Current Inlet Structure



Secret Town Pipeline and Hydroelectric Project

Immediately Upstream of Inlet Structure



Secret Town Pipeline and Hydroelectric Project



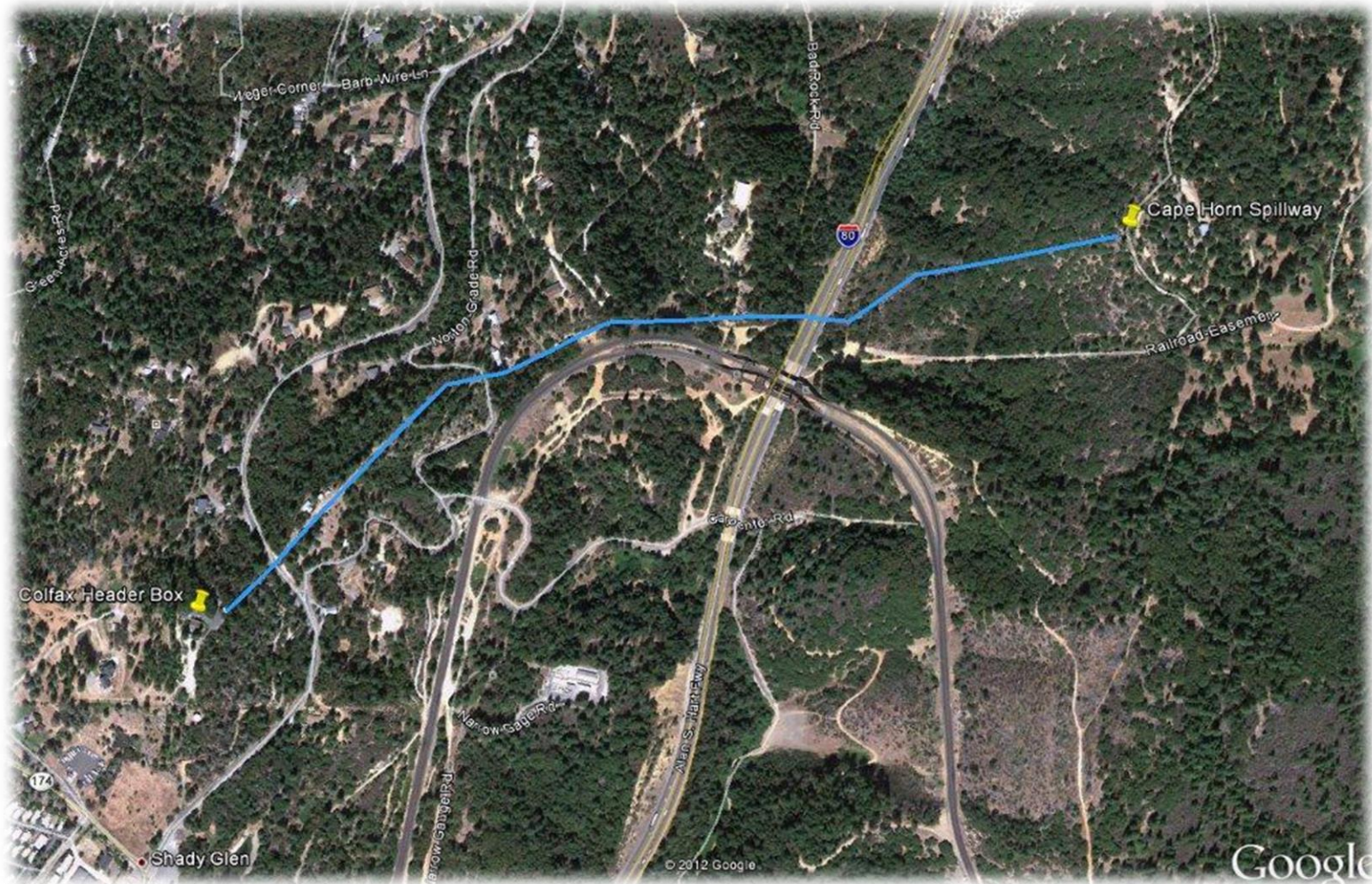
Immediately Downstream of
Pipe Outlet



Secret Town Hydroelectric Summary

- Average Flow = 13.6 cfs (peak = 26 cfs)
- Average Head = 198 ft
- Plant Rating = 235 KW
- Annual Generation = 1,503,210 KWH
- Turbine Type = Crossflow (1 unit)
- Annual Revenue = \$186,935
- Capital Cost = \$1,671,500
- Simple Payback = 8.9 yrs

Long Ravine Pipeline and Hydroelectric Project



Long Ravine Pipeline and Hydroelectric Project



Long Ravine Pipeline and Hydroelectric Project



Long Ravine Pipeline and Hydroelectric Project



Just upstream of that...another 40-ft of drop

Long Ravine Pipeline and Hydroelectric Project

Outlet Structure (Colfax Header Box)



Long Ravine Pipeline and Hydroelectric Station Summary

- Average Flow = 13.6 cfs (peak = 26 cfs)
- Average Head = 210 ft. (up to 320 ft. by capturing additional drops)
- Plant Rating and Other Parameters = TBD

California Environmental Quality Act

- CEQA Compliance

- Small Hydroelectric Projects at Existing Facilities

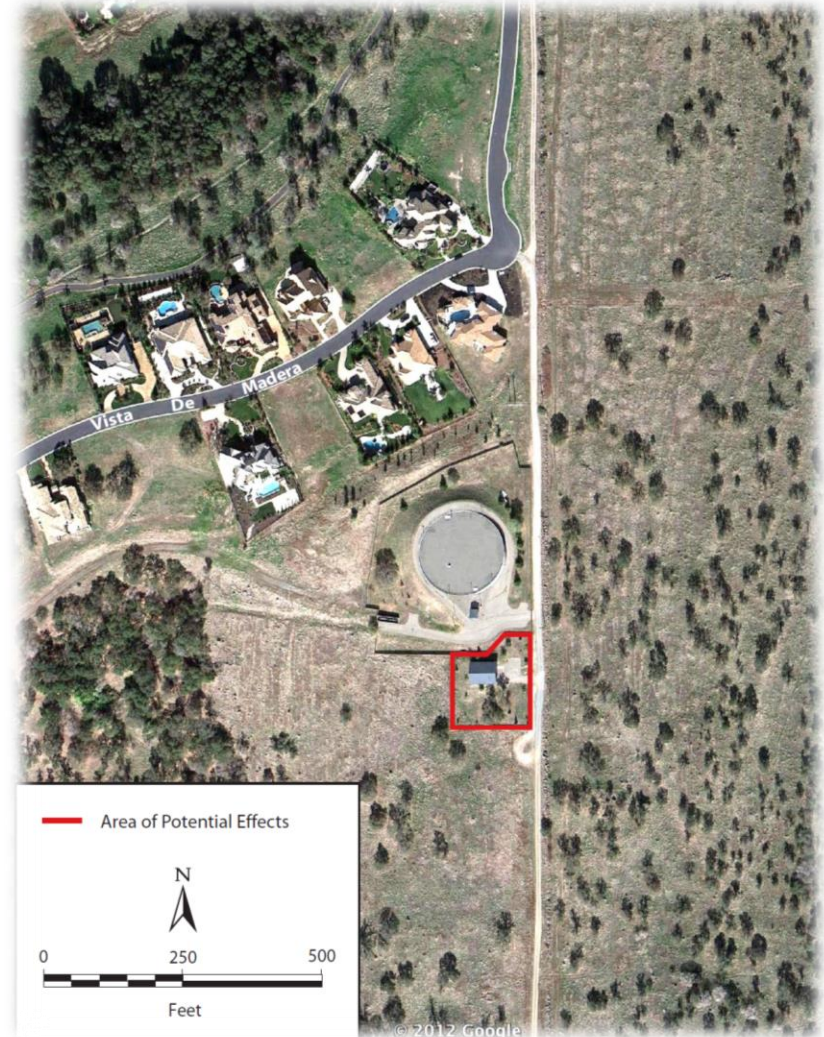
Categorical Exemption – Class 28 consists of the installation of hydroelectric generating facilities in connection with existing dams, canals, and pipelines where... (Guidelines Article 19, Section 15328)

- Environmental Permitting and Approvals

California Environmental Quality Act

Lincoln Metering and Hydroelectric Station

- Blue Oak Woodland Habitat
- Previously Disturbed
- No Aquatic Features



California Environmental Quality Act

- **Lincoln Metering and Hydroelectric Station**

New Construction or Conversion of Small Structures

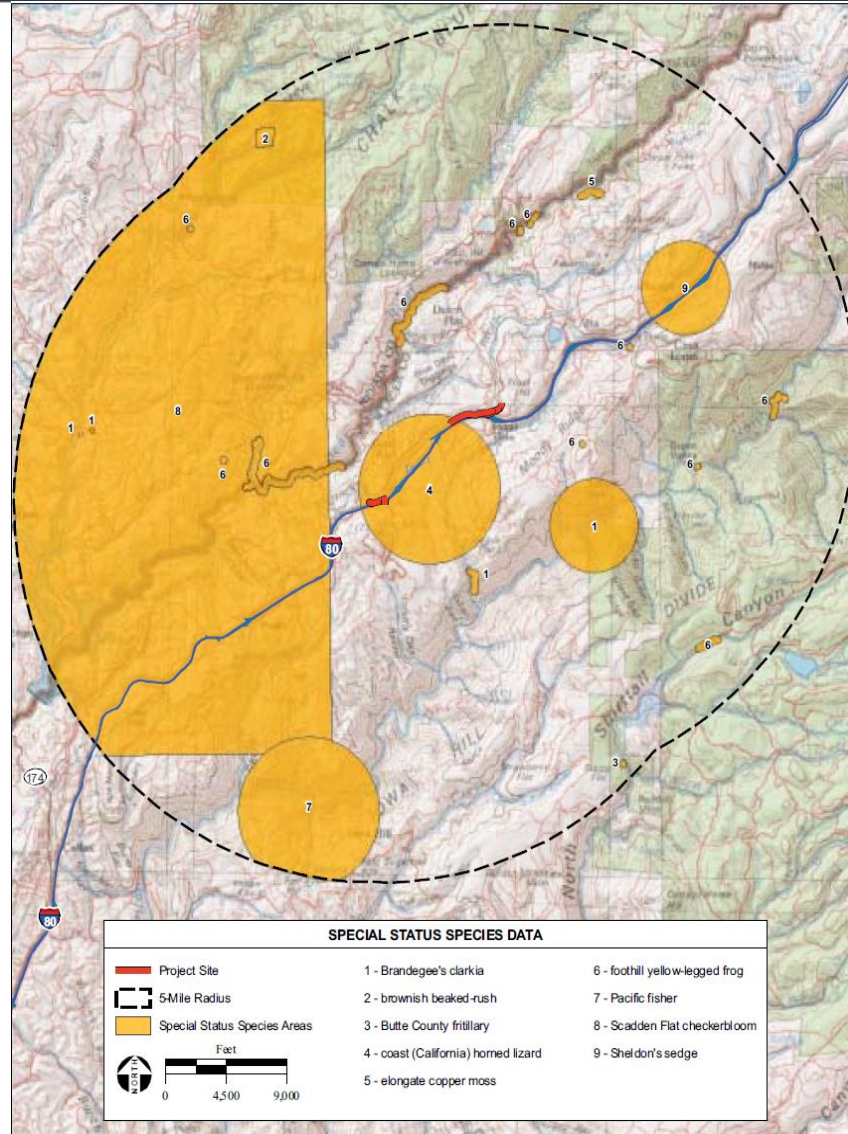
Categorical Exemption – Class 3 consists of construction of a new small facility or structure; installation of small new equipment and facilities in small structures. (Guidelines Article 19, Section 15303)



California Environmental Quality Act

Gold Run Pipeline and Hydroelectric Station

- Ponderosa Pine Woodland
- No Waters of the US



California Environmental Quality Act

- **Gold Run Pipeline and Hydroelectric Station**

Subsequent Mitigated Negative Declaration

- Beneficial Impact of Non-Polluting Power Supply
- Visual Resources
- Noise
- Air Quality
- Erosion and Sediment Control Measures
- Mitigation Measures being incorporated under CEQA

FERC Process

- Prepare Stakeholder List
- Initial Consultation Document
 - Environmental Report for the Project is Limited to Hydroelectric Facility
- Joint meeting and Site visit
- Response from Resource Agencies and Interested Parties

FERC Process

- File Conduit Exemption Application with FERC
 - Provide Documentation of Property Rights
 - Water Source is Existing Pipeline
 - PCWA has Existing Water Rights
 - End Use Requirements Water for Ag and Potable uses
 - No issues with ESA, Waters of the US, Tribes, Public
 - Preliminary Design Drawings
 - 18 CFR, Part 4, Subpart D, Section 4.38(c)

Current Status, PCWA Small Hydro

- **Lincoln Metering and Hydroelectric Station**

- CEQA and FERC

- Circulated ICD: May 11, 2012
 - Held Joint Meeting: June 5, 2012
 - Submitted Application: August 6, 2012
 - FERC Exemption Issued to PCWA: October 31, 2012

- Design and Construction

- Design contract authorized: April 2011
 - Turbine Procurement Contract Awarded: October 2012
 - PG&E Interconnection and PPA Process: March 2013
 - Construction Start Anticipated: Fall 2013
 - In-Service Anticipated: May 2014

Current Status, PCWA Small Hydro

- **Gold Run Pipeline and Hydroelectric Station**

- CEQA and FERC

- Circulated ICD: June 1, 2011
 - Submitted Application: September 29, 2011
 - Exemption Issue Date: January 10, 2012

- Design and Construction

- Multi-phased Project
 - Building and Pipeline Construction In Progress
 - Next Phase of Construction: TBD
 - In Service: TBD

Current Status, PCWA Small Hydro

- **Secret Town Pipeline and Hydroelectric Station**
 - Pre-Design Work Anticipated: 2013
 - CEQA and FERC: 2013-14 pending outcome of pre-design work
 - Streamline CEQA and FERC ICD Process
 - Design and Construction: TBD
- **Long Ravine Pipeline and Hydroelectric Station**
 - Pre-Design Work: May 2013
 - CEQA and FERC: 2016 or TBD
 - Streamline CEQA and FERC ICD Process
 - Design and Construction: TBD

Challenges and Lessons Learned

- FERC Permitting
 - Lengthy Process (FERC, etc.)
 - Request Estimate of Fees for Reimbursing Costs
 - Response from Resource Agencies and Interested Parties
 - Documentation
- Utilize Qualified and Experienced Consultants
- Feasibility Studies Should Be Based On Realistic Cost Estimates

Challenges and Lessons Learned

- Canal Encasement
 - Sound and Aesthetics
 - No Significant Impacts
 - Precedence Setting



Conclusions

- Moving Forward
- Long-Term Perspective
- PCWA Board Support

Questions???