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LIVINGSTON STONE NATIONAL FISH HATCHERY SUPPLY PIPING

Project Team: Lane Hanson, Korvin Jones, Collin Morgan



Faculty Advisors: Fritz Fiedler, Ph.D., P.E.; Erik Arnson, P.E.; Angel Monsalve, Ph.D.; Richard Nielsen, Ph.D., P.E

PROJECT LOCATION

Shasta Dam, California

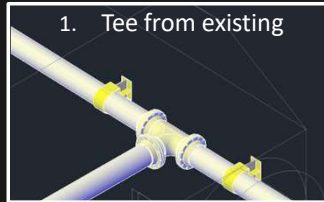
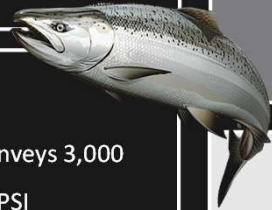


PROJECT BACKGROUND

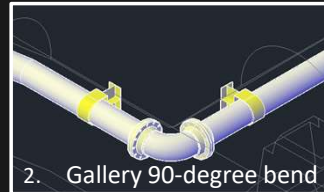
- LSNFH is operated by U.S. Fish and Wildlife, Shasta Dam is operated by USBR
- Extreme California droughts reduce pool elevations & increase water temperatures
- High temperatures create poor spawn conditions for Delta Smelt and Chinook Salmon

OBJECTIVES

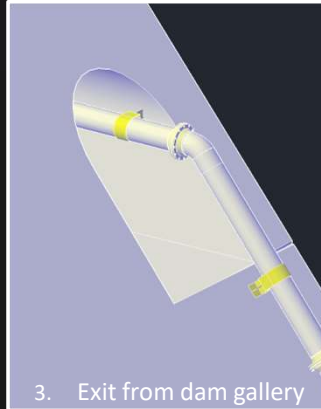
- Design a water supply pipeline that conveys 3,000 GPM and internal pressure up to 210 PSI
- Retrofit a flanged connection into the existing penstock manifold
- Ultimately reduce pressure to 30 PSI to supply Livingston Stone National Fish Hatchery
- Develop a secondary manifold with integrated valve control to allow for penstock backfill



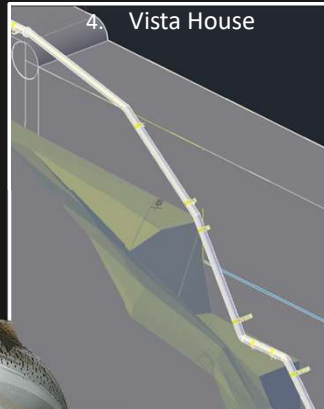
1. Tee from existing



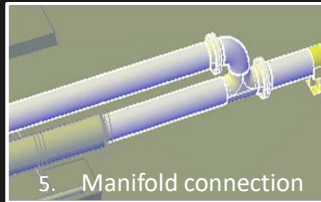
2. Gallery 90-degree bend



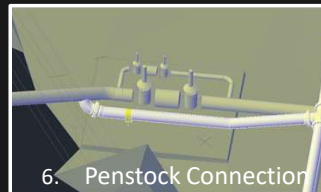
3. Exit from dam gallery



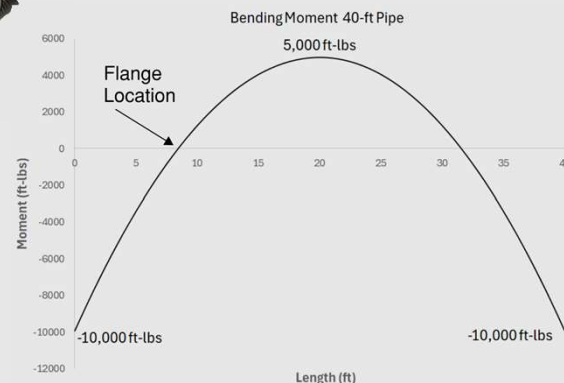
4. Vista House



5. Manifold connection



6. Penstock Connection



HYDRAULIC DESIGN

- 900-ft water supply pipeline 10" schedule 40 low-carbon steel
- Connect to existing system using 10" carbon steel butt weld tee
- 200-ft penstock backfill manifold, gate valve regulated
- Cla-Val Co. 10" Pressure Reducing Valve

PIPE CONNECTIONS

- Weldable flanged connections: 150 class 285 PSI working pressure
- Welded angle bends when angle is $< 45^\circ$
- Expansion joints installed at straight sections to minimize thermal stress outside of dam

COST ANALYSIS

Item	Estimated Cost
Total Material Cost	\$405,600
Construction Cost (55%)	\$223,100
Contingency (10%)	\$40,600
Total Project Cost	\$669,300

EXPO 2025
engineering design **CAPSTONE PROJECT**