WENATCHEE VALLEY COLLEGE

P.U.D. CHELAN COUNTY

Chelan PUD Dryden Dam Automation

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Problem Statement

- The Dryden Dam plays a critical role in supporting local orchards through the irrigation canal and facilitating migration research via the fish ladder during spawning season

- The current system uses a rubber bladder that spans The Wenatchee River and is manually filled with river water using a centrifugal pump. This decades-old system relies heavily on human input and includes a complex mechanical backup intended to automatically drain the bladder when the river flow exceeds 4000 CFS (cubic feet per second)

- We have been tasked with finding a way to improve the system functionality and process

Main Components

- Weir
- Rubber Bladder
- Self-Priming Pump
- Valves
- Emergency Drain Mechanism

Implemented Changes

- Electrical Control Cabinet
- Manual Control Switches
- Control Loop
- Electronically Actuated Valves
- Electronic Level Sensor

Weir and Bladder

- An inflatable rubber bladder is used during trapping operations and to regulate irrigation canal level

- The bladder spans roughly 190 feet across the Wenatchee River

Pump and Gauges

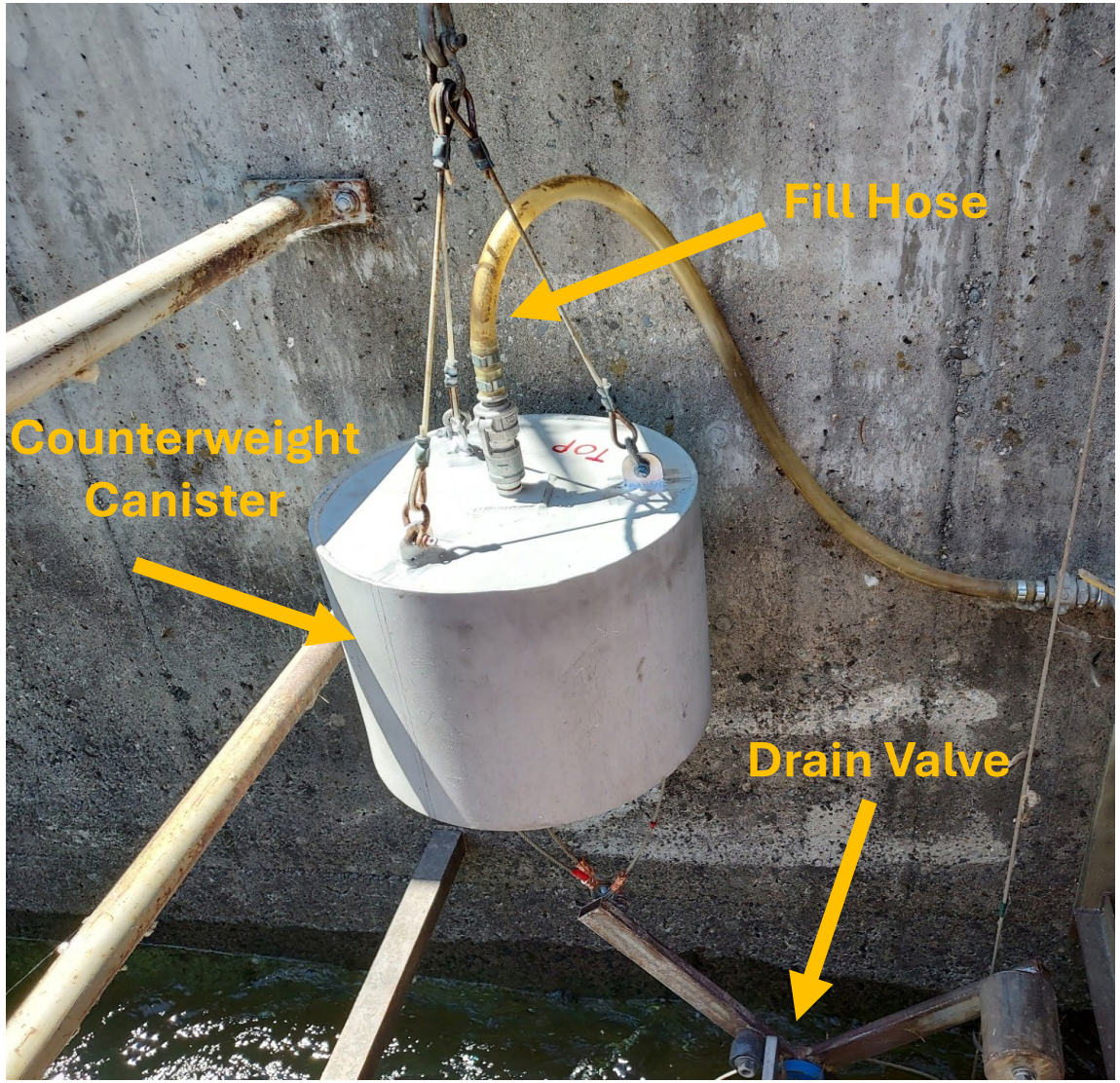
- A self-priming centrifugal pump is used to fill the bladder with Wenatchee River water

- With the proposed improvements the pump won’t change; instead, an electronic control system will be implemented to actuate the pump

Valves & Drain

- Valves control water flow to the bladder, pump, and drainage system

- When the upstream water level rises too high, the counterweight canister fills faster than it drains, triggering the valve to open and deflate the bladder



Proposed Improvements

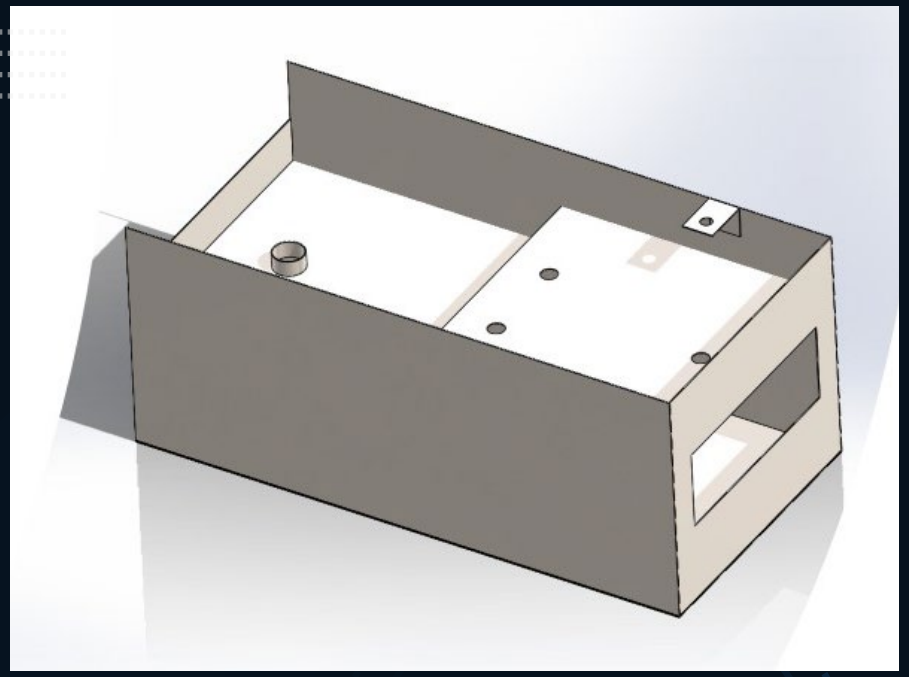
Automate Bladder Inflation and Deflation	Control loop with an ultrasonic level sensor to actuate electrical valves and pumps to regulate water level
View Live Data and Control the Operations Through Manual Mode	Live data can be viewed on controller screen and operation can be manually controlled via switches
Backup Power Supply for Temporary Power Outages	Backup power supply to combat temporary power outages

Bladder Operation

- An ultrasonic level sensor will be used to provide controller with the precise level of the water behind the bladder
- If level is below the programmed range, controller will actuate bladder fill pump to bring river level into set range
- If water level exceeds the programmed range, the controller will actuate electronic drain valve and allow the bladder to deflate

View Live Data & Emergency Control

- Live data can be displayed and viewed on controller screen
- Controller can be changed into manual mode for emergency control if needed
- The controller allows for multiple profiles to be programmed, allowing for seasonal presets depending on performance needs



Design & Fabrication

- Model helped visualize and communicate how the project should be constructed before we began to avoid wasting materials
- Rubber pool floaty was cut and attached to base via pinch plates and bulkhead fittings

Prototype Pictures

Improved Functionality

- The switches on the left side of the electrical box are used for manual control
- Switch in the top right enables/disables the automatic control loop
- All electronics are housed together for efficient operation and improved serviceability

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