



Single-Stage Water Filter with Dual Sand Media Sizes

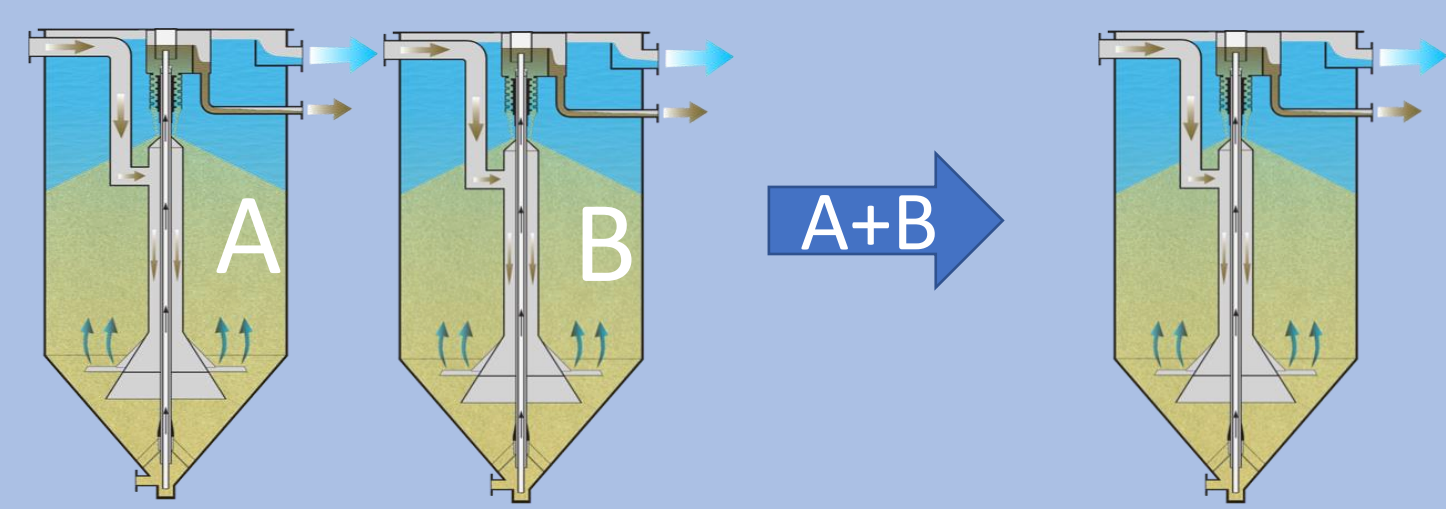


University of Idaho

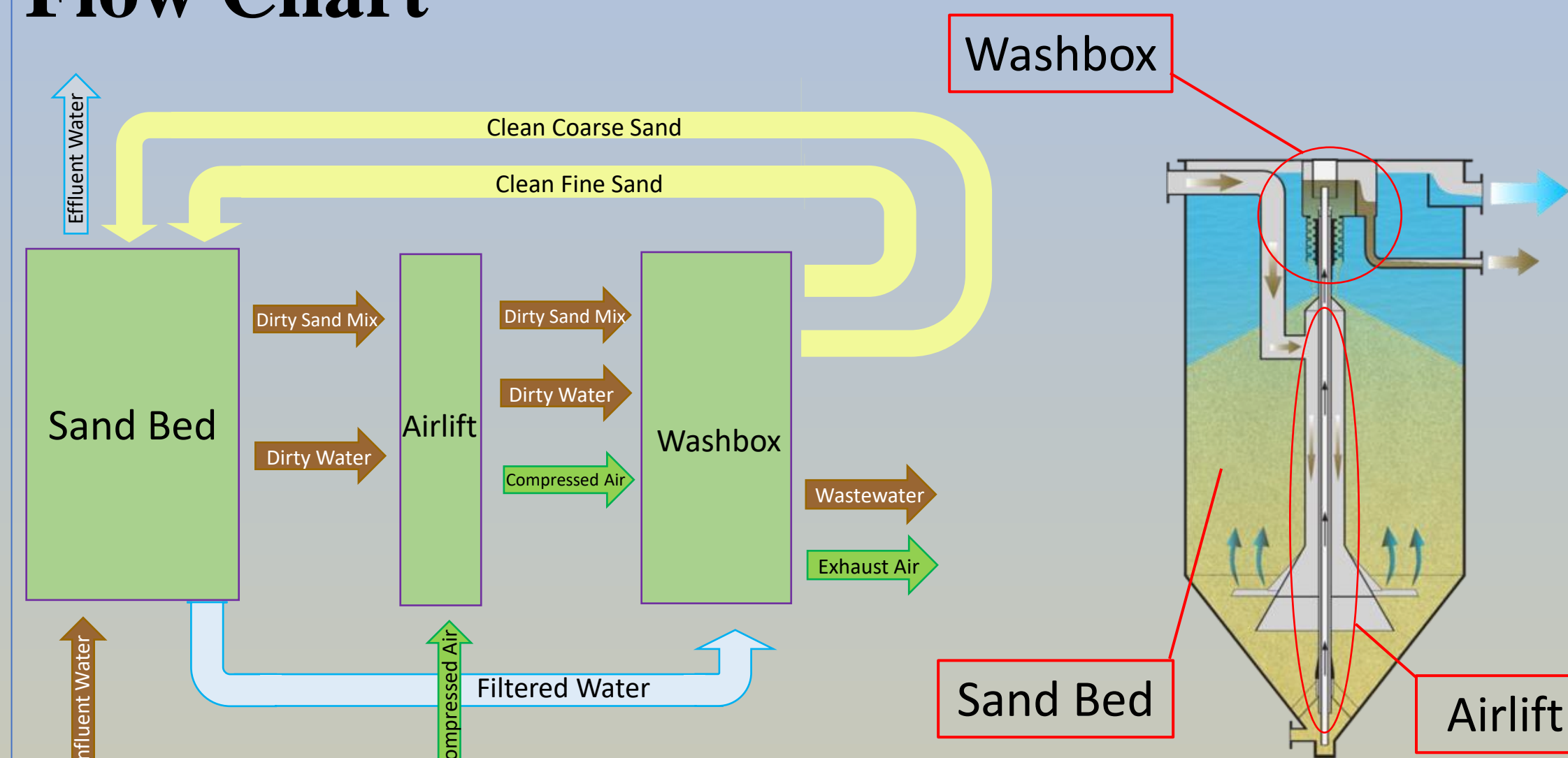
Team Hydration Station: Jaden Cavender, Tobias Flores-Wentz, Benjamin Marek, Tayson Thompson, Blake Urie

Objective

Design a single-stage dual media sand filtration washbox system.



Flow Chart



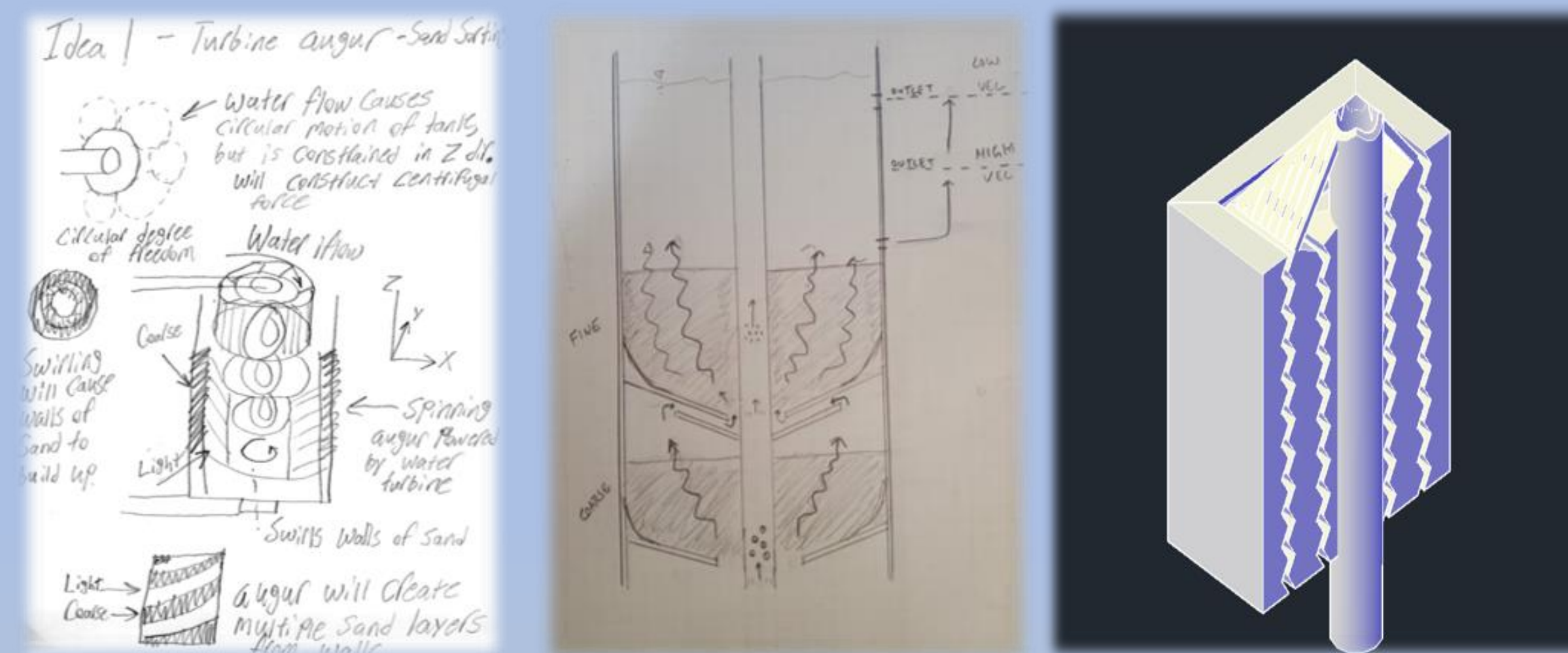
Value Proposition

Clean water is arguably the world's most important resource; therefore, it is vital to invest in water filtration technology. By combining the two-stage filter into a single-stage, we hope to cut back on maintenance and operation costs, while increasing efficiency.

Key Requirements

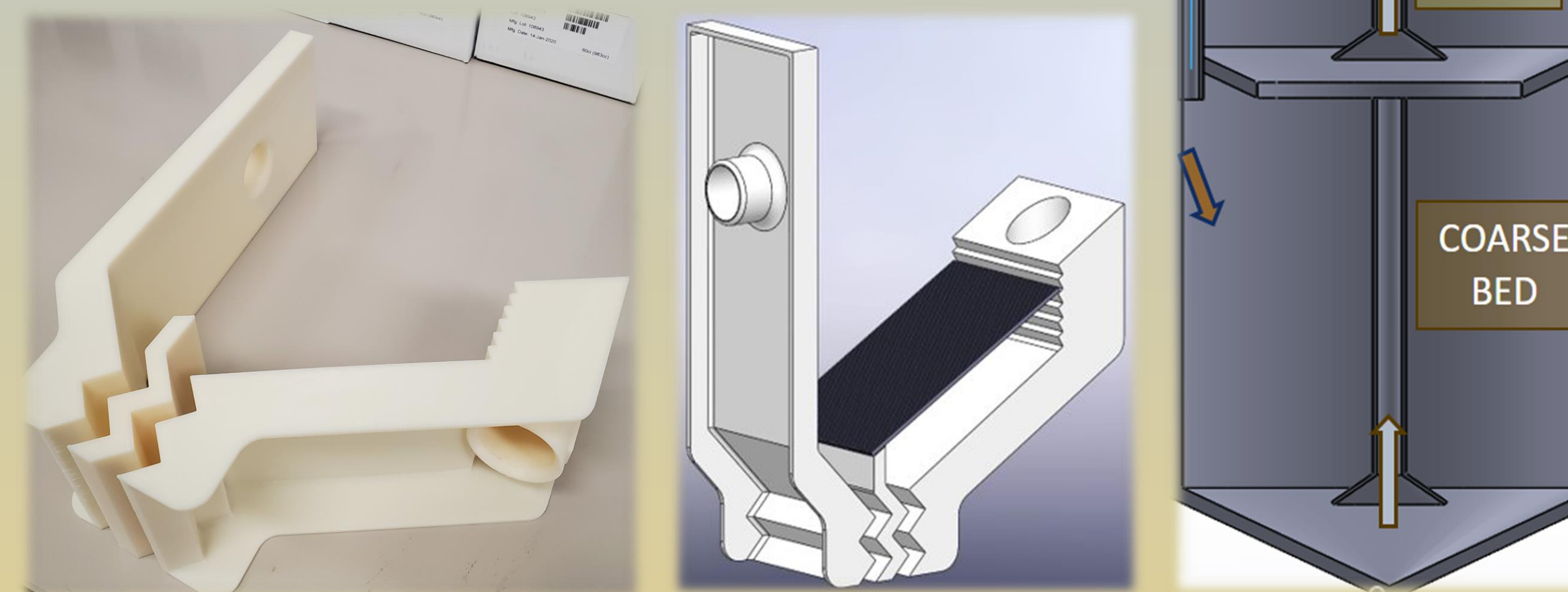
- Minimum 75% separation of the two sand sizes.
- Chemical and corrosion resistance.
- Minimum upflow rate of 1.8 gallons per minute.
- Maintain a bed turnover rate of 0.7 to 1.4 inches per minute.
- Continuous operation with a maximum of 30 minutes of routine weekly maintenance.

Concept Development



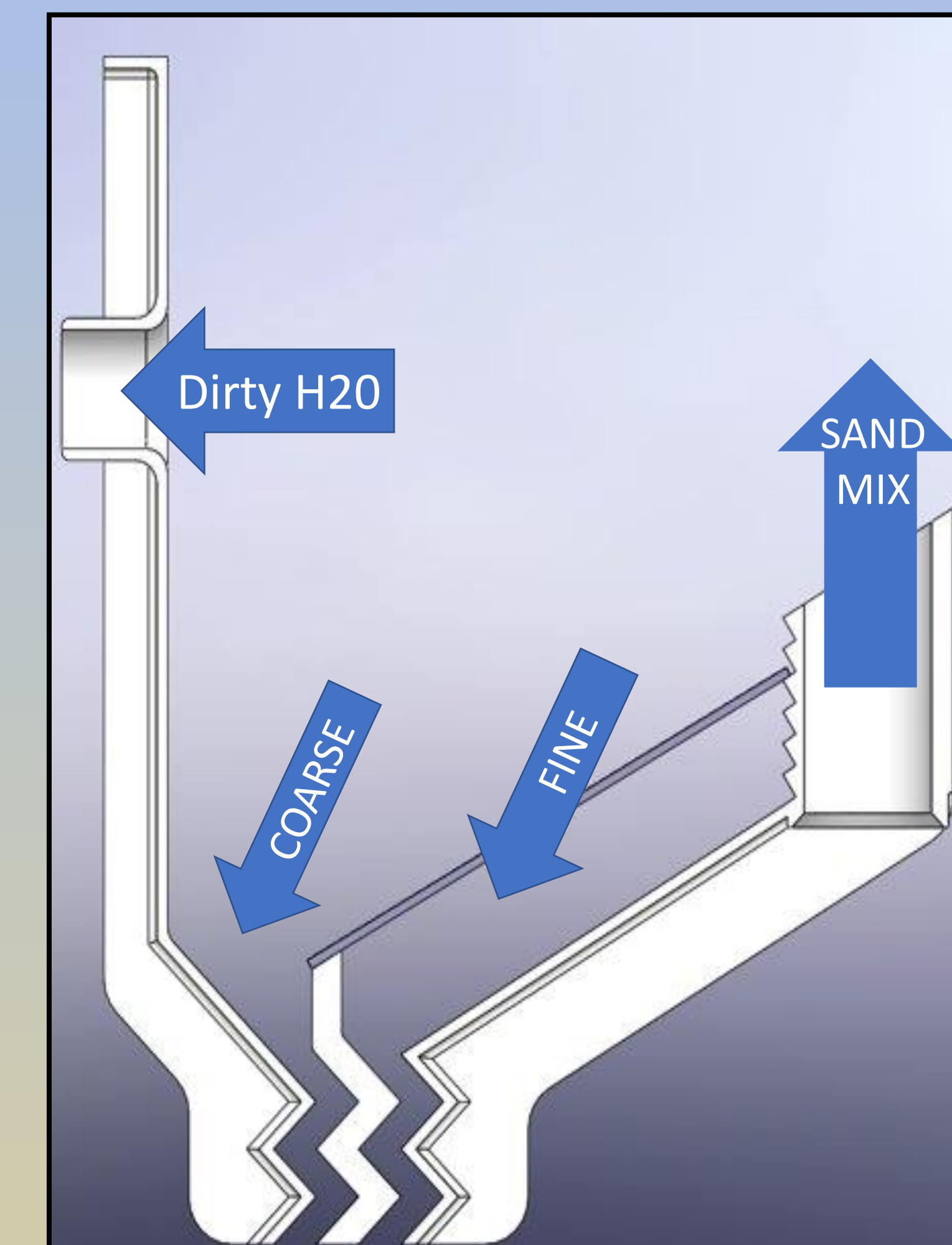
Current Design/Prototype

- Wedge wire screen separation
- Allows slight mixing with single bed
- Dual inlet airlift
- Segregation through sand outlet locations
- Adjustability



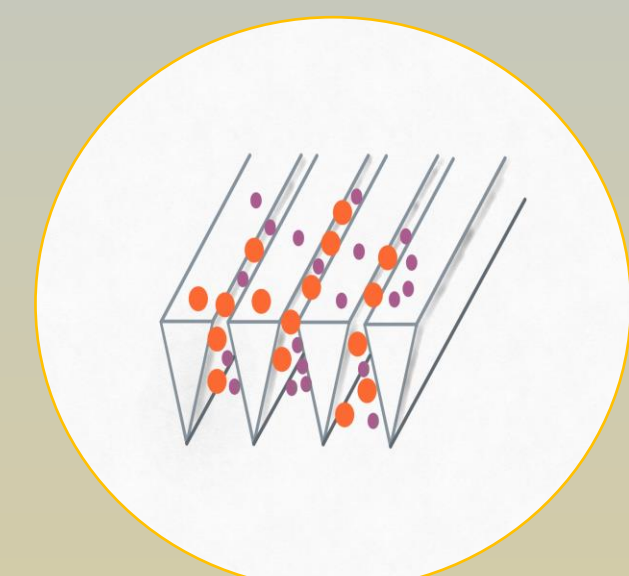
Design Validation

- Design Validation is being conducted on an experimental model.
- The part will model sand separation and screen resistance.



Adjustability

- Channel Velocity
 - .43 -.87 in/s
- Screen Angle: θ
 - 16 -42 degrees



Current Design Issues

- Assessing wear on components
- Airlift with Dual Inlets
- Achieving 75% sand separation

Project Completion

- Total Suspended Solid test
- Elutriation Experimentation
- Test Stand build

Acknowledgements

Advisor: Sarah (Xiao) Wu, Ph.D.
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Mr. Martin Baker

Simulation

Using SolidWorks to simulate upwards water particle flow with similar geometry, it was verified that effluent water would not encounter filtered water, and that airflow will maintain operation of cycles.

