Mountain Water & Sanitation District Wastewater Treatment Improvement Project

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About the Project Team:

- Mountain Water & Sanitation District provides water and sewer service to approximately 900 people residing 45 minutes southwest of Denver, Colorado.

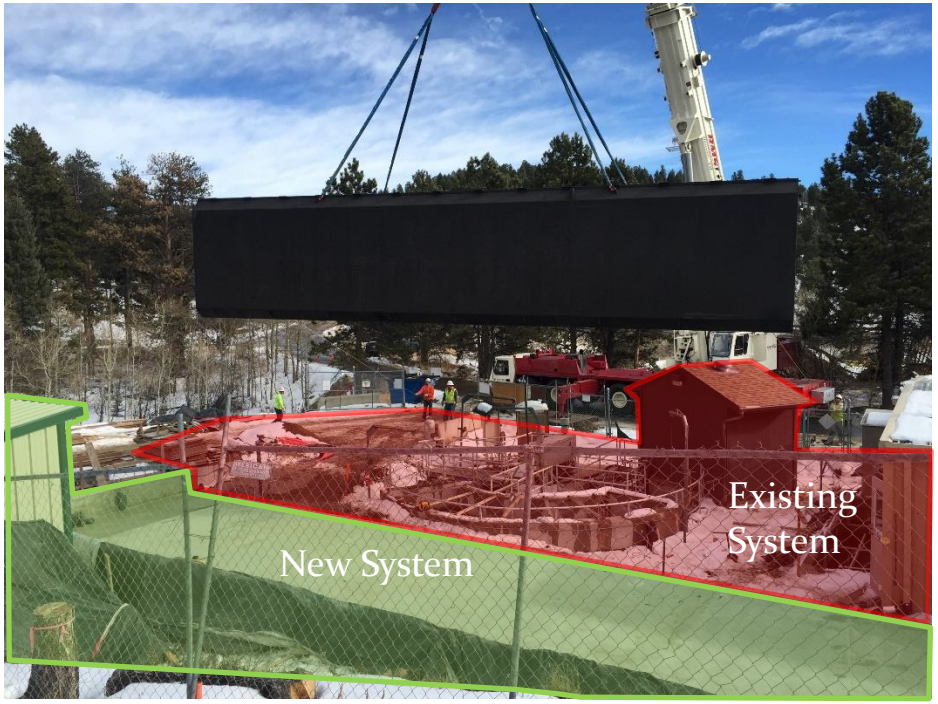
- AquaWorks DBO is an engineering firm specializing in water and wastewater treatment infrastructure for small and rural utilities with populations of 10,000 or less – which make up 92% of our nation's community water/sanitation providers.

Problem Statement:

- Colorado Department of Public Health and Environment's newly issued discharge limit for ammonia in the District's effluent was 4.3 mg/L.
- Existing RBC was not capable of meeting the limit.
- Future need to treat for total nitrogen was evaluated and incorporated into new facility design – at no additional cost.
- District was required to maintain compliance with current discharge limits throughout new construction.

Project Complexities:

- Required to maintain continuous treatment capabilities on a piece of property 1/3 of an acre in size.



- 35 steps in 8 phases enabled transition between previous and new facility.

Project Complexities:

- What is the best way to meet new and future effluent permit limits?
  - There are a number of options available: membrane biological reactor, sequencing batch reactor, and conventional activated sludge.
- How to improve energy efficiency and biosolid handling encountered during wastewater treatment?
  - Options available.
- How do we afford this?
  - Has to be affordable on a per capita basis for 900 people.

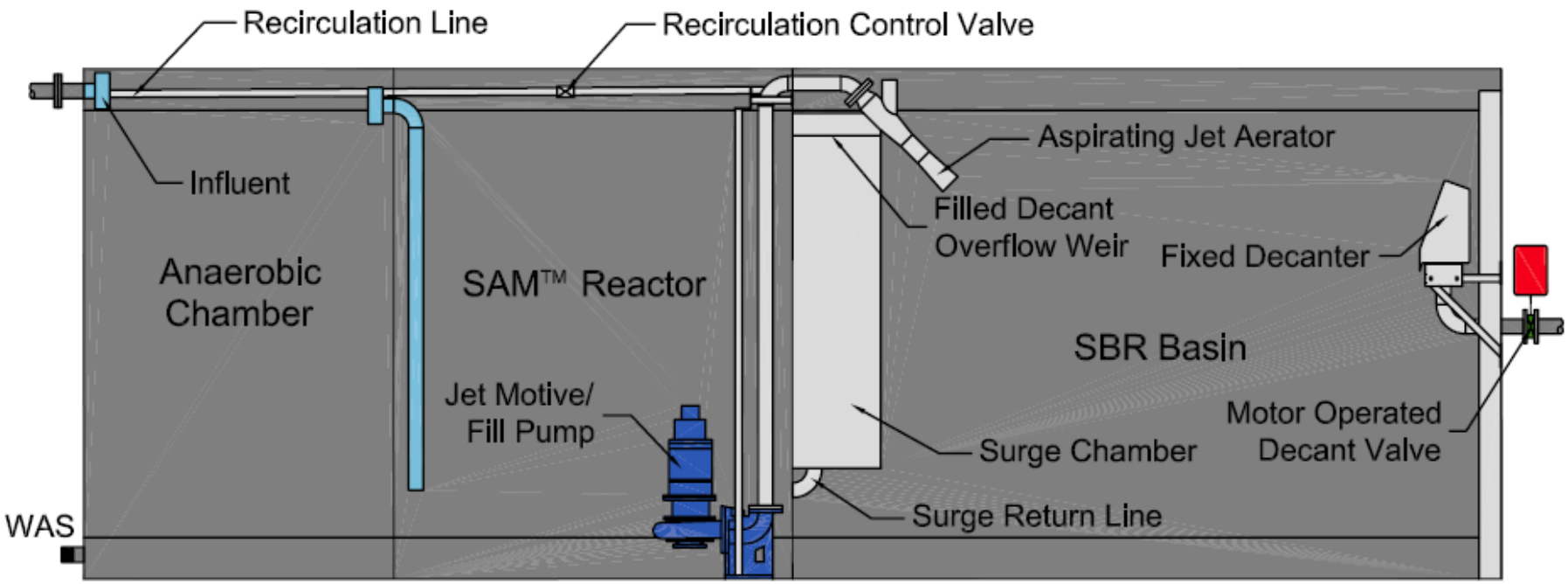
Best Available Technology:

- For this application a Fluidyne sequencing batch reactor (SBR) was selected as the best approach.
- Gravity fed energy free anaerobic chamber for initial biosolid digestion.
- Multipurpose process components.

- Total nitrogen removal included at no additional equipment or operational costs.

Total Nitrogen Removal:

- Achieved at no additional costs.
- Multipurpose components to maximize project value.



Total Nitrogen Removal:

- Uses combination of aerobic, anoxic, and anaerobic biological environments for total nitrogen removal.
- Raw wastewater enters the first chamber where inorganic and organic insoluble solids settle. The soluble compounds including BOD, TKN, and other compounds pass to the second chamber, which operates as both an equalization tank and anoxic mix zone.
- Nutrient and BOD-rich wastewater finally pass to third chamber (SBR tank) for treatment of BOD and ammonia.
- During batch cycle, wastewater is cycled between aerobic and anoxic conditions as nitrified wastewater is passed between anoxic tank and SBR.
- Wastewater reaches an anoxic stage wherein the nitrifying bacteria will utilize the oxygen bound to nitrogen in nitrate (NO_3) and produce inert nitrogen gas (N_2) as a waste product.

System Performance:

- Ability to treat for total nitrogen removal limits of 10 mg/L at no additional costs.
- Effluent tests with ammonia as low as 0.42 mg/L.
- Upgraded SCADA components enable improved process control.

State Revolving Fund Loan Program:

- The State Revolving Fund program is for the purpose of providing low-interest loans for investments in water and wastewater infrastructure.
- The program can support:
  - New Treatment Facilities
  - Improvements & Expansions
  - Consolidation
  - Distribution/Collection Systems
  - Water Storage Facilities

State Revolving Fund Loan Program:

- Rates can range between 0% and 2%.
- It is a competitive program where projects are ranked on a point system.
- The District obtained a $2,000,000 loan 20-year term at a 0% interest rate.
- The District was able to qualify for the 0% rate because of the Green Project Reserve Program.
  - To be deemed “green”, 20% of the project’s costs had to meet EPA criteria (green infrastructure, energy efficiency, water efficiency, or environmentally innovative).

Financial Success:

- Final project cost for the WWTP improvement project was $2,500,000. $2,000,000 was at a 0% interest loan, saving the District hundreds of thousands of dollars in interest expenses.

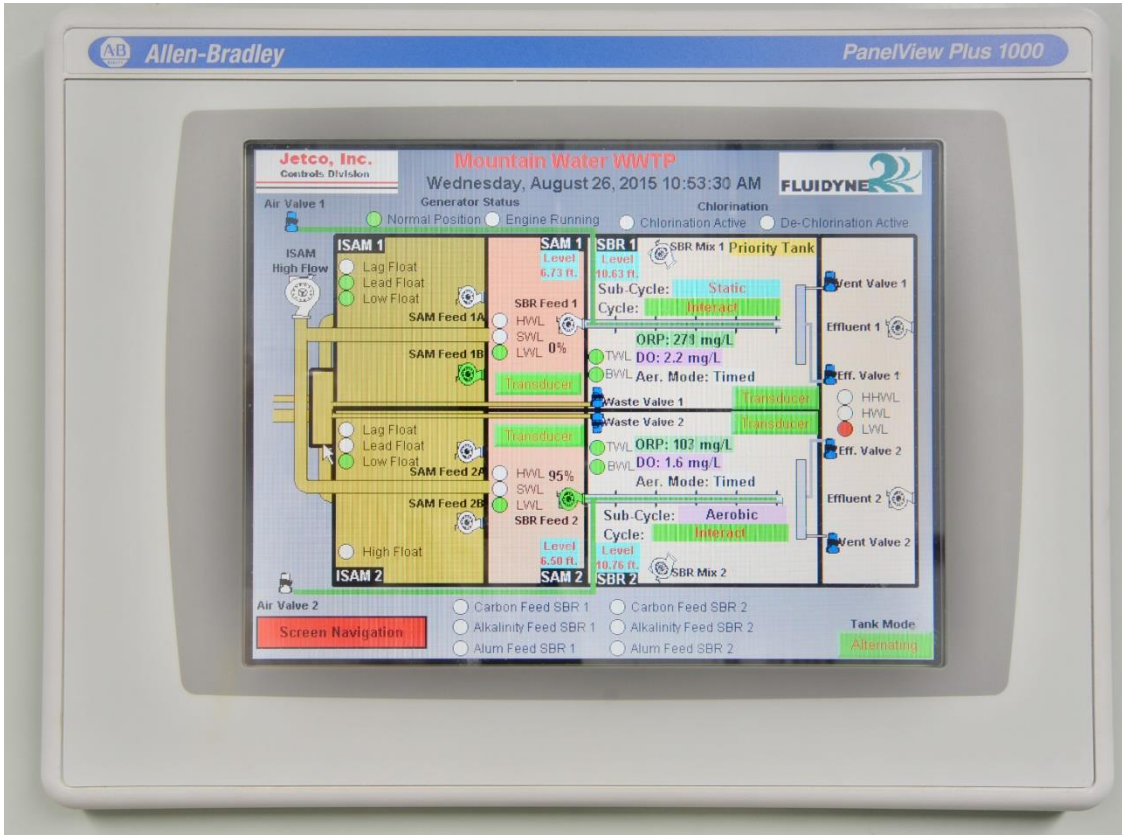
- Operational savings due to infrastructure and process improvements are approximately $16,000 per year.

Additional environmental benefits:

- Reduction of generated biosolids, totaling 130,000 gal/yr.
- 4,472 miles saved in vehicle trips per year.
- Reduced operator involvement and increased process efficiency.

Additional Accomplishments:

- SCADA components offer improved process control.
- Variable Frequency Drives enable energy efficiency of motors, aligning output with demand.



Conclusions & Questions:

- Open for questions and comments.

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