

Trinity River Authority Increases Filtration Capacity And Decreases Backwash With AquaDiamond® Cloth Media Filters

By Aqua-Aerobic Systems

Trinity River Authority/Central Regional Wastewater System - Grand Prairie, TX

The Trinity River Authority (TRA) of Texas established its Central Regional Wastewater System (CRWS) in 1957 and began operations in December 1959. The original treatment plant served Irving, Grand Prairie, Farmers Branch, and a portion of western Dallas. The plant has since expanded and now serves approximately 1.2 million people in the Dallas/Fort Worth area. CRWS processes include a bar screen, grit removal, primary clarifiers, aeration tanks, secondary clarifiers, traveling bridge sand filters, chlorine disinfection, and dechlorination. Thirty (30) traveling bridge sand filters were sized to handle the plant design flow rates for tertiary filtration. After many years of operation, however, several of these filters required full rehabilitation due to mechanical and performance degradation. CRWS also faced the additional challenge of soon needing another 100 MGD (378,000 m³/d) of filter capacity. This prompted an exploration of other filter technologies.

TRA chose to retrofit the existing traveling bridge sand filters with AquaDiamond® cloth media filters in order to remedy its concerns. According to Mike Young, CRWS's Operations Manager, *"We had sand filters that were in need of rehabilitation. After some research we found that the AquaDiamond units had a direct fit to our filters, with minimal structural changes, and provided higher flow capacities."*

Each AquaDiamond cloth media filter has more than twice the treatment capacity of one of the existing sand filters. CRWS initially retrofitted two (2) of its existing traveling bridge sand filters with two (2) AquaDiamond filters. Each cloth media filter is designed to handle an average flow of 12 MGD (45,400 m³/d) and maximum flow of 24 MGD (90,800 m³/d). Today the plant operates six (6) AquaDiamond filters.

AquaDiamond® FILTER PROCESS

In the filter basin, the cloth media is completely submerged during filtration. Solids are deposited on the outside of the cloth as the influent wastewater flows through the media. The filtered effluent is collected inside the diamond lateral and flows by gravity on to discharge. The filtration process requires no moving parts. Increased headloss due to the deposited solids automatically initiates periodic backwashing. During backwash, a pump provides suction to the backwash shoes, which make direct contact with the media, allowing solids to be vacuumed from the cloth as the platform traverses the length of the diamond laterals.

The platform operates only during backwashing and solids collection. Because of the vertical orientation of the media, some solids will settle to the basin floor during normal operation. Small suction headers provide a means for collecting and discharging the settled solids. The solids collection process utilizes the backwash pump for suction.

PERFORMANCE TESTING

Shortly after installation, process performance tests were conducted on one (1) AquaDiamond filter for seven (7) consecutive days. The filter was tested at the average design flow of 12 MGD (45,400 m³/d) for most of the testing. During the first three (3) days, the peak flow and/or peak influent total suspended solids (TSS) concentrations were simulated for a period of two (2) hours. The average effluent TSS and backwash requirements were met during normal and peak operating conditions.

The operations staff was impressed with the reduction of backwash water created by the AquaDiamond units. Mike Young explains, *"We now have six AquaDiamond units handling over 80 MGD on a daily basis with less return flows back to the front of the plant. During peak flows we have put more than 150 MGD through these filters with TSS results still in the 1-2 mg/l range. The biggest advantage of the AquaDiamond units is the ability to handle 12-25 MGD with less backwash, resulting in a capacity gain at the front of the plant."*

The cloth media filters addressed CRWS's treatment performance concerns. The targeted requirements for the AquaDiamond filters are listed in the following table.

TARGET PERFORMANCE REQUIREMENTS

Parameter	Influent	Effluent
TSS mg/l	15	5
	30	15
Backwash rate limit, % of throughput based on influent filter TSS	15 mg/l	3%
	24 mg/l	6%

AquaDiamond® FILTER ADVANTAGES

- Unique OptiFiber® pile cloth media
- 2-3 times the flow capacity of a traveling bridge filter with an equivalent footprint
- Reuse quality effluent
- Low backwash rate
- Small footprint
- Low head requirements
- No downtime for backwashing
- Less maintenance than sand filters
- Variable speed drive platform and backwash pump for immediate response to solids excursions
- Enhanced platform drive system for better traction and guidance
- Eliminates "crabbing" experienced with traveling bridge sand filters
- Tolerates extreme variations in loads
- New plants or retrofits
- Low life-cycle cost