SUCCESS STORIES

AQUA-AEROBIC SYSTEMS, INC.

PLANT NAME/LOCATION: Little Falls Run WWTF/Stafford, VA

TYPE OF PLANT: Municipal

DESIGN DAILY FLOW: 6 MGD (22,713 m^3/day) **PEAK FLOW:** 12 MGD (45,425 m^3/day)

AQUA-AEROBIC PRODUCTS: (2) AquaDiamond® Filters

FROM PRETREATMENT...TO REUSE

AQUADIAMOND®CLOTH MEDIA FILTER RETROFIT SOLVES HYDRAULIC LOADING PROBLEM!

Little Falls Run Wastewater Treatment Facility began its operation in 1991. It is one of two wastewater treatment facilities owned by Stafford County, Virginia and was constructed to accomodate the area's growing population. The plant's original treatment scheme included an activated sludge system with a secondary clarifier for secondary treatment and dual-bay traveling bridge sand filters, 44' long x 16' wide, for tertiary filtration. In 2003, the plant began experiencing problems with the filters going into constant backwash mode when the flows exceeded 6 mgd (3 gpm/ft^2). To remedy the problem, the plant operators were bypassing a portion of the flow. With flows expected to increase and the anticipation of tougher discharge limits, the Stafford County Department of Utilities initiated a project to resolve the situation.

One of the AquaDiamond® filters retrofitted into an existing traveling bridge filter tank at Little Falls Run.

The initial design consideration was to double the filter capacity by duplicating the existing traveling bridge filter process which involved constructing identical cast in-place concrete tanks with matching filter underdrains, dual-media and traveling bridges. Significant drawbacks to this solution included very limited land space with the elimination of future expansion possibilities, concerns about the actual capacity of the expanded filters, and expected downtime during the construction period. The Department of Utilities decided to investigate an alternative solution, the AquaDiamond® cloth media filter manufactured by Aqua-Aerobic Systems, Inc. Two diamond filters could potentially treat 12 mgd average and 24 mgd peak flows within the existing filter basin footprint with minor structural modifications and for approximately the same cost as duplicating the original filter process. This benefit combined with the successful operation of an AquaDisk® cloth media filter at its sister facility prompted the Department of Utilities to conduct a three-week pilot program to test the AquaDiamond® filter's suitability for Little Falls Run. The pilot program demonstrated the AquaDiamond® filter's ability to meet more strict design limits under extreme hydraulic and solids loading conditions.

The expansion project was then re-designed to incorporate the AquaDiamond® cloth media filters. The traveling bridge sand filter tanks were retrofitted one at a time to reduce interference with plant operations. The first retrofitted cloth media filter went into operation in August 2005, within six weeks from the time the existing sand filter was taken out of service. A testing period followed to validate performance requirements prior to removing the second existing sand filter from service. Again, performance results were excellent so the second filter was retrofitted with an AquaDiamond® cloth media filter in September 2005.

CONTACT US

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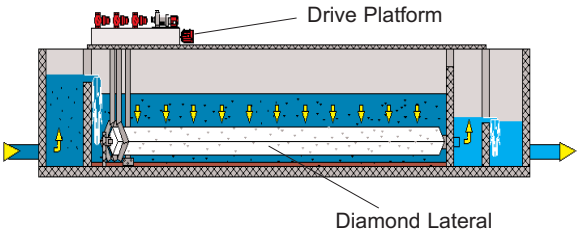
AquaDiamond® Filter Process

The cloth media is completely submerged during filtration. Solids are deposited on the outside of the cloth as the influent wastewater flows through. The filtered effluent is collected inside the diamond lateral and flows by gravity, 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 vacuum heads, 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.



Design Characteristics/Operating Data

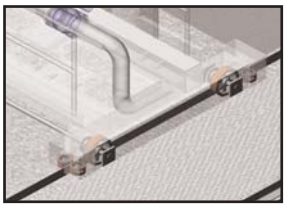
Little Falls Run currently has a design average daily flow of 4.0 mgd and actual flow of 3.45 mgd. Current discharge limits for the plant include 9 mg/l BOD, 9 mg/l total suspended solids and 2 mg/l total phosphorus. The plant expects more stringent limits in the near future, however, with discharge requirements of 4.5 mg/l BOD, 4.5 mg/l total suspended solids and 0.5 mg/l total phosphorus. The filters are already consistently producing effluent total suspended solids below the expected future limits of 4.5 mg/l. In fact, stringent testing has shown excellent results of an average effluent total suspended solids of 2.4 mg/l with only one filter online.

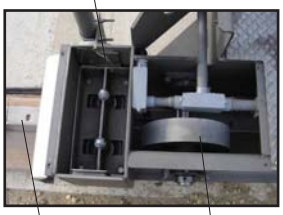
The low backwash waste volume generated has been especially impressive. The results were 0.1% of total throughput in initial start-up testing and 0.3% during the most recent one-month testing period, compared to typical rates of 1% to 3%.

Keith Dayton, Assistant Director of Utilities says, "*By selecting this technology, the facility has preserved valuable space for a later expansion, while preparing for more stringent discharge limits in the near future.*"

AquaDiamond® Filter Advantages:

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



Advanced tracking system consists of (1) stainless steel guide angle (2) main drive wheels and (2) pairs of guide wheels to avoid misalignment.

Drive and tracking system is more reliable than the traditional design. Drive and guide wheels are made of hard, wear resistant rubber.