



Smith & Loveless Inc.
Above all others.™

Project Profile - Rogers, AR

Rogers WWTP Baffles Grit and Variable Flows with PISTA® 360™



Application: Rogers, Ark.
Equipment: PISTA® 360™ + V-Force™
Data: Design Flow: 14 MGD
Peak: 49 MGD

“Do the very best job we can,” is the simple, yet effective, philosophy undertaken by Rogers Water Utilities Plant Manager Mike Lawrence and his staff. Doing the best job at the award-winning Rogers Wastewater Treatment Plant means achieving high treatment standards while minimizing costs to do so.

“Following the leadership of our utilities manager, we’ve tried to do everything we can for effluent quality without breaking the bank,” Lawrence said, noting the Rogers plant performance includes total nitrogen reduction even though permitting does not currently require it.

People have noticed the quality, including the United States Environmental Protection Agency, which honored the plant with two Environmental Excellence Awards. Visitors to the facility are also often struck by its immaculate condition.

Lawrence joined Rogers Utilities as plant manager just a week after the treatment plant was christened 21 years ago. He has since overseen two major expansions, the most recent completed in March 2009.

The recent expansion, designed by Black & Veatch and built by BRB Contractors, affected all phases of the plant. The design provided for increased flow and upgraded process equipment through the entire plant.

A principal component of B&V’s design is the new headworks facility, which includes screening and a new Smith & Loveless PISTA® 360™ grit removal system with patented V-Force Baffle™. According to Lawrence, grit removal historically caused problems at the plant following large flow surges that often overwhelmed the original grit and scum system.

“[The original system] was unable to meet our needs during high flows,” Lawrence explained. “Under these conditions we not only had the higher flows, which increased the upward velocities in the unit, but the scouring or flushing of grit from the collection system during these events added to the problem.”



An exterior view of the Rogers PISTA® 360™ grit removal system.

Because larger quantities of grit flushed through from collection system I&I, grit build-up occurred over time in downstream basins. Lawrence and Robert Moore, Rogers Water Utilities Operations & Maintenance Manager, worked with their consultants to seek new approaches to prevent grit build-up. The expansion, planned for 20 years growth, increased design conditions to 14 MGD (from 6.7 MGD), while peak capacities were set at 48 MGD because of the I&I from its collection system. This large variance made successful grit removal system selection more complex, and with the historical infiltration, more essential.

True to their philosophy, Lawrence and Moore undertook a thorough evaluation process. Their course of action included numerous visits to other wastewater treatment plants, collaboration with colleagues and meetings with various equipment suppliers. They observed and evaluated several grit removal approaches, ultimately choosing to go with a vortex-type approach.

Even still, the new flow conditions posed challenges for a vortex chamber design. Low daily flows compared to the peak flow would typically necessitate multiple vortex grit chambers and the use of downstream leveling devices to effect proper channel velocities required to move grit. During the evaluation process, Lawrence and Moore became familiar with the PISTA® 360™ grit removal system with patented V-Force Baffle™.

“One of the attractive things about the PISTA® was its ability to handle this wide range of flows,” Lawrence said, referring to the single chamber system.

continued on reverse

Rogers Water Utilities Chooses PISTA® 360™ for Plant Expansion

continued from reverse



Grit trapped by the **PISTA® 360™** gets moved by **PISTA® Turbo Grit Pumps** to the second-stage **PISTA®** grit washing and dewatering units.

Unlike conventional vortex-type systems, the **PISTA® 360™** grit removal system with patented **V-Force Baffle™** increases velocity during low flow periods while maintaining consistent grit capture during surges. Flow control baffles distinctly positioned within a 360-degree, flat-floor grit chamber contain a patented hydraulic design, which creates a forced vortex for efficiently removing grit at all flows. An opening in the center of the chamber floor allows the grit to move into a lower collection hopper, where it is fluidized and then pumped for cleaning and dewatering.

The key to its success in the Rogers application is the integral **V-Force Baffle™** design, which serves as a water level control device. When the lower daily flows ensue, the baffle design causes the water level to change, thus maintains high velocities across the channel for satisfactorily moving grit into the chamber. Before the introduction of the **V-Force Baffle™** design, the most common way to control the velocity in low flow periods was to back up flow with a downstream-submerged weir. The pre-engineered **PISTA® 360™** with preset inlet and outlet openings supplants the need for a downstream-submerged weir.

By integrating water elevation settings with the baffle design, the overall outlet footprint requirements decreased and enabled the outlet channel to make a 90-degree turn past the chamber.

Most significant for Rogers Water Utilities was the eliminated need for multiple vortex-type units. Instead, a single Model 50B **PISTA® 360™** with **V-Force Baffle™** (rated at 50 MGD capacity) covers daily and peak flows in a single chamber. The significance of reducing the design to one chamber reduces capital costs by nearly half, and lessens long-term energy, maintenance and operational costs.

During their evaluation, Lawrence and Moore visited other **PISTA®** installations and followed up with a trip to Smith & Loveless' factory in the Kansas City metropolitan area. Factory trips are always welcomed and encouraged by Smith & Loveless, which has maintained market leadership with more than 2,200 grit removal system installations.

"We visited [the] facility to help us be sure the **PISTA®** system was one that would meet our needs," Lawrence remarked. "The fact that I was impressed with representatives of Smith & Loveless further increased my comfort level with the **PISTA®** system."

Such statements from veteran professionals like Lawrence are meaningful given his staff's emphasis on doing the best job for his utility and its customers. For equipment suppliers like Smith & Loveless, doing the best job means investing in product research and development and on-going field-testing while providing professional assistance and project support.

The installation of the **PISTA® 360™** grit removal system with patented **V-Force Baffle™** at Rogers Wastewater Plant improved the plant's grit removal efficiency to a high standard, and its distinctive design allowed Rogers Water Utilities to save on capital and long-term operational costs. For all involved, it was a job well done.

Rogers (Ark.) WWTP Grit Testing

Following installation and start-up of the Rogers **PISTA® 360™** Grit Removal System, grit testing was performed to profile the influent grit and measure the grit removal efficiency achieved by the system.

Overall Grit Removal Efficiency Achieved by the PISTA® – 98%

Influent Grit Profile – Particle Sizing

Grit Size	Percentage of Sample Collections
50 Mesh & Larger	91%
50 – 70 Mesh	4%
70 – 100 Mesh	2%
100 Mesh & Smaller	3%

**The key to obtaining accurate results is acquiring representative grit samples with proper testing equipment that limits channel interference and/or bias. For example, extensive research by Smith & Loveless has demonstrated that the bulk of all sizes of grit will be located along the bottom of the flume (operating with normal velocity conditions of 2 – 3.5 fps). On the contrary, improper sampling techniques can lead to bad samples and an inaccurate report. Smith & Loveless follows proven field grit testing techniques developed and maintained for more than 30 years, including written protocols for field sampling and lab analysis to ensure accurate and consistent processes.*