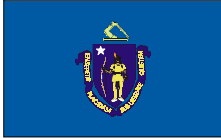


FAST® Process Retrofits into CMAS Plant for Total Nitrogen Reduction



Application Profile: Stow, MA
S&L Equipment: FAST® Process
Installed: 1991



FAST media was added to an existing aeration basin, creating a fixed-film, stable process for effective nitrogen reduction.

A large corporate facility located west of Boston, which serves as the customer service headquarters of a major computer software manufacturer, was required to upgrade its treatment plant to achieve satisfactory total nitrogen reduction—in addition to BOD and TSS removal. The primary wastewater contributor was a large cafeteria that serves the entire work force.

The original system was designed to treat a maximum wastewater flow of 30,000 GPD with a maximum organic loading of 97.5 lbs. BOD/day. It consisted of flow equalization, aeration, clarification, filtration, chlorination and sludge storage. The system was a completely mixed activated sludge (CMAS) system, which operated in the extended aeration mode. All treated wastewaters were discharged to subsurface leachate fields.

New effluent requirements made it necessary to modify the existing wastewater treatment plant to obtain total nitrogen removal to 10 mg/L. These requirements made it necessary to obtain denitrification in addition to BOD removal and nitrification. Two factors were considered during the review of the system. One was a possible future increase in flow accompanied with possible highly varying influent quantities throughout the week. The other factor considered was the two possible process modes available for nitrification-denitrification systems: raw wastewater as a carbon source and methanol as a carbon source.

In consultation with the owner and its engineering group, Smith & Loveless recommended retrofitting the existing aeration tank with media to convert it from a CMAS system to a fixed-film FAST® system. The FAST® treatment system would assure a more stable condition under varying influent flow by providing a sufficient microbial population attached to the submerged media. In addition, adding partitions to create an anoxic treatment zone and a re-aeration zone with submersible recycle pumps in the aeration zone would provide operational flexibility.

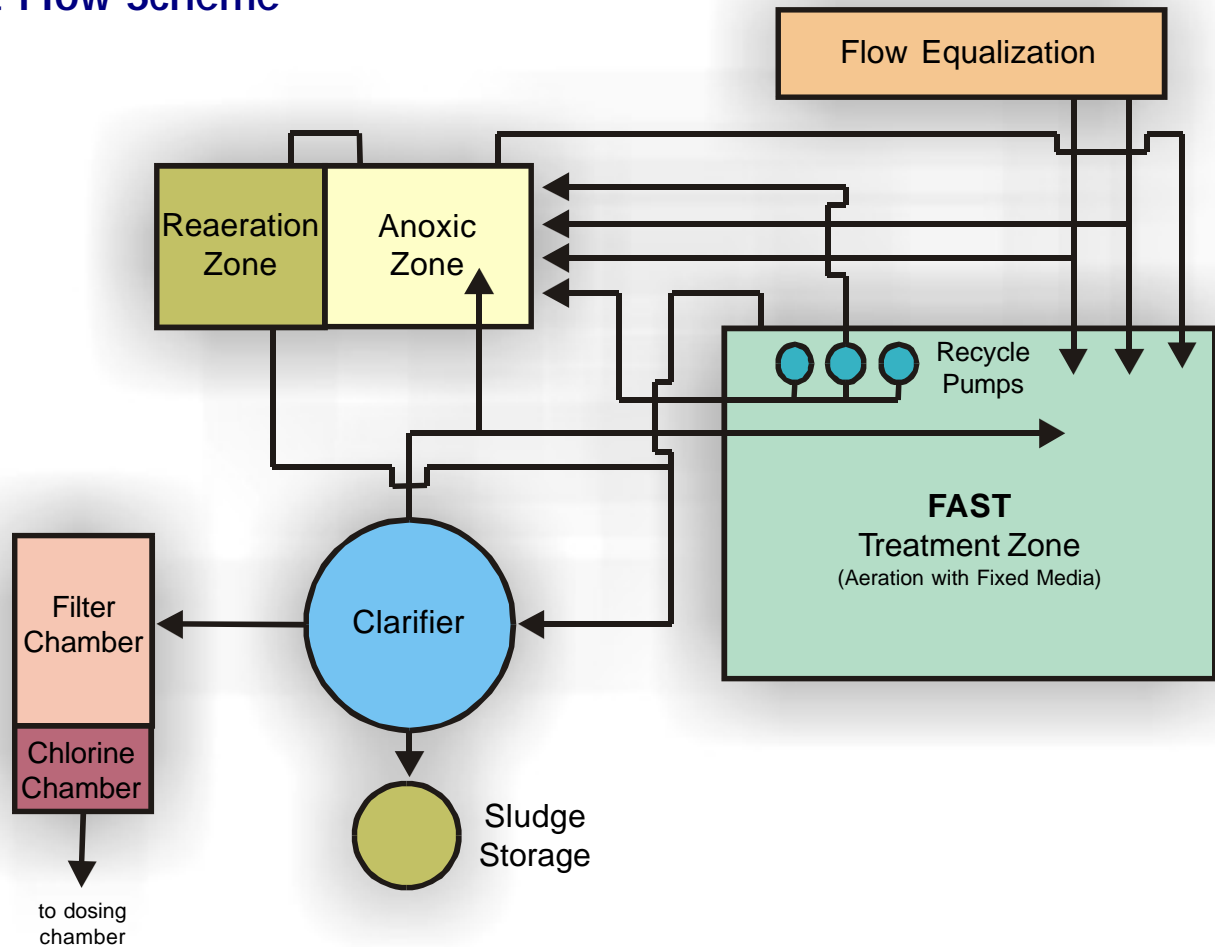
Depending on temperature, the reactor was sized to provide for MCRT's between 5 and 10 days. The theoretical methanol requirement at maximum conditions was calculated to 10 GPD

Average Effluent Data (Following start-up)							
	BOD	TSS	NH ₄	TKN	ALK.	NO ₃	TN
Influent	367	314	34	46	322	—	—
Effluent	12	5	1.1	0.7	—	1.4	2.1

and was provided by a small metering pump. The metering pump was tied in with the raw wastewater influent pump, so methanol was only fed when wastewater was pumped to the plant. Two variable speed mixers provide mixing in the anoxic zone. A re-aeration zone follows the anoxic zone for the reduction of any remaining carbonaceous BOD and a positive DO level prior to clarification. Because the treatability study showed the influent alkalinity was insufficient to compensate for the alkalinity consumed by nitrification, additional alkalinity in the form of dry sodium bicarbonate (NaHCO₃) is added to the flow equalization basin to assure good pH condition for nitrification. Quantities would depend on the incoming flow, and were calculated to be in the range of 25 to 200 lbs. of NaHCO₃ per day.

Other modifications included installing recycle pumps and additional piping to provide the flexibility of operating in both process modes. It was also decided to provide a building for the entire system so adverse weather conditions would not negatively effect the system. One additional blower was provided to assure sufficient oxygen could be provided at future flows. Finally, the aeration zone was retrofitted with FAST® media to provide for a total loading rate of about 1.5 lbs. BOD/1,000 ft². No modifications were made to the flow equalization basin, clarifier or filter. *Continued on reverse.*

Plant Flow Scheme



continued from page 1

After start-up the system had established sufficient populations of nitrifiers and denitrifying bacteria to provide total nitrogen removal efficiencies of 95% and the system continued to perform exceptionally well.

In summary, the **FAST** treatment process performs exceptionally well. As shown in the Table, removal efficiencies for BOD, TSS and Total Nitrogen were above 95%, and produced an effluent quality well below the required state discharge limits. This was achieved by modifying existing equipment rather than installing an entirely new system, saving the company money.

For more information about this installation, or the proprietary **FAST**® Process, please contact us at Smith & Loveless Monday through Friday between 7:45 am and 4:30 pm Central Standard Time. Our technical team is available to assist you and address your inquiry.

Smith & Loveless Inc., based in the Kansas City metropolitan area, is a global leader in designing and manufacturing quality pre-engineered water and wastewater treatment and pumping systems. Backed by 55 years of experience, we provide systems for both municipal and industrial applications throughout the United States and the world.



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