

Complete Mix Activated Sludge (CMAS) system

The Complete Mix Activated Sludge (CMAS) system removes soluble, suspended solids and ammonia by exposing the waste to organisms that will feed on it. Air is blown into the tank to keep the waste mixed with the organisms and to add oxygen to the water.

The CMAS system consists of four aeration basins, five centrifugal blowers and 200 coarse bubble diffusers per basin.



Aeration Basins

The basins are 105 feet by 105 feet with 15-foot side water depth. The volume of one aeration basin is 1.23 million gallons. The plant design is to have one blower for each basin in service plus one backup. Each basin is capable of independent operation for seasonal flexibility.



Multi-stage Centrifugal Blowers

The blowers are multi-stage centrifugal blowers rated at 300 Hp with an output of 4700 scfm each. Each blower has a throttling valve before the blower to adjust the actual scfm output. Through trial and error, it has been determined that the process can run with half of the design aeration, which saves on maintenance and electric usage. The plant was designed to have two basins on line during the summer and three basins during the winter. With a lower Return Activated Sludge (RAS) rate the plant is still able to handle the treatment of the flow and lower the electricity usage. The design for the Sludge Retention Time (SRT) is 4.8 days in the summer and 9.2 days in the winter. To be at the design SRT the MLSS in the summer would be 700 mg/L and 1200 mg/L in the winter. The plant has been running at an average of 1300 mg/L MLSS with all four basins in service in the summer and an average of 1770 mg/L MLSS in the winter.

The Complete-Mix Activated Sludge process handles slug loads better than the typical activated sludge system. This is achieved by having the identical concentration of activated sludge throughout the tank. A disadvantage is that a C-MAS system is prone to filamentous bulking and hydraulic short-circuiting. This plant has never had a problem with either of the two. The effluent from the trickling filters is mixed with Return Activated Sludge and then sent to the CMAS system. Each of the CMAS basins has its own influent line feeding into the bottom on the side away from the basins effluent. Air is added to the system to keep the D.O. above 1 mg/L. The biological floc consists of bacteria, protozoa, rotifers, and nematodes. The floc is used to reduce the carbonaceous BOD and oxidize ammonia content of the sewage. Bacteria make up about 95% of the activated sludge biomass. These organisms grow in the wastewater by consuming bio-

degradable materials such as proteins, carbohydrates, fats and many other compounds. A sign of a healthy floc is the present of higher forms of animal life like Protozoa & Rotifers.