Airport Water Reclamation Facility

Liquid Treatment Processes

Headworks

Wastewater flows enter the plant at the influent manhole. Flows from the influent manhole are conveyed to a metering manhole located upstream of the new headworks facility. The headworks facility consists of screening, grit removal systems, and washer/compactor equipment.

Equalization

The previous design for the Airport WRF contained two oxidation ditches. These oxidation ditches have been repurposed as equalization basins. A portion of the wastewater flow downstream of the grit basins will be diverted to the equalization basins during peak hour conditions and pumped back to the incoming flow during low flow conditions.

Activated Sludge

Screened, degritted wastewater is blended with return activated sludge (RAS) at the inlet of the Aeration Basins influent channel. The aeration basins (two trains) are configured as two-pass basins. The initial 20% (MLE) and 27% (Bardenpho) of each train will be configured as anoxic cells in which RAS, wastewater and mixed liquor are blended and kept mixed to allow for nitrification. Nitrified mixed liquor then flows into the aerated zones where two swing zones (anoxic/aerobic) and four separate aeration zones will be provided. At the end of each train, a submersible propeller pump will return denitrified mixed liquor to the anoxic zone, while the remainder of the mixed liquor flows over a full-width weir into the mixed liquor channel. Mixed liquor from all the basins will be collected in the mixed liquor channel where it flows into the secondary clarifier splitter box, and splits to the secondary clarifiers.

Secondary Sedimentation

The secondary sedimentation is an integral part of the secondary treatment process which allows solids to settle by gravity. This water/solids separation serve two purposes – 1) reduction of the suspended solids levels in the secondary effluent from 3800 mg/l to less than 10 mg/l and 2) capturing the biomass and returning it to the aeration basins.

Two (2) clarifiers are provided under Phase 1. Water enters each clarifier via the center column and into the energy dissipation well which allows the flowing water to dissipate its energy and uniformly disperse within the clarifier. A circular baffle or feed well is located around the energy dissipation well. This well directs the flow downward to minimize short circuiting and serves as a stilling basin. Spiral rakes convey the settled solids from the bottom of the clarifier to the hopper located in the center of the basin. A buried pipe connects the sludge hopper to the Return Activated Sludge (RAS) pump station.

The RAS pumps are used to recycle the sludge back to the aeration basins influent channel and future primary effluent splitter box. To maintain predetermined level of mixed liquor concentration in the aeration basin, excess mixed liquor suspended solids (MLSS) is wasted to the solids handling facility using the Waste Activated Sludge (WAS) pumps. RAS and WAS pumps are located in the RAS/WAS pump station. The WAS flow rate is operator adjusted via pump VFD speed and the system allows for continuous wasting. Scum skimmers will direct the floating scum to the scum hopper from which they are piped to the scum wet well. Scum pumps draw the scum from the wet well and pump it to the solids handling facility.

Tertiary Filtration and Disinfection

Secondary effluent enters the filter influent common channel. Flows to each filter are diverted by opening the appropriate gates or valves. Three (3) tertiary filter units are installed in a building to provide protection from the elements and provide an adequate work environment for the operations staff during the cold months.

Disinfection is required as a unit process to achieve the effluent discharge limits for BADCT and Class A+ effluent requirements. Additionally, chlorine (oxidizing agent) is needed to prevent biological growth in the tertiary filter units, and to prevent bulking and foaming in the activated sludge process units. Chlorine is also added to the non-potable water system (plant water)

Chlorine is fed at these dose points in the form of 0.8 percent sodium hypochlorite solution. The chlorine solution is generated onsite through the electrolysis of brine. The sodium hypochlorite is stored in fiberglass reinforced plastic (FRP) tanks and metered to the various points of application using peristaltic feed pumps.

Solids Treatment Processes

Thickening

The facility utilizes two gravity thickeners which are repurposed clarifiers.

WAS is pumped to one of the two gravity thickeners depending on the current operation of each thickener (fill/aerate, settle or decant). Once a thickening basin has filled and aerated for a set period of time, the thickener is allowed to settle. Once settling is complete (approximately 3 hours), the decant operation of the supernatant can be performed via a motorized telescoping valve. Decant from the thickening process is discharged to the return flow pump station that will ultimately discharge this flow into the incoming sewer flow. Subsequently, the aeration cycle will follow while thickened WAS (TWAS) is being discharged to the dewatering process. Positive displacement (PD) blowers are provided to aerate the thickeners.

Dewatering

Once the thickening process is completed, thickened WAS (TWAS) is pumped to one of the two centrifuges. The pumped TWAS passes through a sludge grinder and is pumped to the centrifuge. Polymer is injected into the solids discharge pipe prior to entering the centrifuge. The centrifuge dewaters the sludge and discharges the solids to

the screw conveyor. The screw conveyor fills the roll-off dumpster located outside of the dewatering building. Once the roll offs are full, they are moved by plant staff to a location within the WRF site where they are loaded by a contract hauler for disposal in a permitted landfill. Decant from the dewatering operations is sent to the plant return pump station where it is pumped back to the headworks.