

Technical Documentation

For this project, our company was responsible for purchase engineering services, procurement, Technical Inspection and good transportation of mechanical, electrical, control, and instrument equipment of municipal wastewater treatment plant. In the following, we will describe wastewater treatment plant process briefly.

The raw wastewater is entered to screening unit equipped with manual coarse screen and mechanical fine screen which is considered to prevent downstream equipment from damage and clogging. The screens are compacted and transferred to rubbish mobile container through screw compactor.

The screened wastewater is entered to grit and grease chamber. In aerated grit chamber air is introduced along one side of a rectangular tank. The separation of grit from wastewater is usually accomplished in separate grit chamber designed to physically separate heavy grit particles from lighter organic solids. The grit accumulated on tank bottom is pumped to grit collecting tank. Gritted wastewater is transferred to primary sedimentation. Primary treatment (also called primary sedimentation) is a sanitation technology that removes suspended solids and floating organic material to reduce the suspended solids load for subsequent treatment processes. The removal of pathogens during primary treatment is not high; therefore, downstream treatment will require further pathogen removal technologies to meet discharge or reuse guidelines. The selected biological process have capability to remove BOD, COD and Nitrogen including anoxic, aeration and sedimentation that allows continuous inflow of wastewater into the treatment tanks. Pretreated wastewater is carried to a division box that distribute it into 8 anoxic tanks. Each anoxic tank is equipped with submersible mixers. The adopted aeration system is diffused aeration with fine disc diffusers and Turbo blowers. Biological treatment unit effluent is lead to sedimentation unit. Produced sludge is collected by diametral scraper into the hopper and then it is entered to sludge pump station. Some part of sludge is pumped to biological treatment unit by returned activated sludge pumps and wasted activated sludge is transferred by WAS pumps to sludge processing unit. Clarified effluent is sent to chlorination contact tank and chlorine gas system is considered as disinfectant agent.

Primary sludge and secondary sludge are transferred to sludge processing unit. Gravity belt thickener is considered as mechanical thickener. The equipment developed for thickening consists of a gravity belt that moves over rollers driven by a variable speed drive unit. The sludge is conditioned with polymer and fed into a feed/distribution box at one end, where the sludge is distributed evenly across the width of moving belt. The water drains through the belt as the concentrating sludge is carried toward the discharge end of the thickener. Thickened sludge from GBT is lead to anaerobic digester. Anaerobic digestion of municipal wastewater sludge has been widely practiced since the early 1900s and is the most widely used sludge treatment method. Overall, the process converts about 40% to 60% of the organic solids to methane (CH₄) and carbon dioxide (CO₂). The chemical composition of the

gas is 60-65% methane, 30-35% carbon dioxide, plus small quantities of H₂, N₂, H₂S and H₂O. Methane is the most valuable because it is a hydrocarbon fuel (giving 36.5 MJ/m³ in combustion). In addition to anaerobic digester equipment, this wastewater treatment plant is equipped with CHP plant (Combined heat and power) for using produced methane. Digested sludge is transferred to belt filter press. In belt filter presses, conditioned sludge are first introduced on a gravity drainage section where it is allowed to thicken. In this section a majority of the free water is removed by gravity. Following gravity drainage, pressure is applied in a low-pressure section, where the sludge squeezed between opposing porous cloth belts. On some units, the low pressure section is followed by a high-pressure section where the sludge is subjected to shearing forces as the belt pass through a series of rollers. A belt filter press system consists of sludge feed pumps, polymer feed equipment, belt filter press, sludge cake conveyor and support systems (wash water pumps and air compressors).