6.2.1 Intermediate Pumping Overview

The intermediate pumps are the feed pumps to the MBR system. The pumps take flow from the primary effluent channel and pump it to the channel in front of the fine screens.

Process Overview

The intermediate pump station is located in the gallery level of the fine screen building. There are two large intermediate pumps (Nos. 1 and 2) with a pumping range of 2 - 10-mgd each and one small intermediate pump (No. 3) with a pumping range of 1.5 – 5-mgd. The system is designed to have only one pump operating at a time. The small pump during low flow periods and one of the large pumps during higher flow periods and as a redundant pump.

Under normal operating mode, the pumps take flow from the primary effluent box and discharge to the fine screen influent channel. The flow is metered at a weir located at the influent of the MBR aeration basin. The flow rate and flow control mode is determined by the operator in the SCADA system and is automatically controlled through SCADA. The flow diagram is shown on ***Figure 6.2.1-1***.

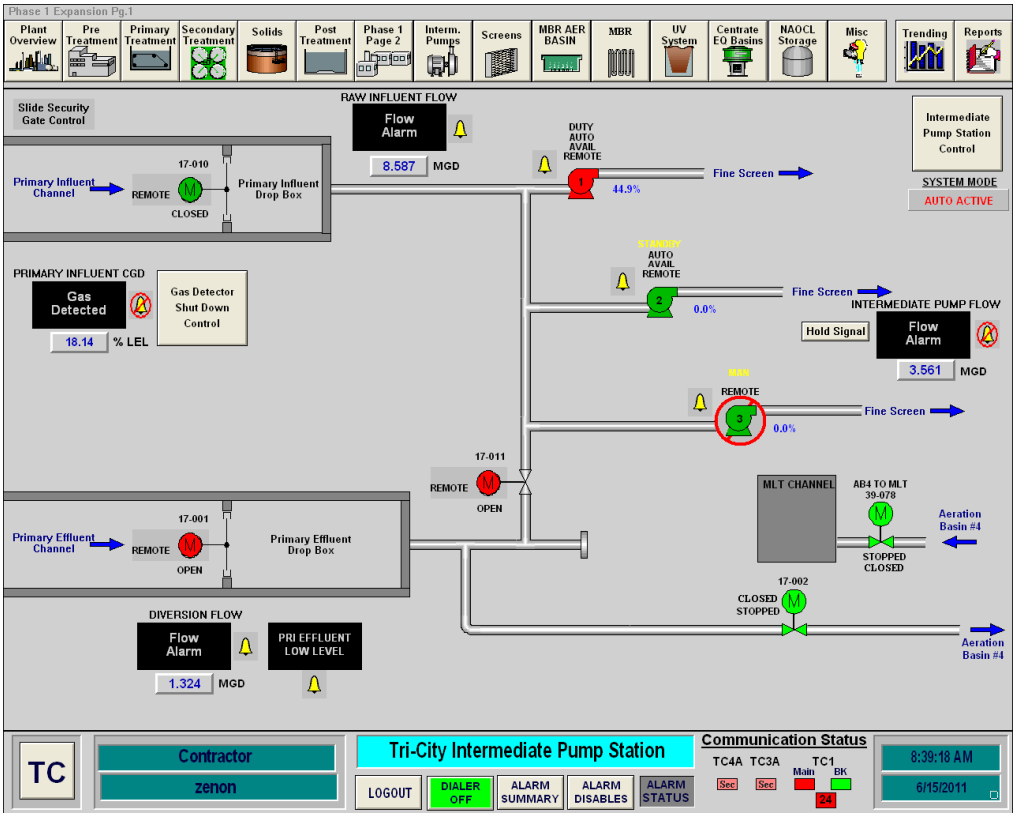

Figure 6.2.1-1 – Intermediate Pump Station Main Screen

During periods of extremely high flows to the treatment plant, typically 55 to 60-mgd as determined by the operator, the gate to the primary influent box will close and the gate to the primary effluent box will open. This will allow the flow to the MBR system to

become primary influent flow. This will limit the flow to the primary treatment process to less than its design flow of 60-mgd. The loading to the MBR process will not be affected, as the wastewater strength is low during these high flow events.

Intermediate Pump Station Components

The intermediate pump station is made up of a number of components that operate interactively to provide automatic operation of the station functions. These components are:

- Intermediate Pumps
- Primary Effluent Box
- Primary Influent Box
- Influent Channel LEL Monitoring

Intermediate Pumps

There are three intermediate pumps: two large pumps and one small pump. The two large pumps are WEMCO Hydrostall pumps with a capacity range of 2 to 10-mgd. The small pump is a Flowserve centrifugal pump with a capacity range of 1.5 to 5-mgd. A VFD located in the Fine Screen Building electrical room provides control to each pump. Power to each VFD is provided at the MCC located in the same electrical room.

Automatic control of the intermediate pumps is provided through the plant SCADA system.

Primary Effluent Box

The primary effluent box is connected to the primary effluent channel located at the end of the primary clarifiers. An automatic slide gate provides for isolation of the box from the effluent channel. The primary clarifiers have a capacity to treat up to 60-mgd with all six basins in service. Effluent flow from the primary clarifiers can go to the CAS system at a rate of 25.2-mgd, to the MBR plant at a flow of 10-mgd and to the chlorine contact basin influent at a peak flow of 34.8-mgd.

Primary Influent Box

The primary influent box is connected to the primary influent channel located at the influent end of the primary clarifiers. The primary influent channel receives flow discharging from the aerated grit basins. The channel provides for even distribution of flow to the primary clarifiers. An automatic slide gate provides for isolation of the box from the influent channel. When the plant flow reaches a setpoint flow, adjustable by the operator in SCADA, the gate in the primary influent box will open and the gate in the primary effluent box will close. This will direct flow from the primary influent channel to the MBR plant. This process mode allows the peak flow to the treatment plant to exceed the capacity of the primary treatment process.

Influent Channel LEL Monitoring

The air changes in the fine screen building have been minimized to conserve on the energy required for heating and ventilation. Protection within the building from a fire or explosion potential from a spill is provided by an LEL (Lower Explosion Limit)

monitoring system located in the primary influent box. When the LEL increases to the designated set point, the intermediate pumps will be shut off to protect the fine screen building from an explosion hazard. The LEL alarm set-point is adjustable on the main Intermediate Pump SCADA screen.

Intermediate Pump Station Controls

The flow rate of the intermediate pumps is controlled through SCADA. When the pumps are place in automatic, one of the pumps will operate based on the set point flow rate. The SCADA control screen for the intermediate pumps is shown in **Figure 6.2.1-2**. The intermediate pumps are started and stopped in automatic mode from this screen.

Pump No. 3 will be the first pump to operate as long as the flow is less than the P3 Max Setpoint. This value is set as a value slightly under the maximum flow rate for the pump which is 5-mgd. If the set-point flow is greater than the P3 Max Setpoint, then either Pump No. 1 or 2 will operate, depending on which is set as the lead pump.

There are four modes of control that the operator can select. The mode of control determines the set point flow for the intermediate pumps and controls the flow sent to the MBR process.

Mode 1 – Percent Influent

The percent influent flow mode controls the set point flow as a percent of the plant influent flow. This percentate is selectable on the Intermediate Pump Control Screen. Under this mode, the flow to the membranes will vary with the plant influent flow diurnal curve.

Mode 2 – Constant Flow

The constant flow mode controls the setpoint flow as a constant flow rate. The flow rate is selectable on the Intermediate Pump Control Screen. The MBR system will run at a constant flow rate no matter the plant influent flow.

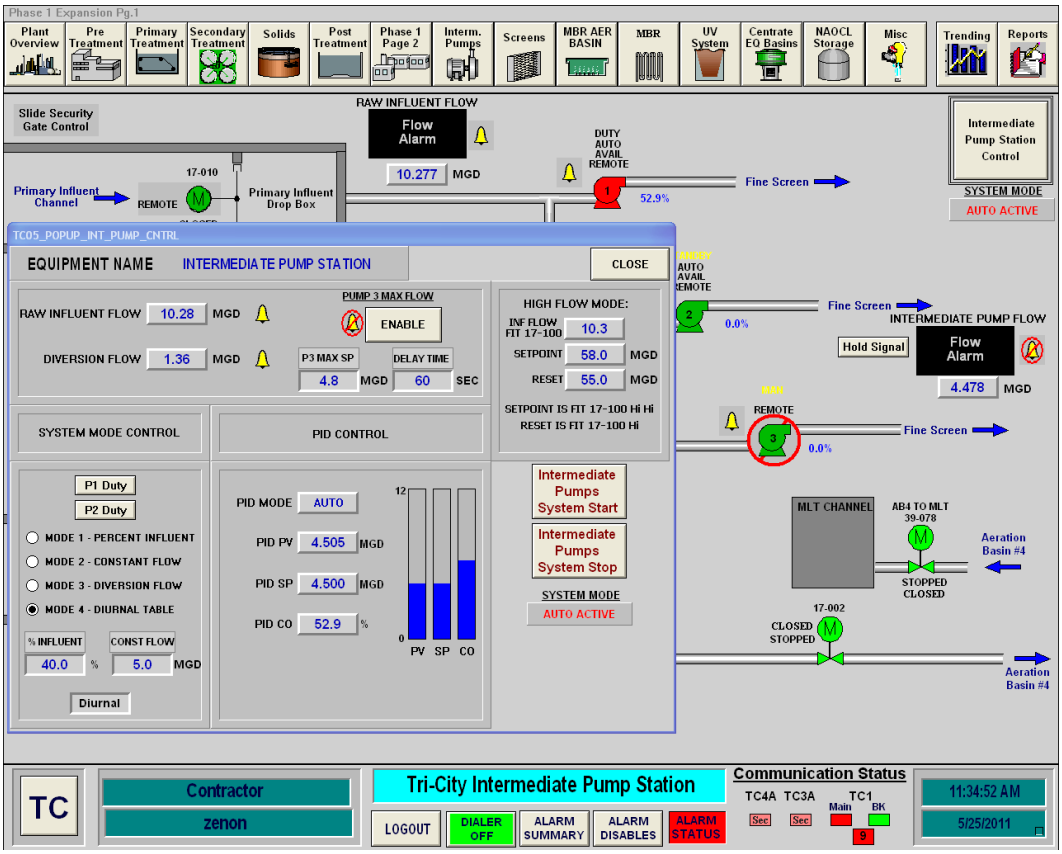

Figure 6.2.1-2 – Intermediate Pump Control Screen

Mode 3 – Diversion Flow

The diversion flow mode controls the set point flow at the same flow as the diversion flow. Under this mode, the flow to the membranes will vary with the diversion flow diurnal curve.

Mode 4 – Diurnal Table

The diurnal flow control mode allows for setting the flow rate on an hourly basis. The MBR plant flow will then match the desired set point. The operator can set the flow rate for each hour on the diurnal flow set point table.

High Flow Operation Controls

The set points to determine if the feed to the MBR plant will be from the primary effluent or primary influent box are entered on the Intermediate Pump Control Screen. The High Flow Mode Setpoint determines the flow that the flow to the station is changed from the primary effluent box to the primary influent box. The High Flow Mode Reset is the flow the flow is changed back to the primary effluent box.

Manual Control Through SCADA

Each pump can be controlled manually through SCADA. Selecting the pump icon to access the pump control box does this. In this box, the pump can be taken out of automatic mode and placed in manual mode. Once in manual mode, the pump can be started and stopped from the screen. The pump flow rate is selectable by adjusting the percent speed of the pump.

Intermediate Pump Station Sustainable Features

The intermediate pump station has been designed with sustainable features.

Energy Efficient Pumps

The pumps in the station are high efficiency Wemco Hydorstall pumps. These pumps provide high volume low head pumping and are the most energy efficient pump available for this application. Each pump also maintains its efficiency throughout its pumping range and provides a wide range of flows with a turndown to 20% of output.

Phased Expansion

The station currently has three pumps. The smaller pump No. 3 will be removed and replaced with a larger pump similar to pump Nos. 1 and 2 with the first expansion to take the station capacity to 20-mgd. The station is then designed to add one additional pump at 10-mgd each up to a firm capacity of 50-mgd with a total of six pumps.

Intermediate Pumping Master Plan

The intermediate pump station can is designed for a peak firm capacity of 50-mgd. This will be done by the replacement of intermediate pump No. 3 with a 10-mgd pump, the addition of a fourth 10-mgd pump to the existing station and then expanding the station into the open area towards the UV building and adding two additional 10-mgd pumps. The south wall of the station has been designed with knockouts to provide access to the new pump room. The suction header has been designed to provide for the build-out flows. Each pump will pump through a dedicated discharge pipe to the fine screen influent channel.