

6.3.1 Fine Screening Overview

The fine screens receive flow from the intermediate pumps and provide screening of the MBR feed prior to the MBR aeration basin. The screens are 2mm punch-plate screens that remove the fine material from the process stream to keep it from accumulating on the membrane fibers.

Process Overview

The fine screens are located at the ground level of the fine screen building. There are two band screens (Nos. 1 and 2) with a peak flow capacity of 15-mgd each. The system is designed to have one screen operating at a time.

Under normal operating mode, one of the screen channels will be in operation. The screen will accept flow from the influent channel. As the screen plugs, the level in the channel will rise to a point where the screen will turn on and go through a cleaning cycle. The screen will run and the screenings will be washed off of the screens into a trough. The trough drains to a sluice that transports the screenings to one of the two screenings washers. The screenings washer will wash the screenings and discharge then to the screenings dumpster. The screenings are then hauled to a landfill for final disposal. The operator determines the operating screen and screenings washer on the SCADA system control screens. The flow diagram is shown on **Figure 6.3.1-1**.

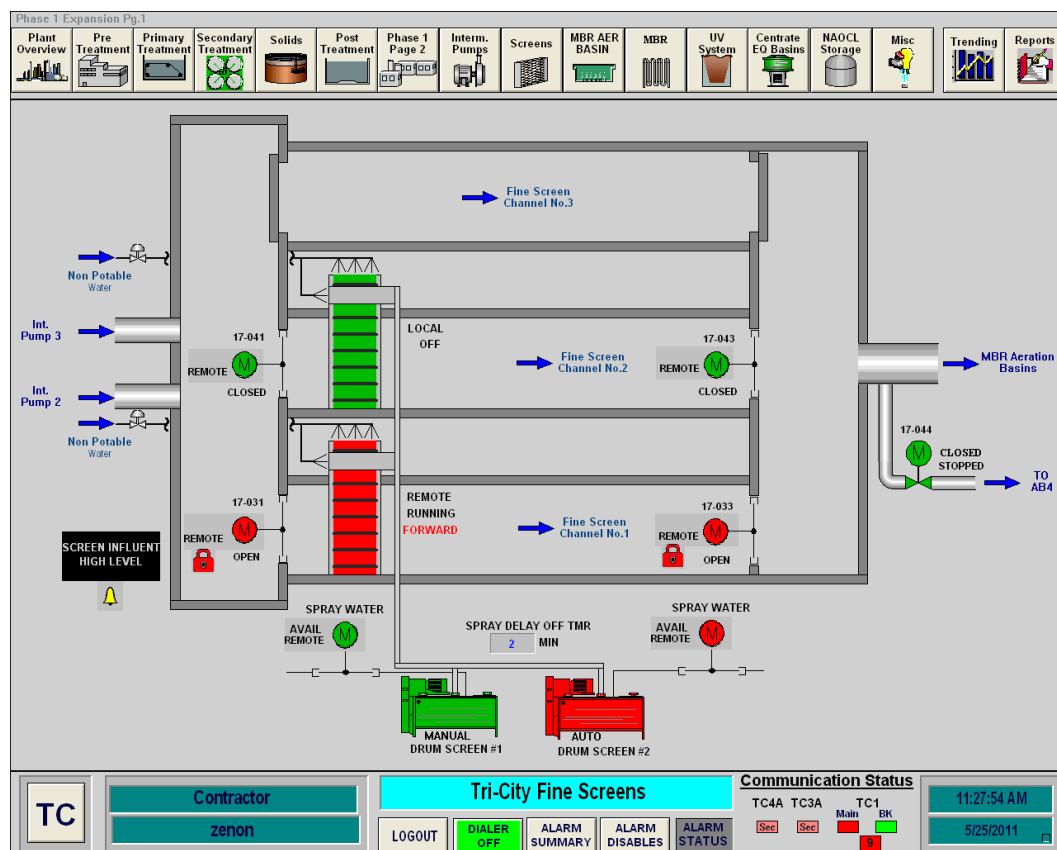


Figure 6.3.1-1 – Fine Screening Main Screen

Fine Screen Building Components

The fine screen building is made up of a number of components that operate interactively to provide automatic operation of the functions. These components are:

- Influent Channel
- Influent and Effluent Channel Gates
- Fine Screening
- Screenings Washing
- Influent Channel LEL Monitoring
- Fine Screen Building Odor Control

Influent Channel

The three intermediate pumps discharge into the influent channel of the Fine Screen Building. The influent channel distributes flow to one of three screening channels. Only two of the screening channels are in service with the third available for a future expansion. The channel has an overflow weir that overflows to the intermediate pump suction line. This prevents the channel from overflowing. A high level alarm will notify operations personnel of a high level condition and will also shut the intermediate pumps off.

Influent and Effluent Channel Gates

Each of the screenings channels has an influent and effluent gate. One pair of gates must be fully open before the intermediate pumps will operate in auto. The gates can be opened directly from SCADA with set in the REMOTE mode or can be operated locally at each gate valve actuator.

Fine Screening

The fine screens are 2mm band screens. The screen assembly is installed perpendicular to the channel so that the rotating perforated screen panels are parallel to the flow. The established flow pattern allows the channel flow to enter into the center of the screen and exit out the two sides of the assembly. As the screen collect debris, the screens plug and the level in the influent channel increases. When the influent channel reaches a preset level, the screen starts and the perforated panels rotate by a spray wash assembly that washes the collected debris from the screen discharging it into a trough that runs through the middle of the screen near the top of the unit. The spray water and solids are flushed from the screen to the screenings sluice. The screens have a timer override that will operate the screen at a preset time, if the screen has not operated on influent channel level. The start and stop level for screen washing can be adjusted at SCADA or on each screens control panel.

Screenings Washing

The screenings are sluiced to one of two internally fed rotary drum screens. The operator must manually direct the screenings to the proper washer by inserting a manual gate in the screenings sluice.

The wash water from the screen is sluiced to the drum screen that is on-line. The drum screen is a self-contained system that screens, washes and transports the screenings to a container for disposal. The wash water enters the head box of the drum screen where it is distributed on the drum. The screen is a 1mm woven mesh. A spray wash located outside of the drum screen along the top of the drum removes the solids from the

screen panels as the drum rotates and washes the collected solids to the bottom of the drum screen. The wash water flows through the screen as the screenings are deposited on the screen mesh. After the water flows through the screen, it is collected in the drain pan and flows to the waste line that flows by gravity back to the treatment plant influent pump station. The screenings that are collected on the 1 mm screen panels moves along the drum on the spiral rib attached to the inside of the drum. The collected solids are discharged at the end of the drum to the discharge chute that directs the screening to the dumpster. The dumpster is dumped with the rest of the screenings and grit for the treatment plant and hauled to a landfill for long-term disposal.

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.

Fine Screen Building Odor Control

Odorous air from the influent and effluent screenings channels is collected and discharged in the MBR odor treatment system. (See Odor Control Treatment for a description of this system's operation.)

Fine Screening Controls

The fine screening equipment can be operated through SCADA with limited access locally at the equipment. There are safety interlocks between the screening channels and the intermediate pumps to ensure that when the pumps operate that a screening channel is available.

Influent and Effluent Gate Controls

The influent gates can be opened and closed locally at the automatic gate operator located on each gate. Each gate can also be operated remotely through SCADA by placing the local gate controller in REMOTE. Both gates must be open for the intermediate pumps to operate.

Fine Screen Controls

Each fine screen has a dedicated control panel located next to the screen. The screen can be placed in LOCAL or REMOTE mode with a HAND-OFF-REMOTE selector switch located on the front of the panel. In the OFF mode, the Screen will not run. In HAND mode the Screen will run continuously. In REMOTE mode, AUTO mode is enabled. In AUTO mode, the Screen shall run when initiated by the one of the ultrasonic level sensors or by timer, whichever takes the longest to occur.

Each screen has a SCREEN REVERSE-JOG pushbutton located on the face of the screen's control panel. When the SCREEN REVERSE-JOG pushbutton is pushed, the Screen will run in reverse until the pushbutton is released. The SCREEN REVERSE-JOG pushbutton will only operate when the SCREEN HAND-OFF-REMOTE selector switch is in the HAND position.

Pushing the RESET pushbutton on the front of the control panel will reset the screen controller to correct a fail condition. There is also an EMERGENCY STOP pushbutton on the front of the panel. When the pushbutton is pushed, the controller will be de-energized and the equipment will stop.

The PLC setpoints can be accessed through an interface screen on the face of each control panel. The operator interface displays Fail and Operational Messages as well as allows for changing of setpoints. Operating setpoints can also be changed through the SCADA screens.

Screenings Washer Controls

The controls for the screenings washer are located in the MCC panel. The screening washer is placed into HAND or AUTO mode with the HAND-OFF-AUTO selector switch for the drum screen and drum screen spray wash located on the MCC panel. In HAND, the screenings washer will operate continuously. In AUTO, the screenings washer will start when one of the fine screens wash cycle begins and will operate for the period of time as set on SCADA.

Fine Screen Building Sustainable Features

The fine screen building has been designed with several sustainable features to provide for economic expansion of the system as well as minimize energy use. In addition, the fine screen building has an interactive educational display that discusses screening in the treatment plant.

Phased Expansion

The station currently has three screening channels. Screens have been installed in two of the channels, one to meet current flow demands and a fully redundant unit. In the next expansion, a screen will be added to the third channel. This will provide adequate screening for up to a 30-mgd peak design flow to the MBR facility.

The screenings building was designed to be expanded to the south with the addition of two additional screening channels. The influent and effluent channels have been designed with knock-out walls to accommodate the expansion. A roll-up door has been placed on the south side of the screenings area to provide access to the new screenings room in the future.

The screenings building has been designed to have grit and screenings loading structure built on the east side of the building. This structure will contain the grit washers and hoppers for the new grit basin to be constructed on the north side of the screenings building as well as a screenings hopper. A conveyor will be installed to direct the screenings to the screenings hopper so the screenings dumpsters will no longer be needed. The hoppers will provide for loading the grit and screenings into a truck in an enclosed loading area.

Air Handling System Design

The screenings building has been designed to provide minimum ventilation airflow to minimize power consumption for ventilation and heating. The screenings room has a normal airflow to provide six air changes per hour. When the outside temperature drops to below 45°F, the ventilation rate will drop to provide three air changes per hour and a temperature of 45°F. Typical air change requirements for a screening building are twice this amount. The lower air changes were allowable because the screenings

channels are sealed from the room atmosphere and are kept negative as channel air is drawn to the odor control system. In addition, the air space in the screenings channel monitored with a Lower Explosion Limit (LEL) meter that will shut the intermediate pumps down if an explosive gas is ever measured in the air space.

In addition to the lower airflows, the air handling system is also controlled on building pressure. The supply air units provide a specific volume of air for six or three air changes. The exhaust fans adjust their airflow rate to provide a negative pressure of 0.1 psi inside of the building. This was done to ensure the proper ventilation rates are maintained as well as to ensure the fans worked in a compatible manner to optimize power use.

Fine Screen Building Heating

The fine screen building heating is provided by two air-handling units located on the mezzanine level of the building. These units have been installed with both a natural gas furnace as well as hot water coils for heating. The current system uses the natural gas furnace for heating. In the future, the system is designed to be added to an expanded hot water loop that will be installed with the solids handling building expansion that will provide heat from the engine generators.

The fine screen building also contains two electrical rooms: a substation and the electrical room that contains the VFDs and MCCs for fine screening and intermediate pumping. The ventilation system in the substation operates to keep the room from getting too warm. During the summer months, this system ventilates outside the building. During the winter months, this system ventilates to the fine screen room minimizing the heating requirements for the room. The electrical room is ventilated by two air conditioners located on the mezzanine level of the screenings room. If the electrical room needs cooled, the air conditioners discharge to the fine screen room providing additional heat to minimize the heating requirements.

Fine Screen Building Master Plan

The Fine Screen Building can be designed for a peak firm capacity of 60-mgd with five screens 15-mgd screens. This will be done by the installation of a screen in the third channel currently constructed in the Fine Screen Building. The screenings building was designed to be expanded to the south with the addition of two additional screening channels. The influent and effluent channels have been designed with knock-out walls to accommodate the expansion. A roll-up door has been placed on the south side of the screenings area to provide access to the new screenings room in the future.