Memorandum

To: CT #231837 Design Team

From: Georgia Conway

Subject: Conneaut WWTP NFA Improvements – Control Narrative

Date: 06/02/2024

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1. UV Disinfection – Specification Section 466656
    a. Basis of Design:
        i. Model: UV Signa
        ii. Manufacturer: Trojan Technologies
    b. Purpose and Function:
        i. Primary Function: Disinfection of wastewater by inactivating microorganisms and damaging their DNA.
        ii. Expected Performance: 126 CFU / 100 mL
    c. Operational Parameters:
        i. Capacity: 10.3 MGD
        ii. Optimal Conditions: 254 nm at 60% UV Transmittance.
    d. Control Strategy:
        i. Key Control Parameters:
            1. Automatic flow and water quality paced PLC control system, provided by equipment manufacturer. Lamps will energize and de-energize to maintain required UV dosage and adjusts UV intensity in proportion to wastewater flow rate.
        ii. Automatic/Manual Operation Procedures:
            1. Includes HAND-OFF-AUTO switches for each UV bank.
            2. Emergency Stop
        iii. SCADA Monitoring:

1. Monitor for all parameters monitored in the manufacturer provided control system.

iv. SCADA Control:

1. The following control capabilities shall be available to the WWTP operator via the SCADA system:

a. Ability to select automatic / manual operation.

b. Ability to remotely start and stop the UV disinfection process. This includes controlling individual banks of UV lamps or the entire UV system as needed.

c. Control of the automatic mechanical/chemical cleaning system for the UV lamps, including initiation cleaning cycles or manual overrides as necessary.

d. Ability to acknowledge/reset various system alarms.

e. Adjust settings of monitoring systems.

f. Initiate emergency shutdown procedures.

g. Access to historical data.

h. Manual override capabilities for critical functions in case of automatic control failures.

i. Remote access for monitoring and control.

2. Final Clarifiers – Specification Section 464321.00 – Circular Clarifier Equipment

a. Basis of Design:

i. Manufacturer: Clear Stream

b. Purpose and Function:

i. Final clarification follows the biological treatment process completed in aeration tanks. The sludge that is settled in the final tank is partially returned to the aeration process as “Return Activated Sludge” that serves to maintain the biomass of microorganisms and sustain biological treatment.

c. Control Strategy:

i. SCADA Monitoring

1. Monitor for all parameters monitored in the manufacturer provided control system, including the display of any alarms, whether the mechanism is currently on or off, and the load on the mechanism.

ii. SCADA Control

1. Reset any alarms.

2. Turn mechanisms on or off.

3. Remote access for monitoring and control.

3. Return Activated Sludge (RAS) Pumps

a. Basis of Design:

i. Manufacturer: Hayward Gordon Screw Centrifugal Pumps

b. Purpose and Function:

i. Manage flow of return activated sludge (RAS) to the aeration tanks.

c. Operational Parameters:

i. Pump Capacity: 833 GPM at 4.75 ft TDH.

d. Control Strategy:

i. Key Control Parameters:

1. Pump manufacturer provided control system, with automatic VFD adjustments to maintain a set RAS flow as percentage of the WWTP influent flow meter.

2. The operator needs the ability to adjust the VFDs independently of the influent flow.

ii. Automatic/Manual Operation Procedures:

1. Automatic control based on the influent flow.

2. Manual control based on VFD adjustments.

3. Includes HAND-OFF-AUTO selector switch and emergency stop for each pump.

iii. SCADA Monitoring:

1. Display pump speed as % of maximum speed.
2. Display RAS flow rate as % of WWTP influent flow.
3. Monitor for all parameters monitored in the pump manufacturer provided control system.

iv. SCADA Control: The following controls capabilities shall be available to the WWTP operator via the SCADA system:

1. Ability to select automatic/manual operation.
2. Manual adjustments of pump flow rates via VFDs.
3. Adjust RAS flow rate as % of WWTP influent flow.
4. Manual selection of lead pump.
5. Control over pump start/stop operations.
6. Ability to acknowledge/reset various system alarms.
7. Manual override capabilities in case of automatic control failures.
8. Initiate emergency shutdown procedures.
9. Access to historical data.
10. Remote access to monitoring and control.

4. Waste Activated Sludge (WAS) Pumps

a. Basis of Design:

i. Manufacturer: Hayward Gordon Screw Centrifugal Pumps

b. Purpose and Function:

i. Manage flow of Activated Sludge to waste.

c. Operational Parameters:

i. Pump Capacity: 250 GPM at 16 TDH.

d. Control Strategy:

i. Key Control Parameters:

1. Pump manufacturer provided control system, with automatic VFD adjustments to maintain a set RAS flow as percentage of the WWTP influent flow meter.

2. The operator needs the ability to adjust the VFDs independently of the influent flow.

ii. Automatic/Manual Operation Procedures:

1. Automatic control based on the influent flow.

2. Manual control based on VFD adjustments.

3. Includes HAND-OFF-AUTO selector switch and emergency stop for each pump.

iii. SCADA Monitoring:

1. Display pump speed as % of maximum speed.

2. Display RAS flow rate as % of WWTP influent flow.

3. Monitor for all parameters monitored in the pump manufacturer provided control system.

iv. SCADA Control: The following controls capabilities shall be available to the WWTP operator via the SCADA system:

1. Ability to select automatic/manual operation.

2. Manual adjustments of pump flow rates via VFDs.

3. Adjust RAS flow rate as % of WWTP influent flow.

4. Manual selection of lead pump.

5. Control over pump start/stop operations.

6. Ability to acknowledge/reset various system alarms.

7. Manual override capabilities in case of automatic control failures.

8. Initiate emergency shutdown procedures.
9. Access to historical data.
10. Remote access to monitoring and control.

5. Existing Influent Screen
    a. Existing Equipment Information:
        i. Model: Flex Rake
        ii. Manufacturer: Duperon
    b. Components:
        i. Two mechanical bar screens
        ii. One manual bar screen.
    c. Purpose and Function:
        i. Removal of debris from incoming wastewater.
    d. Operational Parameters:
        i. Average Design Flow: 3 MGD
    e. Control Strategy:
        i. Key Control Parameters:
            1. Manufacturer provided PLC control system with automatic adjustments based on water level.
        ii. Automatic/Manual Operational Procedures:
            1. Includes HAND-OFF-AUTO selector switch, FORWARD-OFF-REVERSE selector switch, and emergency stop.
        iii. SCADA Monitoring:
            1. Monitor all parameters monitored on the manufacturer provided control system.
        iv. SCADA Control:

1. Ability to start/stop each bar screen.
2. Ability to select automatic/ manual operation.
3. Ability to select the screen direction.
4. Ability to acknowledge/reset various system alarms.
5. Access historical data.
6. Initiate emergency shutdown procedures.
7. Remote access to monitoring and controlling.

6. Existing Grit Equipment
    a. Basis of Design:
        i. Model:
        ii. Manufacturer: Smith and Loveless Inc.
    b. Purpose and Function:
        i. Removal of grit from wastewater using a vortex type grit chamber, grit concentrator, and grit washer.
    c. Operational Parameters:
        i. Average Design Flow: 3 MGD.
    d. Control Strategy:
        i. Key Control Parameters:
            1. Manufacturer provided PLC control system.
        ii. Automatic/Manual Operational Procedures:
            1. ON-OFF selector switch for each motor starter.
            2. MOMENTARY-OFF-AUTOMATIC selector switch for each grit pump.
        iii. SCADA Monitoring:

1. Monitor for all parameters monitored in the manufacturer provided control system.

iv. SCADA Control:

1. Ability to start/stop operations.
2. Ability to acknowledge/ reset various system alarms.
3. Adjust settings of monitoring systems.
4. Emergency shutdown procedures.
5. Access to historical data.
6. Remote access to monitoring and controlling.

7. Aeration System: Blowers (Existing), Air Control Valve, Dissolved Oxygen Sensors, and MLSS Sensor

a. Components:

i. Two blowers (existing).

ii. Two dissolved oxygen sensors, one per tank.

iii. 2 air control valves, 1 per tank.

iv. Two MLSS sensors, one per tank.

b. Purpose and Function:

i. Control airflow to the aeration tanks using a system of blowers, butterfly valves and dissolved oxygen sensors.

ii. Adjust air control valves and blower speeds based on dissolved oxygen readings to maintain optimal dissolved oxygen levels.

iii. Report MLSS Concentration

c. Operational Parameters:

i. Dissolved oxygen: 0-20 mg/L.

ii. MLSS: 0-30 g/L.

d. Control Strategy:

i. Key Control Parameters:

    1. Air control valves will open/close to maintain the dissolved oxygen setpoint. As the valves open/close, the air header pressure will change.

    2. Blower manufacturer control system, with automatic VFD adjustments to maintain the pressure setpoint.

ii. Automatic/Manual Operation Procedures:

    1. Blower HAND-OFF-AUTO selector switch.

    2. Manual override for individual components.

iii. SCADA Monitoring:

    1. Monitor for all parameters monitored in the blower manufacturer control system.

    2. Any parameters monitored by each component's control system.

    3. Display the dissolved oxygen concentration in mg/L.

    4. Display valve position as percent.

    5. Display air header pressure.

    6. Display MLSS concentration in mg/L or g/L.

iv. SCADA Control:

    1. Ability to select automatic/manual operation.

    2. Control over start/stop operations for blowers.

    3. Adjust valve positions.

    4. Adjust dissolved oxygen setpoint.

    5. Adjust pressure setpoint.

    6. Ability to acknowledge/ reset various system alarms.

    7. Manual override capabilities for control failures.

    8. Access to historical data.

9. Emergency shutdown procedures.

10. Remote access to monitoring and controlling.

8. Primary Distribution: Bypass Modulating Valve

   a. Purpose and Function:

      i. Manage flow to the primary clarifiers to prevent flooding.

   b. Operational Parameters:

      i. Capacity of each Primary Clarifier: 3.5 MGD

      ii. Bypass flow at peak hourly design flow: 3 MGD

   c. Control Strategy:

      i. The modulating valve will be controlled to maintain a maximum level in the primary distribution chamber to prevent flooding. The initial level at which the valve should start opening will be set to 583.75 and can be adjusted manually by the operator from the SCADA system. The valve will begin closing when the level falls below the set level or when the flow falls below 7MGD. Field calibration will be necessary to determine/verify the set point elevations at 7 MGD and 10 MGD. A pressure transducer shall be installed in the primary distribution tank to monitor the level. The pressure transducer shall be MultiTrode by Xylem or Engineer Approved equivalent. The signal from the pressure transducer needs to be routed to the control panel.

Existing Primary Distribution Chamber Level	Flow (MGD)	Initial Set Level
583.75	7	Begin Opening Valve with Rising Level
584.4	10	Water Elevation at Which Valve Should be 100% open

      ii. SCADA Monitoring:

         1. Display valve position as percent.

         2. Display set point elevation.

         3. Display increment of position change of valve movement range, as percent.

4. Display the primary distribution chamber level.
5. Display alarm when the level of the primary distribution chamber exceeds set point.

iii. SCADA Control:

1. Ability to select automatic/manual operation.
2. Ability to acknowledge/reset alarms.
3. Ability to manually set valve position as percent.
4. Remote access to monitoring and controlling.