AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Town of Greater Napanee, Ontario
Filter Preliminary Process Design Submittal

Date: November 8, 2023

Project Application Engineer
Phone: 815-639-4568 | Fax: 815-654-8258
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AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Town of Greater Napanee, Ontario

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November 8, 2023

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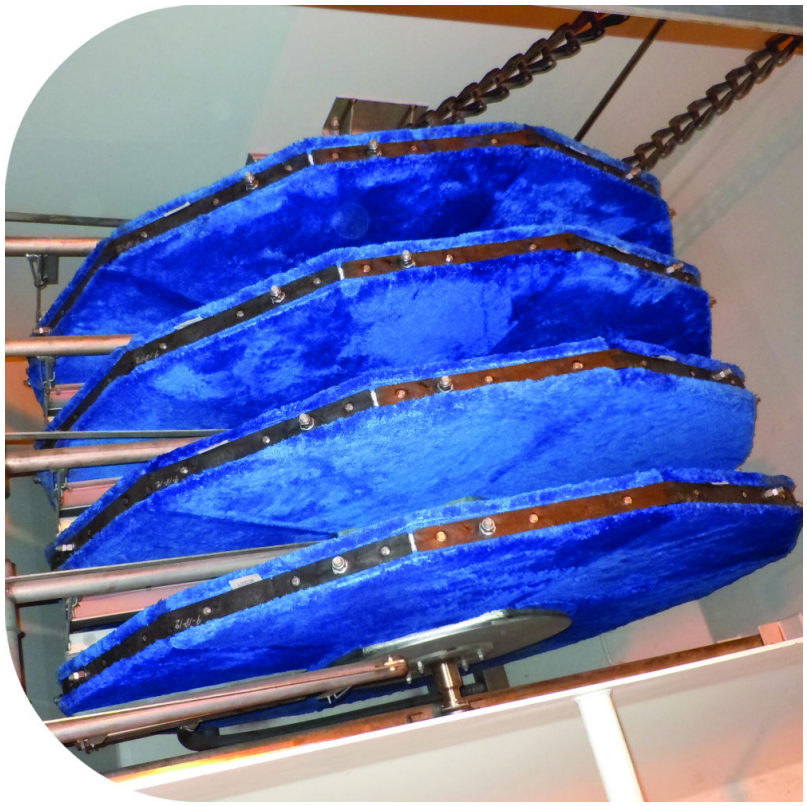
AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Process Design Report

NAPANEE WWTP ON

Design# 172013
Option: Filter Pre-Selection Design



AquaDisk®

Cloth Media Filter

October 04, 2023
Designed By: Natalie Watson

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Design Notes

Process/Site

- To achieve the effluent monthly average total phosphorus limit, the biological process, chemical feed systems, and Cloth Media Filters need to be designed to facilitate optimum performance.

- A minimum of twelve (12) daily composite samples per month (both influent and effluent) shall be obtained for total phosphorus analysis.

- Chemical addition (i.e. metal salts, and/or polymer) shall be furnished prior to the filter. Adequate rapid mixing must be provided as part of the chemical feed system. The chemical dosage should be flow-paced and controlled to avoid overdosing. Jar testing with various metal salts and polymers is recommended to determine the most effective metal salt and polymer as well as the optimum dosages of each, and to estimate the degree of phosphorus removal that can be achieved. In addition, a pilot study may be required to verify the actual performance capability.

- Provisions for a flocculation tank with a minimum of 5-minute HRT at the maximum daily flow shall be furnished after chemical addition and prior to the filter.

- pH monitoring in the range of 6.5-8.5 of the biological reactor is required when adding metal salts.

- The cloth media filter will only remove TP that is associated with the TSS removed by the filter. Since only insoluble, particle-associated phosphorous is capable of being removed by filtration, phosphorous speciation shall be provided by the owner to substantiate the concentrations of soluble and insoluble phosphorous in the filter influent. If the proportions of soluble (unfilterable) and insoluble phosphorous are such that removal to achieve the desired effluent limit is not practical, the owner will provide for proper conditioning of the wastewater, upstream of the filter system, to allow for the required removal.

- The average and maximum design flow and loading conditions, shown within the report, are based on average daily and peak instantaneous conditions, respectively.

Filtration

- The cloth media filter recommendation and anticipated effluent quality are based upon influent water quality conditions as shown under "Design Parameters" of this Process Design Report.

- The filter influent should be free of algae and other solids that are not filterable through a nominal 5 micron pore size media. Provisions to treat algae and condition the solids to be filterable are the responsibility of others.

- The cloth media filter has been designed to handle the maximum design flow while maintaining one unit out of service.

Equipment

- Scope of supply includes freight, installation supervision and start-up services.

- Equipment selection is based upon the use of Aqua-Aerobic Systems' standard materials of construction and electrical components, suitable for non-classified electrical environments.

- If the cloth media filter will be offline for extended periods of time, protection from sunlight is required.

AquaDisk® Tertiary Filtration - Design Summary

DESIGN INFLUENT CONDITIONS

Pre-Filter Treatment: AquaNereda

Avg. Design Flow	= 3.04 MGD	= 2109.71 gpm	= 11500.00 m³/day
Max Design Flow	= 11.18 MGD	= 7766.66 gpm	= 42336.00 m³/day

DESIGN PARAMETERS	Influent	mg/l	Effluent Required	<= mg/l	Effluent Anticipated	<= mg/l
Avg. Total Suspended Solids:	TSSa	15	TSSa	10	TSSa	10
Max. Total Suspended Solids:	TSSm	25	--	--	--	--
Phosphorus:	Total P	0.8	Total P	0.1	Total P	0.1

AquaDisk FILTER RECOMMENDATION

Qty Of Filter Units Recommended	= 3
Number Of Disks Per Unit	= 12
Total Number Of Disks Recommended	= 36
Total Filter Area Provided	= 1936.8 ft² = (179.93 m²)
Filter Model Recommended	= AquaDisk Package: Model ADFSP-54 x 12E-PC
Filter Media Cloth Type	= OptiFiber PES-14®

AquaDisk FILTER CALCULATIONS

Filter Type:

Vertically Mounted Cloth Media Disks featuring automatically operated vacuum backwash . Tank shall include a rounded bottom and solids removal system.

Average Flow Conditions:

Average Hydraulic Loading = Avg. Design Flow (gpm) / Recommended Filter Area (ft²)
= 2109.7 / 1936.8 ft²
= 1.09 gpm/ft² (2.66 m/hr) at Avg. Flow

Maximum Flow Conditions:

Maximum Hydraulic Loading = Max. Design Flow (gpm) / Recommended Filter Area (ft²)
= 7766.7 / 1936.8 ft²
= 4.01 gpm/ft² (9.80 m/hr) at Max. Flow

Solids Loading:

Solids Loading Rate = (lbs TSS/day at max flow and max TSS loading) / Recommended Filter Area (ft²)
= 2331.9 lbs/day / 1936.8 ft²
= 1.20 lbs. TSS /day/ft² (5.87 kg. TSS/day/m²)

The above recommendation is based upon the provision to maintain a satisfactory hydraulic surface loading with (1) unit out of service. The resultant hydraulic loading rate at the Maximum Design Flow is: 6 gpm / ft² = (14.7 m/hr)

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaDisk® Cloth Media Filter
Process Performance Guarantee
for
Napanee WWTP ON
November 8. 2023

Aqua-Aerobic Systems, Inc. (Aqua-Aerobic) guarantees the AquaDisk® Cloth Media Filters in accordance with Specification Section 46 730 00 dated September 5, 2023 and Addenda 1-2, Aqua-Aerobic's Design #172013 and Design Notes dated October 4, 2023 shall provide an average monthly filtered effluent TSS of 10 mg/l and TP of 0.1 mg/l during the performance test.

The guarantee shall apply under the following conditions:

1. The influent flow is supplied to the filter(s) on a continuous basis at an average daily flow not to exceed a rate of 11,500 m^3/day and a peak flow rate not to exceed 42,336 m^3/day and:
    a. Filter influent TSS concentration shall not exceed 15 mg/l (daily average) and 25 mg/l maximum.
    b. Filter influent TP concentration shall not exceed 0.8 mg/l (daily average).
    c. Daily average TSS concentrations are based on 24-hour composite samples. Maximum TSS concentrations are based upon grab samples at any time.
    d. Filter influent solids loading shall not exceed 5.9 kg TSS/m^2/day.
    e. Hydraulic loading to the Cloth Media Filter shall not exceed 2.7 m^3/m^2/hr of disk area at average daily flow and 9.8 m^3/m^2/hr at peak flow. The sustained peak flow shall not exceed 3 hours.
    f. Wastewater entering the Cloth Media Filter is effluent from an AquaNereda process.

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2. The influent TSS and phosphorus are capable of being removed by filtration as determined by an Aqua-Aerobic approved bench pilot filter operated at the proportionate filter design flow and solids loading rate and equipped with media identical to the installed equipment.
3. The filter is installed, operated and maintained in accordance with instructions supplied by Aqua-Aerobic.
4. The equipment has been paid for in accordance with contract terms.
5. A performance test is conducted according to the approved Field Process Performance Test Protocol, dated November, as submitted by Aqua-Aerobic.
6. Data during the performance test shall be sent to Aqua-Aerobic within one week of said testing.
7. The process guarantee shall be considered satisfied upon successful completion of the performance test.
8. Start-up shall be defined by the date stated on Aqua-Aerobic's "Manufacturers Certificate of Inspection" form executed upon completion of start-up services.
9. Should the filter system not meet the guaranteed performance:
    a. The guarantee shall be considered invalid if the influent parameters do not conform to Conditions 1 and 2.
    b. In the event that the influent parameters are within the limits specified under Conditions 1 and 2, Aqua-Aerobic shall have up to 30 days to modify the filters as necessary to achieve the guaranteed performance.
10. If failure to produce the guaranteed effluent is due to influent quality not in conformance with Conditions 1 or 2, the Owner shall have up to 30 days to bring the filter influent to specified limits. If the Owner is unable to produce the specified influent conditions within 30 days, the guarantee will be considered to be satisfied.
11. This guarantee shall no longer be applicable or valid if any product, including any software program, supplied by Aqua-Aerobic, is modified or altered without the written approval of Aqua-Aerobic.

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12. In the event of continued failure of the equipment to produce the guaranteed effluent characteristics at no fault of the owner, Aqua-Aerobic shall have the option to modify the filter(s) as necessary to achieve the guaranteed performance. The maximum cumulative liability to Aqua-Aerobic for the modification or supply of additional equipment shall be limited to 100% of the initial sales price of the equipment supplied.

Aqua-Aerobic Systems, Inc.

_____ _____
Mark Hughes, P.E. Execution Date
Director of Product Management

_____
Customer / Owner Company Name

_____ _____
Authorized Signature Execution Date

_____
Title

NOTE: Aqua-Aerobic Systems, Inc. will execute the process performance guarantee upon receipt of a purchase order, acceptance of terms and conditions and approved submittal drawings.

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AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaDisk® Cloth Media Filter
Field Process Performance Test Protocol
for
Napanee WWTP ON
November 8, 2023

Introduction:

To satisfy Specification Section 46 73 00, dated September 5, 2023 and Addenda 1-2, the following field process performance test shall be performed.

Protocol:

1) The filter(s) will be tested for a period of twelve (12) total working days (3 weeks, days/week) to assess process performance. The field performance testing shall be conducted no later than sixty (60) days after startup or beneficial use. The start date shall be mutually agreed upon by the Engineer, Owner, Installing Contractor, and Aqua-Aerobic Systems. Under supervision of the Owner, Aqua-Aerobic Systems' field service representative will conduct the testing and shall employ the services of a local certified laboratory facility to perform sample analysis in accordance with this testing procedure. The Engineer and the Owner shall have the right to witness the performance test.

2) The performance test shall be executed using plant secondary effluent after the plant processes have stabilized and the plant is performing according to the design specified operating requirements. The filter influent loading conditions shall be in accordance with the values stated in the project bid specifications as referenced in the "Performance and Design Parameters" section of this document. In the event that the filter influent does not meet this criteria, the testing shall be postponed or the performance expectations adjusted as mutually agreed to by the Owner, the Engineer, and Aqua-Aerobic Systems.

   Prior to executing the performance test and following plant process stabilization, including the proper chemical conditioning of the wastewater for the conversion of soluble ortho-phosphorous to particulate form, the Owner shall perform a speciation analysis of the Total Phosphorous (TP). The speciation analysis shall

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be representative of the typical filter influent stream and show respective concentrations of reactive and non-reactive soluble and insoluble phosphorous components and shall be forwarded to Aqua-Aerobic Systems for review. Execution of the performance test shall not take place until it is mutually determined by the Consulting Engineer and Aqua-Aerobic Systems that the phosphorous speciation is representative and acceptable.

3) Testing will be done simultaneously on all filter(s). The filter(s) will be tested for twelve (12) total working days. The actual flow at the time of testing will be monitored and equally split to all filter(s) units. If the flow rate does not reach the targeted flow conditions, filter(s) will be taken offline as needed to simulate target flow conditions. If the target flow conditions cannot be achieved while a single filter is in operation, the test will be conducted on a single filter with the available flow.

4) Daily composite samples consisting of a minimum of four (4) grab samples per hour will be taken from either the secondary clarifier effluent box (mid-depth) or the influent weir (mid-depth) and from each of the filter(s) outlets (mid-depth). Daily composite samples shall be collected, stored, and analyzed for TSS, turbidity, TP and Soluble P according to the latest edition of Standard Methods for the Examination of Water and Wastewater. Testing shall be done by the local certified laboratory facility using personnel and equipment provided by the laboratory. Expedited service from the laboratory shall be requested to ensure that results return within the period of the performance test. Aqua-Aerobic Systems shall furnish all labor, materials, equipment, autosamplers, laboratory services, instrumentation, and any other equipment and services necessary for conducting the field performance testing. The Owner shall furnish all electric, water and other utilities. Phosphorous analyses shall report the concentrations of reactive and non-reactive soluble and insoluble phosphorous.

5) The party responsible for conducting the field performance test shall compile all influent and effluent TSS, turbidity, TP and Soluble P data onto an Excel® spreadsheet and graph the data to clearly show performance compliance. Any data collected by the contractor, the owner, or the manufacturer during the performance testing shall be submitted to the party responsible for conducting the field performance test to be incorporated into this summary.

6) The party responsible for conducting the filter performance test shall compile the filter(s) influent flow rates using the influent flowmeter and the conversion to filtration rates shall be summarized on an Excel® spreadsheet. NOTE: Alternatives to an influent flowmeter are measuring the nappe over the influent weir or readings from an effluent flowmeter. However, these alternatives are less desirable.

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7) The backwash pumping rate for the test will be measured by a flow meter provided by Aqua-Aerobic Systems and installed by the Installing Contractor. The backwash water volume used shall be calculated based upon the actual pumping rate determined from the flow meter multiplied by the duration of each pump runtime during backwash. Flow meter performance shall be validated with a draw-down test prior to commencement of the performance test.
8) A testing day will run from 8:00 am until 8:00 am of the following day.
9) In the event of failure of the equipment to produce the required effluent characteristics during the performance testing, Aqua-Aerobic Systems shall have the option to modify the filter(s) as necessary to achieve the guaranteed performance testing. The maximum liability to Aqua-Aerobic Systems for the modification or supply of additional equipment shall be limited to 100% of the initial sales price of the equipment supplied.

Evaluation:

The AquaDisk® Cloth Media Filter(s) shall have demonstrated the following specified performance parameters based upon the following specified filter(s) influent conditions:

Performance and Design Parameters:

a. Wastewater Flow:

Average Daily Flow: 11,500 m^3/day

Max Daily Flow: 42,336 m^3/day

b. Filter Influent Characteristics:

	Influent
Average Monthly TSS (mg/l)	15
Max. TSS (mg/l)	25
Average Monthly TP (mg/l)	0.8

c. Filter Effluent Characteristics:

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	Effluent
Average Monthly TSS (mg/l)	10
Average Monthly TP (mg/l)	0.1

Reporting of Results:

Aqua-Aerobic Systems, Inc. shall write a report to show the individual and average flow rates, TSS, turbidity, TP and Soluble forms of P concentrations, recorded during the field process performance test and shall conclude whether the filter(s) have met the performance as specified.

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AquaDisk® Cloth Media Filter(s) Field Performance Testing

Performance Test Data

Test Unit

Witnessed By: _____ Date: _____

_____

_____

_____

Time	Influent Flow rate (MGD)	Influent TSS / NTU (mg/l)	Effluent TSS / NTU (mg/l)	Influent TP (mg/l)	Effluent TP (mg/l)	Influent Soluble P (mg/l)	Effluent Soluble P (mg/l)

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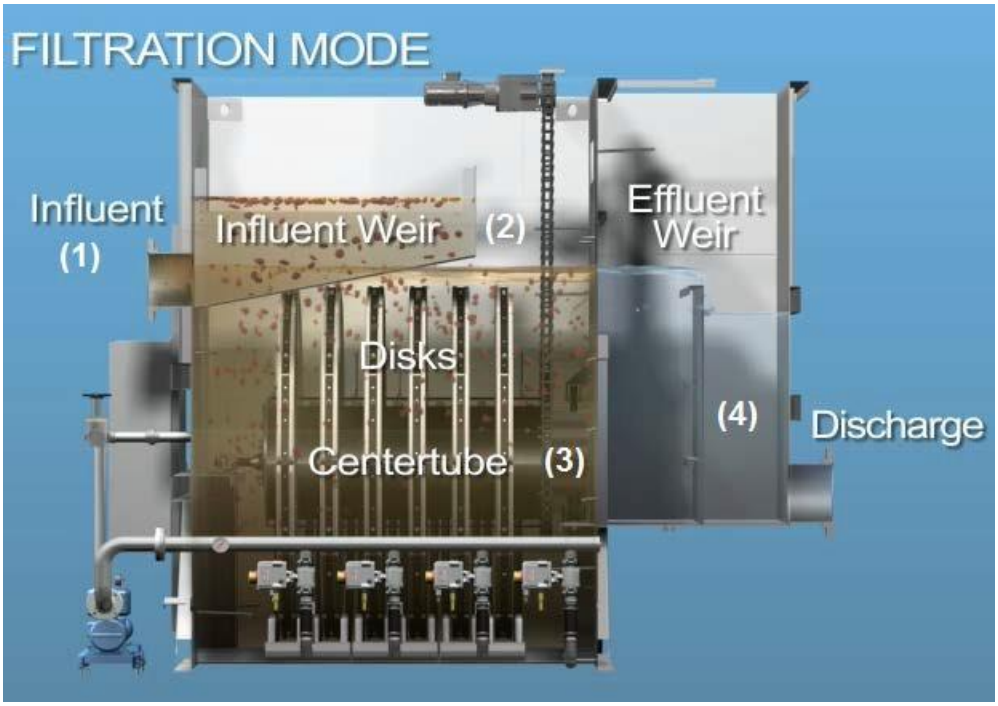
AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaDisk® Cloth Media Filter
Operational Description

The AquaDisk® Cloth Media Filter is a complete system for continuously removing particulates from a flow stream. The system's operational strategy consists of three modes: Filtration, Backwash, and Solids Wasting. A programmable logic controller (PLC) based control system provides for automatic operation of all process modes.

Filtration Mode

The influent pipe (1) routes flow to the filter basin (2), where filtration occurs. The filter basin contains a series of circular disks covered with a unique pile cloth media. As water passes through the media via an outside-in flow path, some particulates are removed and stored within the pile cloth media while others are deposited on the pile cloth media surface. Filtered water, or filtrate, is collected in a centertube (3) and flows, via gravity, over the effluent weir and into the effluent chamber (4) prior to discharge. It is important to note that during filtration, the disks do not rotate.



Normal Operation

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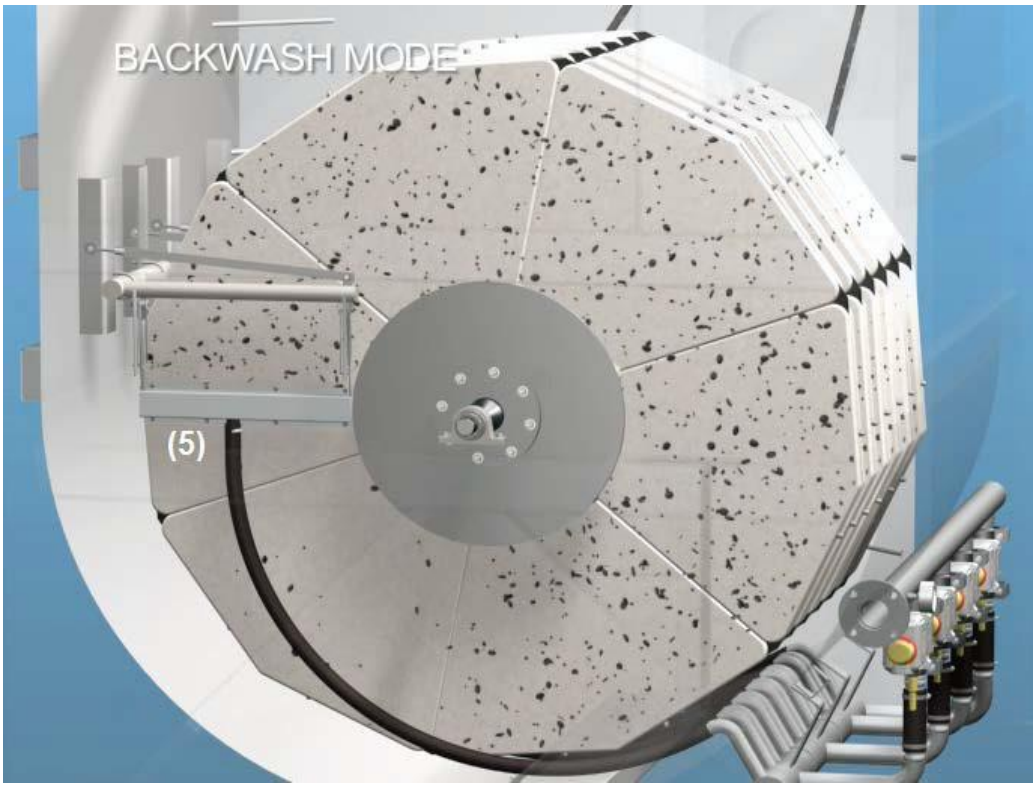
Backwash Mode

As the amount of particulates on and within the pile cloth media increases, the static pressure required to pass water through the pile cloth media increases. This results in an increased water level within the filter basin and increased differential pressure on the pile cloth media. Upon reaching a specific basin level or elapsed time period, the backwash mode will be automatically initiated to clean the pile cloth media.

Solids are backwashed from the pile cloth media surface by liquid suction through backwash shoes (5) positioned on both sides of each disk. These spring loaded backwash shoes contact the pile cloth media to provide the necessary suction for optimum cleaning efficiency. During backwash, disks are cleaned in multiples of two, unless the filter has only one disk. The disks rotate slowly while a backwash/waste pump (not shown) draws filtered water from the centertube through the pile cloth media on an inside-to-outside, or reversed, flow path. This provides effective cleaning of the pile cloth media over the entire disk. By the end of the backwash cycle, the basin water level returns to its normal operating level. Backwash water is typically directed to the headworks.

Filtration continues while the filter is in backwash mode. This feature allows continuous filtration while maintaining efficient filter performance.



Backwash Shoes Clean Media

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Solids Wasting Mode

A quiescent environment during filtration, combined with the outside-in filtration flow path, allows heavier particulates to settle to the bottom of the filter basin. Upon reaching a specific number of backwash cycles performed, or an elapsed time, the solids waste mode will be automatically initiated. The solids waste mode utilizes the backwash/waste pump to provide suction of the settled solids through a perforated solids collection manifold (6). Since solids wasting occurs immediately after a backwash cycle is completed, the backwash/waste pump remains on during the backwash-to-solids waste mode transition. The solids are pumped on an intermittent basis, typically to the headworks.

Filtration continues while the filter is in solids waste mode. This feature allows continuous filtration while maintaining efficient filter performance.

Settled Solids Removal

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Control System

AquaDisk filter operation is automatically controlled by a programmable logic controller (PLC). For multiple filter installations, the PLC based control systems are networked with the SCADA for monitoring or intercommunication purposes.

PLC Equipment Description

The PLC system monitors, regulates and sequences all automatic functions. PLC inputs are via 16 point (120 VAC) discrete or 8 point (4-20mA) analog input modules, while outputs are via 16 point discrete (Relay) or 4 point (4-20mA) analog output modules. In the case of a power loss, the system will resume operation at the point from where they left off as soon as power is restored. On power-up, any multiple motor starts will commence at 10-second intervals. The PLC processors are equipped with a battery to provide ladder program and data table memory support in case of a power failure.

Automatic Operation

PLC systems allow the AquaDisk filter system to perform all the standard functions and provide maximum flexibility for variation in control strategies. Aqua-Aerobic Systems, Inc. provides all standard and customized programs through our in-house Electrical Engineering group. For the AquaDisk filter, these systems are level based with time overrides. They also provide a complement of fully adjustable set points in addition to filter system monitoring.

Manual Override

Aqua-Aerobic Systems control panels are equipped with Hand/Off/Auto motor switches that will allow for switching the respective hand switch from auto to the desired position to operate any motor independent of the current PLC command.

Local Operator Interface Panel

Each PLC control panel is equipped with a Panelview Plus Human Machine Interface (HMI) unit manufactured by Allen-Bradley. The operator interface unit features a color LCD touch screen display and communicates directly to the PLC. This HMI unit will allow the changing of counter and timer values to adjust the various plant controls. The ability to monitor basic system status throughout the plant is also provided at this unit.

This display contains various display pages used to provide the operator with filter status and alarm information. There are also pages from which the operator enters changes to process variables and timers to control the automatic sequencing.

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Interface Operation

Some of the various screens available through the local operator control panel are listed below:

- System status
- Backwash interval/duration adjust
- Sludge waste interval/duration adjust
- Elapsed time meters and totalizers (motors and process)
- Backwash interval history
- Alarm display
- Alarm history

Controls Programming Documentation

As a standard procedure, Aqua-Aerobic Systems will provide a written control strategy with the equipment submittal information. In addition to the control strategy, we can also provide the PLC programming documentation for onsite troubleshooting purposes. Due to the proprietary nature of the program, a confidentially agreement is necessary if this information is provided.

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AQUA-AEROBIC SYSTEMS, INC.
SPECIFICATION FOR AQUADISK® TERTIARY PACKAGE FILTER
PILE CLOTH
For
Napanee WWTP ON 704419A
October 17, 2023 / Design #172013

AQUADISK TERTIARY FILTER

There shall be three (3) Model ADFSP-54 x 12E-PC AquaDisk filter(s) as manufactured by Aqua-Aerobic Systems, Inc., of Loves Park, Illinois. Filter shall be factory tested and ready for operation. Contractor shall furnish all labor, materials, equipment and incidentals required for installation of the AquaDisk as shown on the drawings and as specified herein.

Each unit will include:
Tank Assembly
Drive Assembly
Centertube Assembly with Cloth Media Disks
Backwash System
Backwash/Waste Pump Assembly(ies)
Valves
Pressure Transmitter
Float Switch
Vacuum Transmitter
Electrical Controls with Internal Components

Each filter unit will be shipped fully assembled and wired from the factory, unless noted otherwise herein. All motors, pumps, and bearings shall be designed for continuous duty and long operating life in a high humidity atmosphere. All motors and pumps shall be 575 volt, 60 hertz, 3 phase.

SPECIFICATION PRECEDENCE

The specifications for equipment and controls under this section supersede specifications for equipment and controls specified elsewhere in the contract documents and drawings. Purchased components such as gear reducers, pumps, motors, valves, and actuators shall be provided with standard recommended manufacturers paint, unless otherwise specified within this section.

SERVICE

The equipment manufacturer shall furnish the services of a factory trained representative for a maximum of nine (9) trips and twenty-one (21) eight-hour days at the jobsite to inspect the installing contractor's equipment installation, supervise the initial operation of the equipment, instruct the plant operating personnel in proper operation and maintenance, and provide process assistance. The equipment manufacturer shall furnish the services of a factory trained representative for 1 trip and 3 eight-hour days at the jobsite for performance testing.

If additional service is required due to the mechanisms not being fully operational, at the time of service requested by the contractor, the additional service days will be at the contractor's expense.

The selected manufacturer shall have a free troubleshooting help line available 24 hours a day, 365 days per year for the life of the plant.

WARRANTY

The Manufacturer shall provide a written warranty against defects in materials and workmanship. Manufacturer shall warrant the goods provided by the Manufacturer to be free from defects in materials

and workmanship under normal conditions and use for a period of one (1) year from the date the goods are put into service, or eighteen (18) months from shipment of equipment, whichever first shall occur. This warranty shall not apply to any goods or parts which have been altered, applied, operated or installed contrary to the Manufacturer's instructions or subject to misuse, chemical attack/degradation, negligence or accident.

MANUFACTURING QUALIFICATIONS

The filter supplier shall have experience in the design and manufacture of cloth media filters for a minimum of ten (10) years and shall be able to demonstrate a minimum of fifty (50) installations within the United States in municipal wastewater applications with cloth media.

SUBMITTAL REQUIREMENTS

Drawings
Cut sheets
Media area calculations
Hydraulic loading rate calculations
Solids loading rate calculations
Hydraulic profile through the filter showing the following:

- Influent weir length
- Influent weir elevation
- Influent weir nappe at design and peak flow
- Effluent weir length
- Effluent weir elevation
- Effluent weir nappe at design and peak flow

Elongation and breaking strength test report from ISO certified textile laboratory

PERFORMANCE AND DESIGN PARAMETERS

The AquaDisk filter shall be capable of filtering effluent from a Secondary process. Design shall be for:

11,500 m^3/day Average Daily Flow
42,336 m^3/day Maximum Daily Flow

Filter influent total suspended solids (TSS) concentration shall be 15 mg/l daily average and 25 mg/l maximum at average daily flow rate.

Filter effluent total suspended solids concentration shall not be greater than 10 mg/l based on a monthly average.

The filtration system shall be able to treat 100% of the maximum design flow to meet the above design conditions with one unit offline.

With the growing concern of microplastic pollution, manufacturer shall provide certified third-party testing or peer reviewed journal article demonstrating the ability of the filtration technology to remove greater than 90% of microplastics.

Filter influent total phosphorus concentration shall be 0.8 mg/l daily average.

Filter effluent total phosphorus shall not be greater than 0.1 mg/l based on a monthly average.

FILTER DISK TANK

Each tank assembly shall be painted steel. Entire tank construction shall have a minimum thickness of 10 gauge. Each tank shall have a rounded bottom to ensure deposition of solids does not occur in the corners of the tank. Due to concerns with solids deposit, tanks without rounded bottoms shall not be accepted. Each tank shall be provided with an integral solids waste collection manifold. Waste manifolds that are not integral to the tank shall not be accepted. Each tank drain shall be provided with a manually operated brass ball valve. Valve shall be provided loose for installation by the installing contractor. Tank interior shall be blasted per SSPC-10 and coated with one epoxy basecoat and one epoxy topcoat for a total DFT of 8-12 mils. Tank exterior shall be blasted per SSPC-6 and coated with two epoxy basecoats and one polyurethane topcoat for a total DFT of 8-12 mils. Coating shall be the color “safety blue”, manufactured by Sherwin Williams or Tnemec.

DRIVE ASSEMBLY

Each filter shall include an adjustable drive assembly with a gearbox, nylon drive sprocket, acetal drive chain with 316 stainless steel link pins, and a 316 stainless steel chain guard. The gearbox shall be parallel in-line helical type, AGMA Class 1 with a 3/4 HP drive motor rated for 600 volt, 3 phase, 60 Hz. Gear reducer shall be Nord or approved equal. Drive motor shall be Nord, Weg, Baldor, or approved equal.

To reduce energy demand, the drive assembly shall rotate the disks only during backwash. Systems requiring constantly rotating disks during filtration will not be acceptable. Belt drive systems or systems with multiple drive units per filter will not be acceptable.

If motors and gearboxes require routine maintenance, and are not accessible from the outside tank side walls, the equipment manufacturer shall provide an internal access platform between the tank side walls and motors and gearboxes.

CENTERTUBE ASSEMBLY

Each centertube assembly shall include a minimum 3/16”, 316 stainless steel centertube weldment, driven sprocket, wheel assemblies, 316 stainless steel disk segment rods, and frame and cloth assemblies. Each centertube assembly shall also include a Viton v-ring effluent port seal which provides superior chlorine resistance. Materials other than Viton are not acceptable for seal materials. Systems with swivel joints requiring routine lubrication are not acceptable. The driven sprocket shall be multi segment made of UHMW polyethylene. All fasteners shall be stainless steel.

CLOTH FRAME

Each cloth disk assembly shall be comprised of six (6) individual segments, each consisting of a cloth media sock supported by an injection molded glass filled polypropylene frame with corrosion resistant assembly hardware. The cloth / frame assembly must be installed in direct contact with the centertube without adaptors. Cloth/frame assemblies shall be constructed such that each segment is easily removable from the centertube, without special tools, to allow for removal and replacement of the cloth at the point of installation. Systems requiring special tools and/or the return of media segments to the factory for replacement will not be considered. Disks shall be spaced a minimum of 8 inches from center to center and have a minimum 5 inches of open space between adjacent disks.

FILTER MEDIA

Each cloth disk assembly shall have a minimum of 53.8 square feet of effective submerged filtration area. Each disk shall be divided into no more than six (6) segments and shall be easily removable for service. If the wet weight of the filter disk segment is greater than 50 ponds, a lifting mechanism shall be provided.

Each basin shall include twelve cloth disk assemblies.

Each filter unit shall have a total of**:** 645.6 square feet of minimum effective submerged filtration area.

Cloths shall be of microfiber pile construction having a nominal filtration rating of 5 microns. Granular media and screens having structured identical openings shall not be allowed. The pile cloth shall be free chlorine resistant cloth.

The cloth media shall have an active filter depth of 3 to 5 mm to provide additional collisions between solids particles and the media within the media depth, resulting in capture of solids across a broader particle range. The cloth depth shall also provide storage of captured solids, reducing backwash volumes while maintaining an operational headloss. Woven mesh or microscreen type media with no filtration depth are not acceptable.

Individual pile fibers shall be held in place by a support backing integral to the media. To facilitate proper flow of backwash water through the cloth, the medium's back side shall be of open construction consisting of 10% open area at least 50 times larger than the nominal filtration media in any direction. Media that uses sewn in support structures, which have the potential to prevent free flow through the media, shall not be allowed.

Cloth strength is critical to ensure long term performance of the media. Cloth media breaking strength and elongation shall be tested in accordance with ASTM Standard D5035 2R-E method by an ISO certified laboratory specializing in textile testing. Breaking strength shall be in excess of 200 lbf (890 N) in the warp and the weft direction. Elongation shall be less than 10% at 60 lbf (270 N) in the warp and the weft direction. Test reports shall be provided with submittals to demonstrate compliance with this requirement.

To avoid excessive media movement, deformation and folding during backwash, the maximum distance between cloth restraints must not exceed 36 inches.

FILTER HYDRAULICS

During filtration, the filter unit shall operate in a static condition with no moving parts. The filter system shall provide for the collection of filtered solids on the outside of the cloth media surface to allow for the direct contact of cleaning systems. Filtered effluent shall be used for backwashing. The filter flow path shall be from the outside of the cloth frame to the inside. Systems with flow paths from the inside to the outside of the cloth frame that collect filtered solids and plastic debris on the interior surfaces of the cloth frame will not be acceptable.

Only media area below the effluent weir elevation will be considered in the filtration area calculation since this is the only area that is submerged and available for filtration 100% of the time.

Submittal information shall include calculations that verify the effective filtration surface area. Media surface fused directly to support structure such that water cannot pass through the media shall not be included in these calculations

The operator shall be able to bring a drained filter on line by simply opening the influent isolation device. If the filter design is such that it must be filled with water before the influent isolation device is opened to prevent damage to the filter media, an automated process that sequentially brings the filter back on line with a single switch shall be provided to prevent accidental media damage. The automated process shall activate a minimum 6" diameter motorized valve to fill the filter with effluent or other clean water source in not more than five minutes, verify that the filter is full, and open the motorized influent isolation device.

Because of the frequency of the backwash and misting associated with spray systems, designs that utilize high pressure spray or a moving vacuum head as the sole means of solids removal will not be acceptable.

BACKWASH SYSTEM

The backwash function shall incorporate a pump that draws filter effluent through the cloth as the media rotates past the fixed backwash shoe, thereby removing accumulated solids from the cloth surface. Each disk shall be cleaned by a minimum of two backwash shoes, one on each side. The backwash shoes shall remain in a fixed position. Springs shall be used to maintain the proper tensioning of the backwash shoe against the media surface.

The backwash shoe shall be in direct contact with the cloth to ensure effective media cleaning. Systems utilizing media cleaning mechanisms that do not contact the filter media will not be acceptable. Neither the cloth / support assemblies nor the backwash shoes shall include any gridwork overlays or other interferences that would prevent direct contact of the backwash shoes with the cloth fibers.

The backwash system shall include 316 stainless steel backwash shoe supports with UHMW backwash shoes, 316 stainless steel springs reinforced PVC flexible hose with stainless steel hose clamps, 316 stainless steel backwash manifolds.

BACKWASH/WASTE PUMP ASSEMBLY

Each backwash/waste pump assembly shall include two backwash/waste pump(s), valves and gauges external to the basin. System utilizing internal backwash pumps shall not be permitted. In the external piping shall be backwash and solids waste valves, one flow meter, recirculation ball valve(s), vacuum gauge(s), and pressure gauge(s).

The backwash/waste pump(s) shall be shipped loose for field installation by the installing contractor. Backwash piping between the filter tank and pump(s) as well as piping following the pump(s) shall be supplied by the installing contractor. Installing contractor shall supply unions or flanges for service, wiring, and factory installed conduit shall be provided within 3 feet of the pump(s).

The backwash/waste pump(s) shall be a Gorman Rupp model T3A60, externally mounted centrifugal pump. Pump shall be provided with a 10 HP, 575 volt, 3 phase, 60 Hz motor and operate at variable RPM. Pump shall be rated for a maximum flow of 260 gpm at 66.7 ft TDH with 42.7 ft allowable discharge head after losses in internal filter piping have been accounted for. Motor shall be Baldor, Teco, Weg or approved equal. Backwashing shall be initiated by tank water level, timer, or manually through the operator interface. Operator shall have the ability to specify backwash time interval elapses through the operator interface. The backwash water shall be pressurized by the filter's backwash/waste pump for discharging from the filter system. Systems utilizing non-pressurized backwash flow will not be accepted. Backwash pumps using a belt drive shall not be acceptable due to routine tensioning and other maintenance requirements.

One flow meter shall be provided per filter. Flow meter shall be 3" Krohne Enviromag 2100 C series with IFC100 C signal converter integral to flow meter. Output shall be 4-20 mA. The flow meter shall be provided loose to be installed and wired by the installing contractor.

The 3 inch threaded ball valves shall be a two-piece, full port, with a brass body. Valves and shall be Nibco or approved equal.

The vacuum gauge(s) shall have a minimum 2.5" dial with all stainless steel welded construction, 0-30" Hg vacuum range, liquid filled, ¼" NPT process connection, 316 stainless steel bourdon tube and tip material, and bronze socket material, Ashcroft or approved equal.

The pressure gauge(s) shall have a 2.5" dial with a black painted steel case, 0-15 psi, heat resistant polycarbonate window, ¼" NPT process connection, "C" shaped bronze bourdon tube, and brass socket material, Ashcroft or approved equal.

Filtering shall not be interrupted during normal backwashing and solids waste discharge.

VALVES

Each filter shall include six (6) 2" backwash valve(s). Valve(s) shall be 3 piece, grooved end, ASTM A351 Grade CF8M stainless steel body, 316 stainless steel ball and stem, fullport, installed with painted cast iron Victaulic couplings, with a 115 volt, single phase, 60 Hz, open / close service electric actuator. Valve / actuator combination shall be TCI / RCI (RCI, a division of Rotork), Nibco, or equal. Valve actuator shall include a compartment heater and limit switch feedback to the microprocessor in both the open and closed positions.

Because of fouling that can be caused by stringy material, non-full port valves such as butterfly valves or plastic valves shall not be acceptable.

Each filter shall include one (1) 2" solids waste valve. Valve shall be 3 piece, grooved end, ASTM A351 Grade CF8M stainless steel body, 316 stainless steel ball and stem, fullport, "installed with" painted cast iron Victaulic couplings, with a 115 volt, single phase, 60 Hz, open / close service electric actuator. Valve / actuator combination shall be TCI / RCI (RCI, a division of Rotork), Nibco, or equal. Valve actuator shall include a compartment heater and limit switch feedback to the microprocessor in both the open and closed positions.

Each filter shall include a solids waste removal system in the floor of the filter tank. The manifold shall be designed to siphon settled solids waste for discharge through the backwash/waste pump. The operation of the solids waste removal system shall be automatic with user adjustable intervals and duration through the operator interface. Filters that are designed without a solids waste removal system will not be acceptable.

INDIVIDUAL FILTER ISOLATION

Each filter shall include isolation upstream provided by the installing contractor.

PRESSURE TRANSMITTER

The pressure transmitter shall have stainless steel wetted parts and provide a 4-20 mA signal over a range of 0 psi to 5 psi. Unit shall monitor the water level of each filter tank. Transmitter shall be flush mounted to the tank wall. Transmitter shall be an IFM Effector PX series or approved equal.

FLOAT SWITCH

A float switch shall be furnished to indicate emerging overflow level. The float switch shall be Anchor Scientific Model GSI 40NONC-STO or approved equal. The float shall contain a non-mercury switch, chemical resistant polypropylene casing and a PVC #18 AWG three conductor cable. Switch rating shall be minimum 4.5 amps non-inductive at 120 VAC.

VACUUM TRANSMITTER

The vacuum transmitter shall have stainless steel wetted parts and provide a 4-20 mA signal over a range of -30 to 0 inHg. Transmitter shall be an IFM Effector PX series or approved equal.

MISC/SPARE PARTS

(72) Frame and cloth assemblies and hardware.
(1) Drive Sprocket and chain
(1) Set of Bearings
(24) Backwash shoes
(1) Backwash/solids waste valve and actuator.
(1) Viton V-ring effluent port/centertube seal.
(1) Drive Motor and gearbox
At least 3 of each fuse(s).

At least 2 of each control relay(s), and indicating light replacement bulb(s).

CONTROL SYSTEM

The automatic and manual controls for operation of the Aqua Disk® Filter system shall be furnished fully assembled, wired and pre-programmed in a UL 508A Certified Industrial Control Panel. Controls shall be provided to control or monitor equipment as described in the contract drawings. The control program shall be written in-house by the filter manufacturer. The control system shall include the following control components and practices:

CONTROL PANEL WIRING AND ASSEMBLY

All control enclosures shall be custom assembled and wired in an Underwriters Laboratories (UL) certified cabinet shop using quality materials and labor. Short circuit rating of control enclosure shall be 5 kA RMS symmetrical @ 600VAC maximum.

All control panel single conductor wire shall be 16 AWG multi-strand machine tool wire (MTW) minimum, with PVC insulation.

Wire colors are as follows:

208 VAC or higher	-	Black
120 VAC control power	-	Red
Neutral	-	White
Ground	-	Green with Yellow Stripe
Power from remote source	-	Orange
Neutral from remote source	-	White with Orange Stripe
24 VDC (+)	-	Blue
24 VDC (-)	-	White with Blue Stripe
Intrinsically Safe	-	Light Blue

All wires shall be clearly marked with an identification number consistent with the wiring schematic drawing. Wire markers shall be a thermal transfer printable type. The material shall be a self-laminating vinyl. Labels shall be Brady THT-9-427-10 or approved equal.

Wiring inside the control panel shall be run in PVC wiring duct rated for continuous temperatures up to 122° F (50°C). Devices mounted in the enclosure door shall have wires run in spiral wrap to avoid pinch points when opening and closing the door.

Control components mounted internal and external to the enclosure shall be mounted with stainless steel hardware and clearly labeled with a plastic identification nametag. The tag shall be white with black lettering.

CONTROL PANEL QUALITY ASSURANCE

All Control panels shall be UL certified. Testing by manufacturer's electrical engineering prior to releasing for shipment shall be completed. Testing shall consist of the following:

Point to point testing of all wiring prior to application of power
Intended supply voltage shall be applied to the enclosure
All components shall be tested for proper operation and calibration
The PLC and operator interface program shall be loaded and functionally checked
All components shall be checked to confirm proper mounting specifications have been followed
Enclosure shall be inspected for defects and repaired if necessary
All labeling of wires and devices are correct, properly installed and clean

The manufacturer shall finalize the factory checkout by completing a control panel checklist to document all testing completed above.

Upon the successful completion of the control testing of the enclosure assembly, all applicable documentation (i.e. finalized drawing set, signed control checklist cover page, device data sheets, etc.) shall be placed in the drawing pocket of the enclosure.

PVC NON-METALLIC CONDUIT

All wiring of pre-assembled and mounted external electrical components to control panels or junction boxes shall be protected with rigid PVC nonmetallic schedule 40 conduit and fittings. Conduit shall be sized for adequate spare capacity. All conduit unions and fittings shall be solvent cemented in accordance with instructions from the manufacturer. All conduits shall be supported at maximum 3 foot intervals.

Conduit shall be impact, corrosion and sunlight resistant and be rated for a maximum ambient temperature of 122°F (50°C). It shall be rated for use with 194°F (90°C) conductors and shall be UL Listed for exposed or outdoor usage. Conduit shall be manufactured by Carlon or approved equal.

CONTROL ENCLOSURE

The automatic controls shall be provided in a UL listed, NEMA Type 4X 316 stainless steel (12 gauge) floor mount enclosure that provides insulation and protection for electrical controls and components from highly corrosive environments indoors and outdoors. Enclosure shall include a seamless foam-in-place gasket to assure watertight and dust-tight seal. An internal 3-point latch and 316SS padlocking POWERGLIDE® handle shall be provided. Enclosures shall be unpainted, with a smooth #4 brushed finish. Enclosure shall include a painted white mild steel (12 gauge) sub-panel mounted with collar studs. Enclosure shall be manufactured by Hoffman or approved equal.

The control panel will be remotely mounted. The installing contractor shall install the control panel and connect the wiring between the filter mounted junction box and control panel.

CORROSION INHIBITOR

Each control enclosure assembly shall be provided with corrosion inhibitors to protect interior electrical components from damage caused by high humidity. The corrosion inhibitors shall be installed prior to shipment to provide protection during shipment and storage of the enclosure.
The corrosion inhibitor shall be Hoffman AHCI5E or approved equal.

ELECTRIC HEATER

An electric heater shall be provided inside the control enclosure to protect sensitive mechanical and electrical components from the harmful effects of condensation, corrosion and low temperatures. The heater is a thermostatically controlled, fan-driven unit. The heater shall be manufactured by Hoffman or approved equal.

MAIN DISCONNECT CIRCUIT BREAKER

A UL listed, automatic molded case 3-pole disconnect breaker shall be provided in the control enclosure(s). The primary function of the disconnect switch shall be to provide a means to manually open a circuit and automatically open a circuit under overload or short circuit conditions. The disconnect breaker shall have a door mounted operating mechanism with trip indication. Power distribution connectors shall be mounted integrally to the circuit breaker for multiple load connections. Integral connectors shall be provided. The disconnect circuit breaker shall be a Square D/HDL, JDL, LDL, MDL, PDL or approved equal.

MOTOR STARTER

A full voltage non-reversing Integrated Motor Starter-Controller shall be provided for motor applications up to 15 kW. Each starter shall provide control, protection and monitoring functions for the motor. The starter shall be IEC rated and shall have certifications according to UL and CSA standards and shall bear the CE marking. The starter shall have a maximum rated operational voltage of 690V and provide a 42kA @ 480 VAC rated breaking capacity on short circuit. The starter shall have a mechanical durability of 15 million operations. The starter shall provide short circuit trip, thermal overload trip with selectable tripping class, under current trip and phase imbalance trip.

A full voltage non-reversing IEC Style motor starter shall be provided for motor applications over 15 kW. Each starter shall consist of a circuit breaker, contactor and overload relay. The starter shall be IEC rated and shall have certifications according to UL and CSA standards and shall bear the CE marking. The starter shall have a maximum rated operational voltage of 690V and provide a minimum 18 kA @ 480VAC and 25 kA @ 240 VAC interrupt rating on short circuit when used in combination with a PowerPact circuit breaker. The starter shall have a mechanical durability of 15 million operations. The solid state overload relay shall have class 10 tripping characteristics with trip current adjustment, phase loss and unbalance protection.

VARIABLE FREQUENCY DRIVE

UL Listed Variable Frequency Drive(s) (VFD) shall be provided to control the backwash pump(s) of the filter. The VFD's shall control motor speed via a manual setting. It functions only as a manual adjustment to the motor rpm so that the appropriate backwash rate is provided. The VFD output frequency shall be programmable. The VFD shall be provided in a NEMA Type 20 panel mount package and rated for an operating temperature of -4° to 122°F (-20° to 50°C). The VFD shall have a 65 kA maximum short circuit rating when protected with an Allen Bradley 140M motor circuit protector or Class CC/J fuse. The VFD shall be Allen-Bradley PowerFlex or approved equal.

TRANSFORMER

A step-down multi-tap transformer shall be supplied when there is a necessity to reduce incoming 3-phase power to 120 VAC single-phase. The transformer power wire connections (incoming and outgoing) shall be protected with a finger-safe cover to protect against accidental contact. Primary and secondary fuse protection shall be provided. Transformer shall be UL listed and of continuous wound construction with vacuum impregnated with non-hygroscopic thermosetting varnish. Transformer shall be Square D 9070T or approved equal.

TRANSFORMER PRIMARY AND SECONDARY FUSE

Properly rated fuses and fuse blocks shall be provided for primary and secondary protection of the transformer. Each fuse shall be equipped with a thermoplastic cover to protect against accidental contact. Clip style fuse block shall be rated up to 600 VAC and 100 amps, dual element, time delay fuses shall be rated up to 600 VAC. Fuse blocks and fuses shall be UL listed. Fuses shall be Littelfuse Class CC or approved equal. Fuse blocks and fuse covers shall be manufactured by Marathon or approved equal.

CIRCUIT BREAKER

All single phase branch or supplementary circuits shall be protected with a single-pole, C-Curve rated circuit breaker. Circuit breakers shall be rated for 240 VAC maximum, 50/60 Hz and UL 489 listed. Supplementary and branch protection circuit breakers shall be Merlin Gerin Multi 9 or approved equal.

FUSE

Properly rated fuses and fuse holders shall be provided for protection of individual control devices (discrete and analog signals) mounted outside of the enclosure. Each fuse shall be housed in a hinged type fuse block to protect against contact with the fuse. Fuses shall be rated up to 250 VAC and be

Littelfuse or approved equal. Fuse holders for discrete devices shall be rated to 600 VAC and 30 Amps. Fuse holders for analog devices shall be rated to 300 VAC and 15 Amps. Fuse holders shall be Allen Bradley 1492 or approved equal.

OPERATOR DEVICE

Operator devices (pushbuttons and selector switches) shall be mounted through the control enclosure door for manual operation of the filter. Transformer type push-to-test pilot lights and illuminated pushbuttons shall be provided for indication of an operation status. Lights shall be a 6 VAC LED type lamp. Color coding shall be applied as required and is as follows:

Amber – Alarm active, caution
Green – Valve open, motor running
Red – Valve closed
White - Information

All operator devices shall be UL Listed, 30.5mm style, NEMA Type 4X rated, oil and water tight with finger safe guards located on the contact blocks to prevent accidental contact with wire connections. Operator device function shall be identified with an engraved white Gravoply nameplate with black letters. Operator devices shall be Square D 9001 or approved equal.

HIGH FREQUENCY NOISE FILTER

A UL listed active tracking filter shall be provided to protect the PLC and HMI power feeds from high-frequency noise and low-energy transients. It shall be designed for a single-phase input voltage of 120VAC operating at 50/60 Hz. The unit shall provide surge capacity of 25,000 amps and provide transient protection in all modes (Line to neutral, line to ground and neutral to ground). The noise filter shall be a SolaHD STFV or approved equal.

UNINTERRUPTIBLE POWER SUPPLY

A UL listed uninterruptible power supply suitable for location in a UL 508 panel shall be provided to protect the HMI and PLC from short power outages by switching to an emergency battery backup without data loss or downtime. Nominal input voltage and output voltage shall be 120VAC with an autosensing input frequency of 47 to 63 Hz. The output power capacity shall be 650W / 1000VA. The UPS shall be provided with an audible alarm and LED status indicators and operate from 32° to 122°F (0° to 50°C). The UPS shall be APC or approved equal.

GROUND FAULT DUPLEX RECEPTACLE

A UL listed ground fault circuit interrupter (GFCI) duplex receptacle shall be provided within the panel for instrument (e.g. programming terminal, modem, etc.) use only. The receptacle shall be protected with a 5 Amp circuit breaker. The receptacle shall carry a 20A / 120VAC rating. The electro-mechanical circuit interrupter shall be double-pole and trip free (GFCI protection and shall not be overridden by holding reset button). Built-in transient suppression shall protect GFCI's internal circuitry from voltage transients. Receptacle shall be Hubbell DRUBGFI20 or approved equal.

24 VOLT DC POWER SUPPLY

A UL listed, industrial grade, compact power supply shall be supplied to provide 24 VDC power to such rated components. The power supply shall be DIN rail mounted and functional with input voltage of 100 to 240 VAC (single-phase) incoming control power. The power supply shall have a green LED which shall be illuminated when output voltage is "OK". The power supply shall be an Allen Bradley 1606 or approved equal.

CONTROL RELAY

UL listed control relays for general control purposes shall be supplied with a pilot light to indicate when the coil is in an energized state. The relay socket shall be panel or DIN rail mounted inside the enclosure. The relays shall provide the following ratings: 120VAC coil, 10A contact rating (thermal), 250 VAC insulation rating and 5 million mechanical life cycles. Relays shall be Allen Bradley 700-HK, Square D, or approved equal.

TERMINAL BLOCK

Standard feed-through screw terminal blocks, DIN rail mounted, shall be supplied for all point to point wiring connections. All terminals shall be numbered per the wiring schematic with printed markers. Terminals shall carry a 600V AC/DC voltage rating. Terminal blocks shall be Allen-Bradley 1492-J4 (35A max) and 1492-J16 (85A max) or approved equal.

PROGRAMMABLE LOGIC CONTROLLER

Automatic operation of the Filter shall be controlled through a programmable logic controller (PLC) mounted inside the main control panel. The PLC components shall consist of a power supply, CPU, discrete input and output modules and analog input and output modules. The processor unit shall include built-in USB and two (2) Ethernet IP communication ports. All input and output points supplied (including unused) shall be wired to terminal blocks. Processor design characteristics shall include: 2.0MB user memory size, real-time clock and calendar, battery backed RAM and an operating temperature range between 32 °F and 140°F. The PLC processor shall be an Allen-Bradley CompactLogix 1769-L33ER or approved equal.

Modular equipment shall be provided to complete the PLC system. These Allen-Bradley components include: 1769-PA4 – Power Supply, 1769-IA16 – Discrete input (16 point) modules, 1769-OW16 – Discrete output (16 point) modules and 1769-IF8 – Analog input (8 point) modules, 1769-OF8I – Analog output (8 point) modules.

PLC POWER SUPPLY

Input voltage range of 85-265 / 170-265 VAC, 47-63 Hz, maximum inrush current of 30 amps, backplane output current of 4 amps @ 5V or 2 amps @ 24V, internal fuse protection, ambient operating temperature of 32°F to 140°F, Class I, Division 2 hazardous location certified, UL Listed.

DISCRETE INPUT MODULE

Operating voltage of 79 to 132 VAC at 47 to 63 Hz, backplane current draw at 5VDC = 115mA , off-state current 2.5mA maximum, maximum inrush current 250mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL Listed.

DISCRETE OUTPUT MODULE

Operating voltage of 5 to 265 VAC at 47 to 63 Hz / 5 to 125 VDC, backplane current draw at 5 VDC = 205mA , at 24VDC = 180mA, off-state current leakage is 1.0mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL Listed.

ANALOG INPUT MODULE

Backplane current draw at 5 VDC = 120mA, at 24VDC = 70mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL Listed.

ANALOG OUTPUT MODULE

Backplane current draw at 5 VDC = 120mA, at 24VDC = 170mA, LED status indication of each point, ambient operating temperature of 32°F to 140°F, UL Listed.

ETHERNET SWITCH

An unmanaged Ethernet switch shall be provided inside the control enclosure to provide connectivity between the PLC, operator interface and plant networking. The switch shall support both 10 and 100 Mbit/s operation. The switch shall have five (5) 10/100Base-T ports with RJ-45 sockets and shall support auto-crossing, auto-negotiation and auto-polarity. Maximum distance between devices shall be 100m.

The unit shall be DIN rail mounted and require 24VDC power. Diagnostic LEDs for power and connection status shall be included. The Ethernet switch shall be UL listed and manufactured by Allen-Bradley Stratix 2000 1783-US5T, or approved equal.

HUMAN MACHINE INTERFACE OVERVIEW

The control system shall be equipped with a UL listed operator interface that provides control display screens. These screens shall be used by the operator to monitor and control filter status, setpoint and alarm information.

The Interface shall allow the Operator access to adjust the following operating parameters:

- Backwash interval, Backwash duration, Solids Waste interval, Solids Waste duration, Number of Backwashes between Solids Waste interval.

The operator interface shall provide information to assist the Operator in assessing the status of the filter system. The interface screen shall display, at minimum, the following parameters:

- Water level in the filter, Time since last Backwash, Time since last Solids Waste withdrawal, Elapsed time on the Drive Motor, Elapsed time on the Backwash/Waste Pump(s), Total Backwash time and cycles, Total Solids Waste withdrawal time and cycles.

The operator interface shall allow the Operator to:

- Initiate Backwash
- Control all electric actuated valves

The interface shall display the alarm history. The alarm history shall include the time and date of the most recent 25 alarms along with the description of the alarm.

The interface shall also display current alarms, including the date, time and a description of the alarm.

As a diagnostic aid to the Operator, the interface shall display the time between Backwashes for the most recent 40 Backwashes.

HUMAN MACHINE INTERFACE

The operator interface shall be a NEMA Type 12, 13, 4X rated, 15” diagonal, color touchscreen display with Ethernet and serial communications. The interface shall be a liquid crystal display (LCD). The display type shall be color active matrix thin-film transistor (TFT) with 1024 x 768 pixel resolution. The rated operating temperature shall be 32° to 131° F (0° to 55° C). The operator interface shall be an Allen Bradley PanelView Plus 7 Performance 15”.

JUNCTION BOX

UL listed, type 4X NEMA rated 316 stainless steel wall mounted junction box shall be provided pre-mounted and wired to the tank when the main control enclosure is remotely mounted from the disk filter. The junction box will contain terminal blocks for terminating electrical controls and components. Field wiring from the junction box to the main control enclosure will be the responsibility of the electrical contractor at site. The j-box shall provide for seams which are continuously welded and ground smooth. Stainless steel door clamp assemblies and a seamless foam-in-place gasket shall assure a watertight and dust-tight seal. A hasp and staple shall be provided for padlocking. J-box shall be unpainted with a smooth brushed finish and include a white polyester powder coated sub-panel.

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Equipment List: 172013

TO:	**Greater Napanee (The Corporation of the Town of)** **99-A Advance Avenue** **Napanee** **Ontario K7R 3Y5** **Canada**	**PROJECT:**	**NAPANEE WWTP ON** **BID DATE: October 19, 2023**
ATN:	**Town Officials**		**DATE: October 17, 2023**
CC:	**EVB Engineering / ph#: 613/935-3775 / fx#: Unknown** **Jamie Baker P.Eng, V.P.** **ACG-Envirocan / ph#: 905-856-1414 X222 / fx#: 905-856-6401** **Dale Jackson** **Aqua-Aerobic Systems, Inc.** **Tom Miles / TMiles@aqua-aerobic.com**		

The following Notes apply to Aqua-Aerobic Systems' proposal:

- We are pleased to quote, for acceptance within 240 days of the bid date, prices and terms on equipment listed below.
- Equipment will be furnished by Aqua-Aerobic Systems, Inc. with unloading of goods, civil work, and installation by the Buyer.
- Reference: Specification Section 46 73 00 - Tertiary Filtration System.

Cloth Media Filters

AquaDisk Tanks/Basins

3 AquaDisk Model # ADFSP-54x12E-PC Package Filter Painted Steel Tank(s) consisting of:

- 12 disk tank(s) will be painted steel, estimated dry weight is 13,000 lbs., and estimated operating weight is 60,500 lbs. Each tank will include an integral solids waste collection manifold. The tank will be painted with paint manufactured by Sherwin Williams or Tnemec.
- 3" full port, two piece, ASTM A351 Grade CF8M stainless steel body ball valve(s), flanged end connections with single phase electric actuator(s). Valve / actuator combination shall be manufactured by TCI / RCI (RCI, a division of Rotork).

AquaDisk Centertube Assemblies

3 Centertube(s) consisting of:

- 316 stainless steel centertube weldment(s).
- U.H.M.W. polyethylene multi segment driven sprocket(s).
- Dual wheel assembly(ies).
- Rider wheel bracket assembly(ies).
- 316 stainless steel effluent seal plate weldment(s).
- Centertube bearing kit(s).
- Viton V-ring effluent port\centertube seal(s).
- Pile cloth media and non-corrosive support frame assemblies.
- Disk segment 316 stainless steel support rods.
- Media sealing gaskets.

3 Cloth set(s) will have the following feature:

- Cloth will be OptiFiber PES-14.

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AquaDisk Drive Assemblies

3 Drive System(s) consisting of:

- AGMA class I gearbox(es) with three phase 3/4 HP drive motor(s).
- Nylon drive sprocket(s).
- Acetal drive chain(s) with 316 stainless steel link pins.
- Stationary drive bracket weldment(s).
- Adjustable drive bracket weldment(s).
- Chain guard weldment(s).
- Warning label(s).

AquaDisk Backwash/Sludge Assemblies

3 Backwash System(s) consisting of:

- 316 stainless steel backwash shoe weldments.
- UHMW polyethylene backwash shoe nozzle plates.
- 316 stainless steel backwash shoe support weldment(s).
- 1 1/2" flexible hose.
- Stainless steel backwash shoe springs.
- Stainless steel hose clamps.

3 Backwash/Solids Waste Pump(s) consisting of:

- Gorman Rupp model T3A60S, 10HP, premium efficient, 3 phase externally mounted centrifugal pump(s).
- Stainless steel anchors.
- 0 to 15 psi pressure gauge(s).
- 0 to 30 inches mercury vacuum gauge(s).
- 3" Krohne Enviromag series 2000 F magnetic inductive flow-meter with series IFC signal converter mounted integral to the meter.
- 3" threaded brass ball valve(s).

AquaDisk Instrumentation

3 Pressure Transmitter(s) consisting of:

- Level transmitter(s).

3 Float Switch(es) consisting of:

- Float switch(es).

3 Vacuum Transmitter(s) consisting of:

- Vacuum transmitter(s).

AquaDisk Valves

3 Set(s) of Backwash Valves consisting of:

- 2" full port, three piece, ASTM A351 Grade CF8M stainless steel body ball valve(s), grooved end connections with single phase electric actuator(s). Valve / actuator combination shall be manufactured by TCI / RCI (RCI, a division of Rotork).
- 2" flexible hose.
- 2" painted cast iron victaulic end couplers.

3 Solids Waste Valve(s) consisting of:

- 2" full port, three piece, ASTM A351 Grade CF8M stainless steel body ball valve(s), grooved end connections with single phase electric actuator(s). Valve / actuator combination shall be manufactured by TCI / RCI (RCI, a division of Rotork).
- 2" flexible hose.
- 2" painted cast iron victaulic end couplers.

AquaDisk Misc/Spare Parts

1 Lot of Recommended Spare Parts consisting of:

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- (72) Pile cloth media and non-corrosive support frame assemblies and hardware.
- (1) Centertube bearing kit.
- (1) Viton V-ring effluent port\centertube seal.
- (24) 304 stainless steel backwash shoe weldments with UHMW polyethylene backwash shoe nozzle plates.
- (1) Acetal drive chain with 316 stainless steel link pins.
- (1) Nylon drive sprocket.
- (1) Gearbox assembly.
- At least 3 of each fuse.
- At least 2 of each control relay
- At least 2 of each indicating light replacement bulb.

1 Series of sample analysis for Process Performance Testing, consisting of:

- Analytical laboratory testing per Section 467300. Includes collection and shipment of samples.

AquaDisk Controls w/Starters

3 Conduit Installation(s) consisting of:

- PVC conduit and fittings.

3 Control Panel(s) consisting of:

- NEMA 4X 316 stainless steel enclosure.
- Internal control panel light(s).
- Alarm strobe light(s).
- Alarm horn and silence button.
- Uninterrupted power supply.
- Circuit breaker with handle.
- 2 KVA Transformer(s).
- Fuses and fuse blocks.
- Single phase circuit breaker(s).
- Line filter(s).
- GFI convenience outlet(s).
- Control relay(s).
- Selector switch(es).
- Indicating pilot light(s).
- Compactlogix Processor.
- Power supply(s).
- Input card(s)
- Output card(s).
- Analog input card(s).
- Analog output card(s).
- Ethernet switch(es).
- Fiber optic patch panel(s).
- Power supply(ies).
- PanelView Plus 7 15" color touch screen display(s).
- Size 1 motor starter(s).
- 10 HP VFD(s).
- Terminal blocks.
- Panel will be CSA labeled.

3 Electrical Junction Box(es) will be provided as follows:

- NEMA 4X stainless steel enclosure(s).
- Corrosion inhibitor(s).
- Terminal blocks.
- Wire marker(s).
- Grounding bus bar(s).

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AquaDisk Engineering

1 Set(s) Documentation for the AquaDisk will be provided as described:

- Engineer's Approval Data (English language) in electronic format.

1 Set(s) Documentation for the AquaDisk will be provided as described:

- Operation & Maintenance Manuals (English language) in electronic format.

AquaDisk Supervision/Freight Domestic

1 Supervision Services and Freight Package(s) for the AquaDisk will be provided as follows:

- 21 Day(s) for onsite services
- 9 Trip(s) for onsite services
- FREIGHT TO JOBSITE

The Following General Notes apply to Aqua-Aerobic Systems' Proposal:

- SCHEDULE: We expect Submittals to be completed and transmitted to you in stages, as outlined in Section 1.C of this proposal package. All timeframes assume that there are agreed upon terms and conditions and guarantee of payment. We expect receipt of approved engineer's submittal with release for manufacture within 4-8 weeks of our transmittal of submittal data. We expect shipment of equipment (transit time excluded) to be approximately 16-24* weeks from our receipt of approved engineer's submittal data and release for manufacture. Schedules may be adjusted at time of order placement, depending upon existing order backlog. *Weeks quoted are actual working weeks.
- We expect shipment of control panels (transit time excluded) to be approximately 24-30 weeks* from our receipt of approved engineer's submittal data and release for manufacture. The extended delivery on control panels is based on unprecedented supply chain delays associated with the COVID-19 pandemic. Schedules will be updated as new information becomes available.
- Schedule changes due to supply chain disruption may impact the above quoted times. Aqua-Aerobic Systems will advise if/when any such disruption applies.
- Aqua-Aerobic Systems will be closed for the Christmas Holidays beginning approximately December 24, through approximately January 2nd.
- PRICE ESCALATION INDEX: Aqua-Aerobic Systems, Inc. reserves the right to re-evaluate the pricing quoted prior to order acceptance if; 1) a purchase order is received after the validity date stated in this proposal or, 2) the lead times stated in this proposal are exceeded. Any pricing adjustments required shall be based on a published materials cost index specific to the materials proposed.
- TARIFF PRICE ESCALATION NOTE: The proposed goods may be affected by the recent U.S. Government proposed tariffs on imported steel and aluminum. Because of this, Aqua-Aerobic reserves the right to re-evaluate the pricing quoted prior to order acceptance if; 1) a purchase order is received past the validity date stated in the proposal or, 2) the total of the quoted lead times stated in this proposal are exceeded. Any pricing adjustments required due to tariff impacts will be based on published material cost indices specific to the affected materials.
- CONTROLS NON-DISCLOSURE / CONFIDENTIALITY AGREEMENT: If applicable, Aqua-Aerobic Systems will provide information relating to software documentation to control the treatment system supplied using Aqua-Aerobic Systems' proprietary and/or trade secret information subject to execution of an Aqua-Aerobic "Controls Non-Disclosure / Confidentiality Agreement".
- INTEGRAL DOCUMENTS: All documents listed on Aqua-Aerobics' proposal package "Table of Contents" document dated October 17, 2023 are an integral part of Aqua-Aerobic Systems' proposal.
- Additional supervision services can be provided for an additional charge of $1750 USD/day plus travel and living expenses.

The Following Mechanical and/or Electrical Notes apply to Aqua-Aerobic Systems' Proposal:

- Valve and line sizes are to be verified by the engineer based on actual line losses.
- Pumps and valves ship loose, unless otherwise specified.
- Filter flow hydraulics and plant's capability to handle the intermittent backwash flow is to be confirmed by the purchaser/purchaser's consulting engineer.
- All terminating flanges, valves, etc. will be provided in STANDARD U.S.A. MEASURE. Provisions for conversion from U.S.A. measure to metric measure is the responsibility of the installing contractor/purchaser.
- Motors quoted are direct-on-line start, unless otherwise noted. If Wye start delta run, wire connected, or other special motors are required, this must be clearly stated at time of order. In the event the requirement for a special motor affects the delivery or price quoted, you will be notified at the time of order acceptance.

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- Three phase motors will be 575 volt.
- Single phase motors will be 115 volt.

The Following Scope Exclusion Notes apply to Aqua-Aerobic Systems' Proposal:

- Materials and Services not specifically described/itemized in this proposal are not included in the quoted total price, and are to be supplied by the installing contractor/purchaser.
- Freeze protection may be required for outdoor installation in cold weather climates. All such protection, including but not limited to, heat tracing and insulation of pumps and piping, as well as protection against internal tank freezing, shall be provided and installed by the installing contractor.

SCOPE BY PURCHASER/CONTRACTOR:
*Note this is not intended as a complete listing and is provided as a courtesy.
- Unloading and storage.
- Provisions for equipment access.
- Concrete, handrail and all civil works.
- All piping, spool pieces, supports, gaskets and hardware beyond Aqua-Aerobic's equipment terminations.
- Interconnecting piping, wiring and installation.
- All flanges and/or unions in the piping to service the equipment.
- Unless specifically stated above, weir(s) for each filter unless integral to AASI-supplied tankage.
- Electrical conduit, hardware, supports, attachment of cables, wiring, j-boxes and local disconnects (if any) between motors, electrical valves, instruments and the control panel.
- Installation/field wiring of the control panel(s) that ship loose.
- Electrical wiring and supply power.

The Following Commercial Notes apply to Aqua-Aerobic Systems' Proposal:

- WARRANTY AMENDMENT: Aqua-Aerobic Systems, Inc. warrants the goods provided by Aqua-Aerobic Systems, Inc. in accordance with the "Warranty; Limitation Of Liability; And Disclaimer" as amended herein:
1. In accordance with Specification Section 46 73 00 - Tertiary Filtration System, 3.7 Warranty; Warranty period shall be two (2) years from Substantial Completion.
2. Freight costs for goods repaired/replaced under warranty are included.
3. Labor costs for goods repaired/replaced under warranty are included.

- PROCESS GUARANTEE: A company backed process performance guarantee in accordance with the terms stated on Aqua-Aerobic Systems' process guarantee will be provided.

INCOTERMS®: Price(s) are Incoterms® 2020 “Delivered At Place (DAP): Napanee WPCP, 310 Water St., Napanee, Ontario, Canada
Price(s) and scope of supply INCLUDES:
- Door-to-door transportation (unloading of goods by Buyer).
- Customs clearance.
- Use of a Customs Broker selected by Aqua-Aerobic.
- Documentation consisting of a Commercial Invoice, Bill of Lading, and Packing List.
- Title Transfer will occur at the date of Issuance of the Bill of Lading document.
- An additional charge may apply if non-standard or additional documentation is required.

Price(s) and scope of supply specifically EXCLUDES:
- HST and/or local taxes.

DESTINATION CONTROL STATEMENT:
These items are controlled by the U.S. Government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. government or as otherwise authorized by U.S. law and regulations.

All prices are Canadian dollars converted from U.S. dollar currency based upon prevailing exchange rate of 1.37 CAD per 1 USD as of proposal date. Aqua-Aerobic Systems reserves the right to debit or credit your account if the exchange rate varies by more than 2% at time of invoicing. If the exchange rate varies by 2% or more at the time of invoicing, Aqua-Aerobic reserves the right to invoice or refund its customer the difference between the rate at the proposal date and the rate at invoicing date(s).

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- PAYMENT TERMS: Subject to credit approval and guarantee of payment, 90% payable Net 45 days from date of each shipment, 5% payable Net 45 days from start-up not to exceed 120 days from date of shipment, and balance of 5% payable Net 45 days from completion of a period of twelve (12) months from substantial completion date.
- SCOPE OF SUPPLY NOTE: Aqua-Aerobic Systems' scope of supply and pricing is as described in this proposal, including the listed Integral Documents and the terms and conditions of sale. Please refer to the proposal notes and notated drawings for equipment terminations and items not included in the proposal which are to be provided by the Buyer. Engineer's submittal data will be prepared using these proposed goods and services, and the submittal approved by the Consulting Engineer will become an integral part of the scope of supply under the contract resulting from this offer. Any additions or deletions to the scope of supply will be presented as change orders.
- Reference General Terms and Conditions for Preselected Equipment: If the Owner elects to exercise their option for "City Purchased Materials", we confirm we will accept said assignment conditioned upon 1) Assignment must be for the complete Aqua-Aerobic scope of supply and price (no partial assignment), and 2) terms and conditions will be as mutually agreed at order execution.
- TRADEMARKS: Aqua-Jet® Surface Mechanical Aerator, Aqua-Jet II® Contained Flow Aerator, AquaDDM® Direct-drive Mixer, TurboStar® Directional Mixer, ThermoFlo® Surface Spray Cooler, Endura® Series Limited Maintenance Product, OxyMix® Pure Oxygen Mixer, OxyStar® Aspirating Aerator, TurboSta® Directional Mixer, rFold-a-Float® Self-deploying Segmented Float, SAF-T Float® Safe Accessible Float Technology, Aqua MixAir® Aeration System, AquaCAM-D® Combination Aerator/Mixer/Decanter, AquaSBR® Sequencing Batch Reactor, Aqua MSBR® Modified Sequencing Batch Reactor, AquaPASS® Phased Activated Sludge System, Aqua BioMax® Dual Treatment System, AquaEnsure® Ballast Decanter, Aqua EnduraTube® Fine-bubble Tube Diffuser, Aqua EnduraDisc® Fine-bubble Disk Diffuser, Aqua CB-24® Coarse-bubble Diffuser, AquaDisk® Cloth Media Filter, AquaDiamond® Cloth Media Filter, AquaDrum® Cloth Media Filter, Aqua MiniDisk® Cloth Media Filter, Aqua MegaDisk® Cloth Media Filter, AquaPrime® Cloth Media Filter, AquaStorm® Cloth Media Filter, OptiComb® Backwash System, OptiFiber® Cloth Filtration Media, OptiFiber PES-13® Cloth Filtration Media, OptiFiber PA2-13® Cloth Filtration Media, OptiFiber PES-14® Cloth Filtration Media, OptiFiber PF-14® Cloth Filtration Media, OptiFiber UFS-9® Cloth Filtration Media, Trust the Tag® OptiFiber® Service Mark, AquaABF® Automatic Backwash Filter, AquaMB® Multiple Barrier Membrane System, Aqua-Aerobic® MBR Membrane Bioreactor System, Aqua MultiBore® Membranes, Aqua Multibore® C-Series Ceramic Membranes, Aqua Multibore® P-Series Polymeric Membranes, Aqua ElectrOzone® Ozone Generation System, IntelliPro® Monitoring and Control System, AquaPRS™ PFAS Removal System, AquaPR-206™ PFAS Removal System, Aqua-Aerobic®, and the Aqua-Aerobic Corporate logo artwork are registered trademarks or pending trademarks of Aqua-Aerobic Systems, Inc. Nereda®, AquaNereda® Aerobic Granular Sludge Technology, and the AquaNereda Product logo artwork are a registered trademark of Royal HaskoningDHV. All other products and services mentioned are trademarks of their respective owners.

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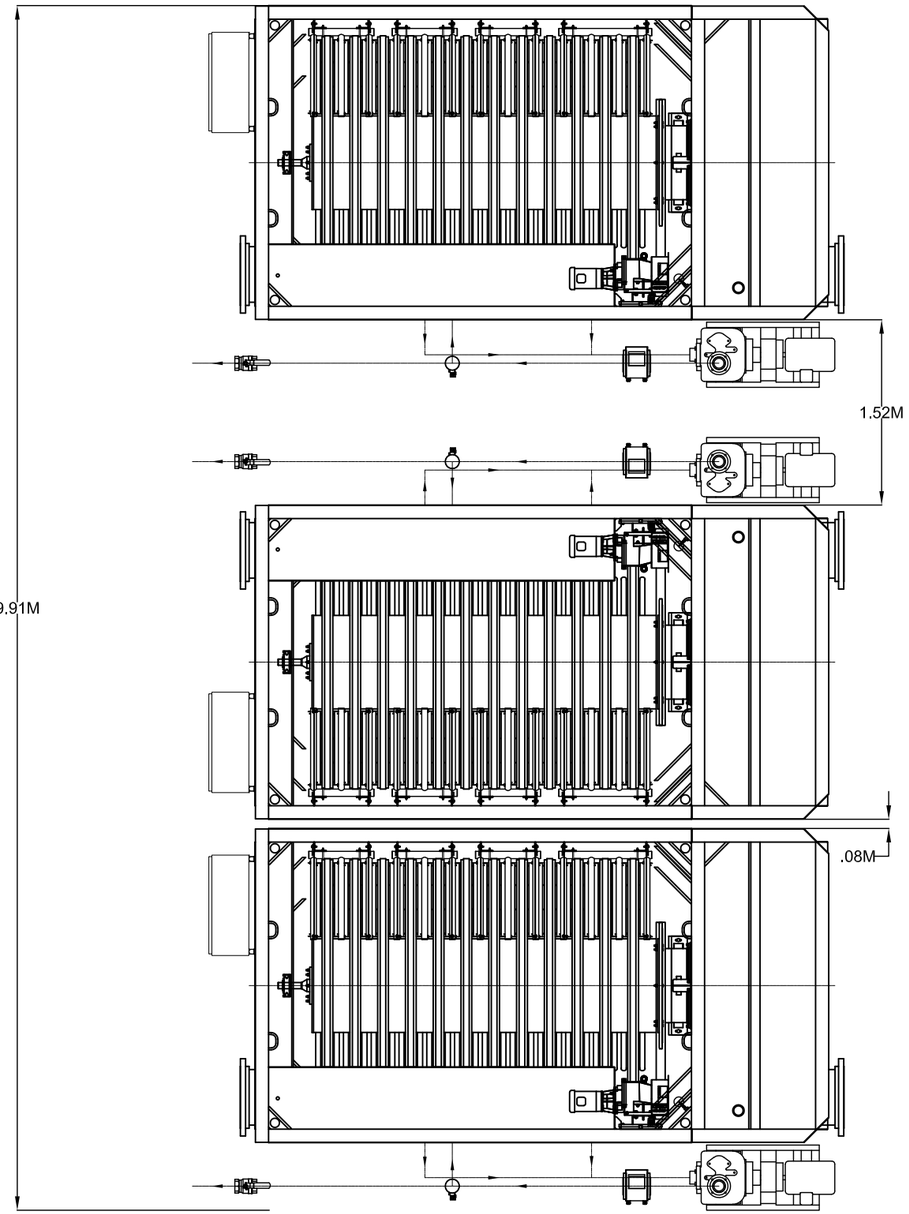

NOT FOR CONSTRUCTION

JOB NAME: NAPANEE WWTP					AQUA-AEROBIC SYSTEMS, INC. A Metawater Company
JOB LOCATION: ON					
					DO NOT SCALE DRAWING — UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES: FRACTIONAL DIMENSIONS +/- 1/16; ALL TWO PLACE DECIMALS +/- 0.010; ALL THREE PLACE DECIMALS +/- 0.005; ALL ANGLES +/- 1/2°; ANSI
					MATERIAL:
					SIMILAR TO:
					TYPE:
					DRAWN BY: ZJD — DATE: 2023-10-05
REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION	WEIGHT: — SHEET: OF
DRAWING NAME: FILTER LAYOUT					DRAWING NUMBER: 8704419A6000 — SCALE: — SIZE: D

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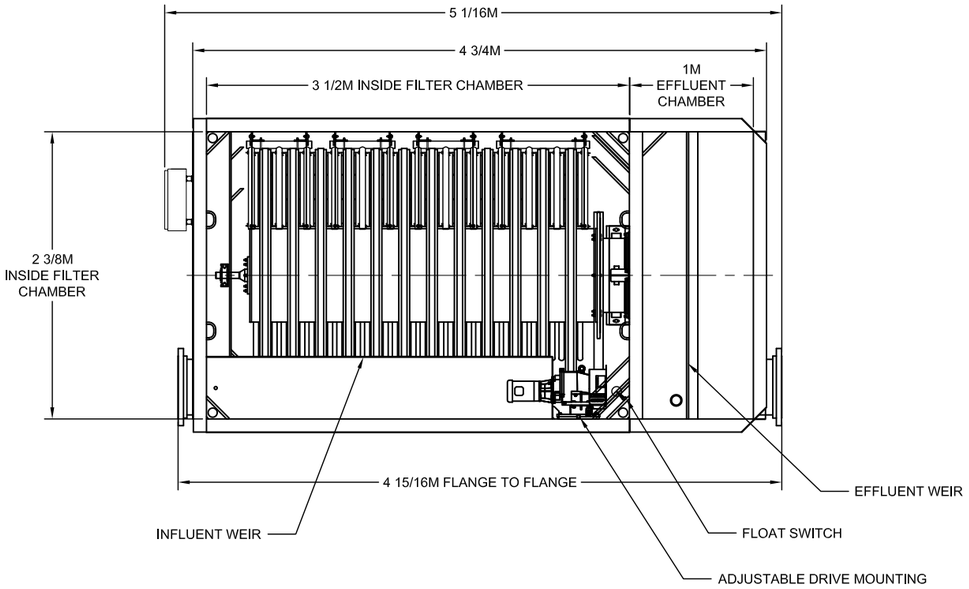
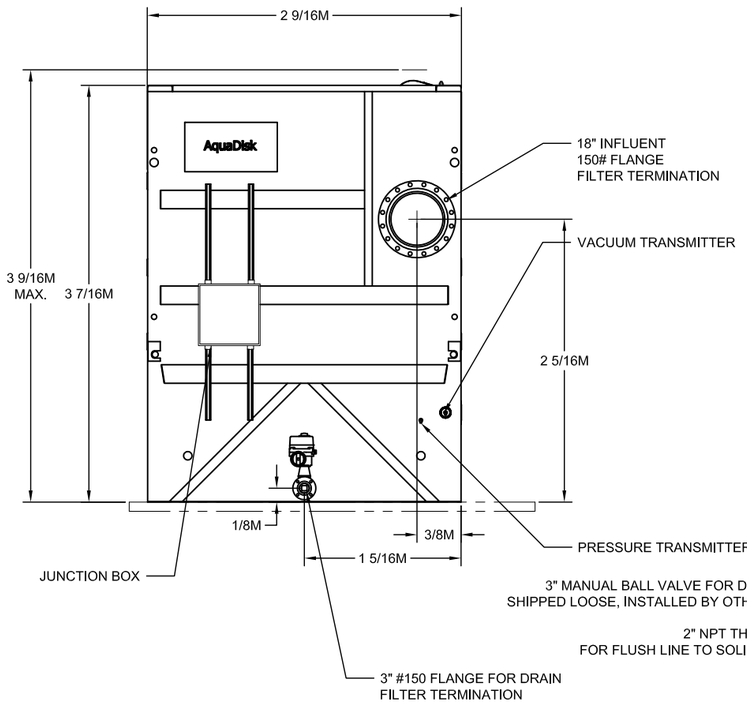
1. IF FREEZING IS A CONCERN AQUA-AEROBIC SYSTEMS RECOMMENDS THE FILTERS BE PLACED IN A HEATED BUILDING. IF A BUILDING IS NOT PROVIDED, ANY NECESSARY PROTECTION, INCLUDING BUT NOT LIMITED TO, HEAT TRACING AND INSULATION OF PUMPS AND PIPING, AS WELL AS PROTECTION AGAINST INTERNAL TANK FREEZING, SHALL BE PROVIDED BY THE INSTALLING CONTRACTOR.

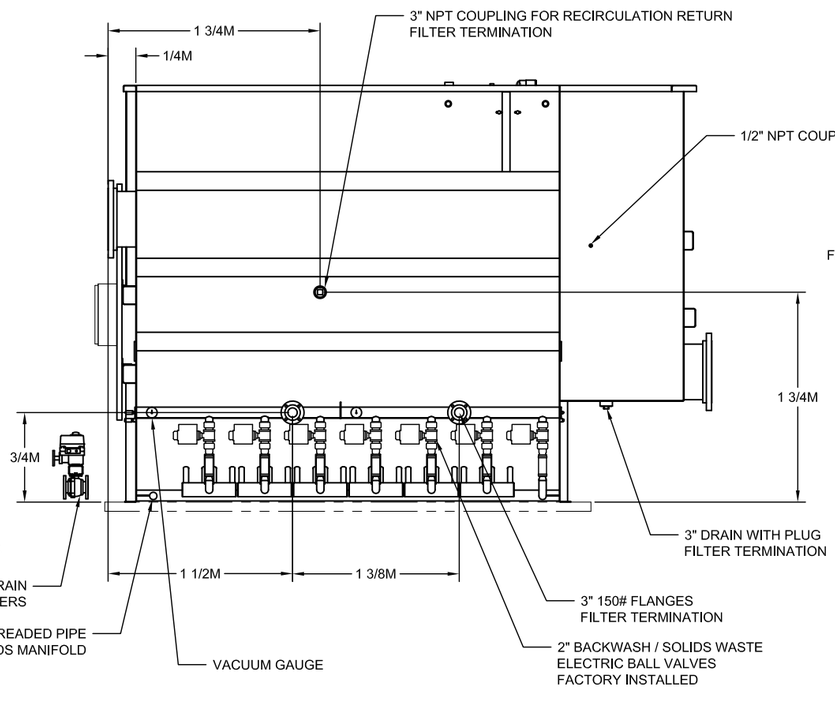
2. THE FILTER CONTROL PANEL IS SHOWN IN THE STANDARD LOCATION. IF THE FILTER IS LOCATED OUTSIDE, THE CONTROL PANEL MAY BE RELOCATED TO THE SIDE OF THE FILTER FACING NORTH, TO LIMIT EXPOSING THE H.M.I. TO DIRECT SUNLIGHT.

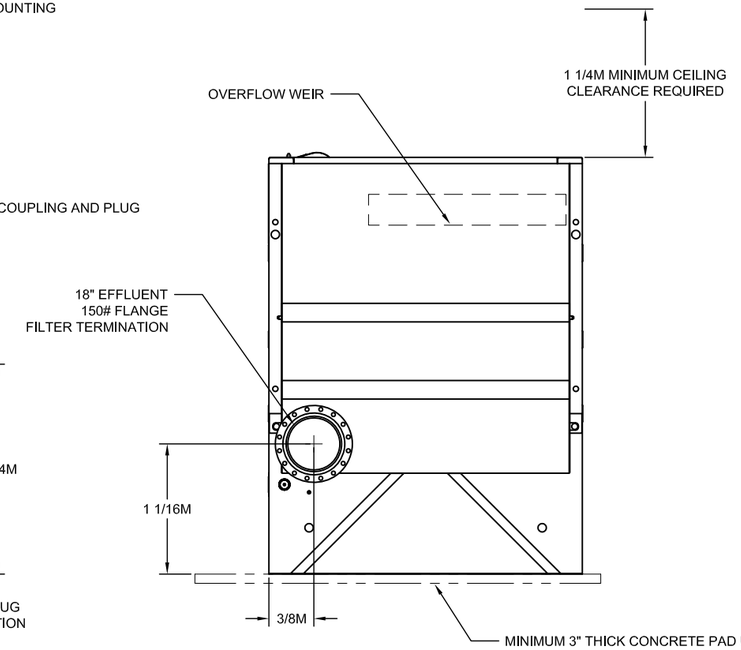
3. THE GRAPHIC ELEMENTS OF THIS COMPUTER GENERATED DRAWING ARE DRAWN FULL SIZE. THE DIMENSIONS ARE ASSOCIATIVE. IF THE SIZE OF THE GRAPHIC ELEMENTS IS CHANGED THE DIMENSIONS WILL NOT BE CORRECT.

4. AN INFLUENT VALVE IS REQUIRED FOR ISOLATION / MAINTENANCE OF THE FILTER UNIT. THE INFLUENT VALVE SHALL BE PROVIDED BY OTHERS AND INSTALLED BY OTHERS.









DRY WT (LBS)	OPER. WT. (LBS)
13,000	60,500

NOT FOR CONSTRUCTION

JOB NAME: NAPANEE WWTP
JOB LOCATION: ON

AQUA-AEROBIC SYSTEMS, INC.
A Matawater Company

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE:

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

DRAWN BY: ZJD
DATE: 2023-10-05
WEIGHT:
SHEET: OF

DRAWING NAME: FILTER TANK DETAILS
DRAWING NUMBER: 8704419A6001
SCALE:
SIZE: D

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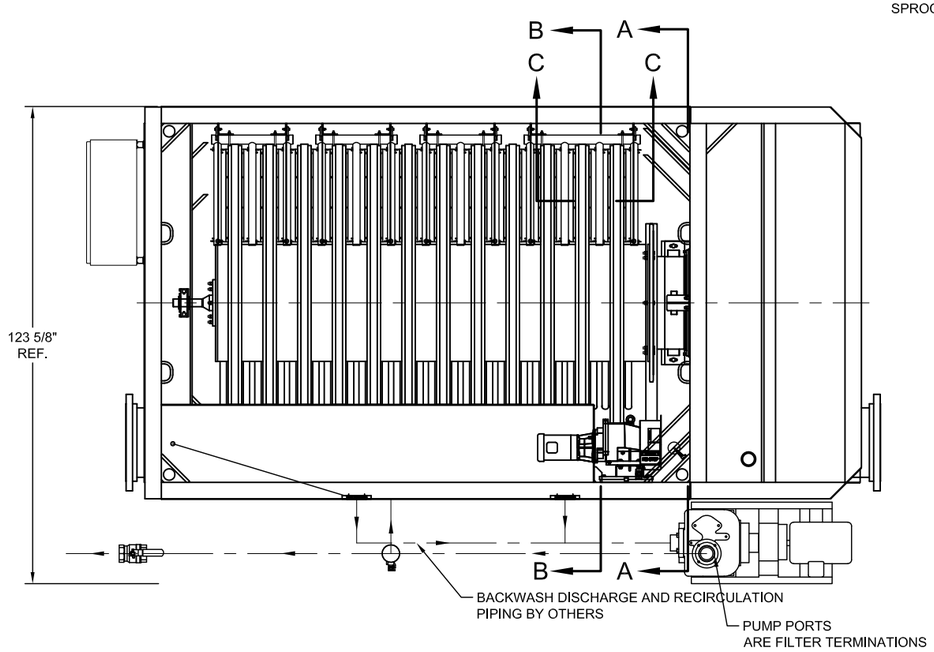
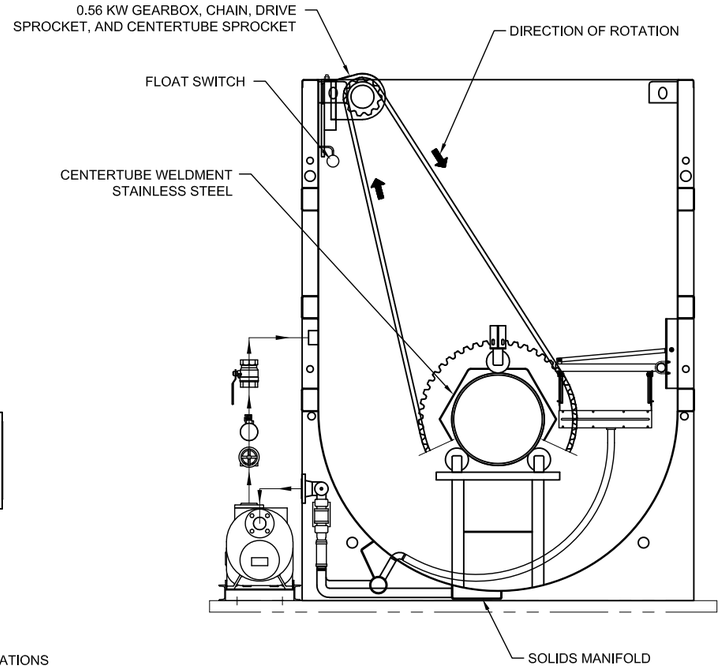
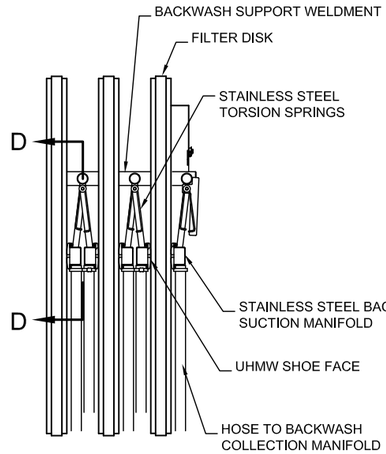
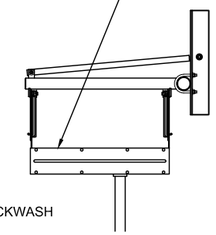




SECTION A-A

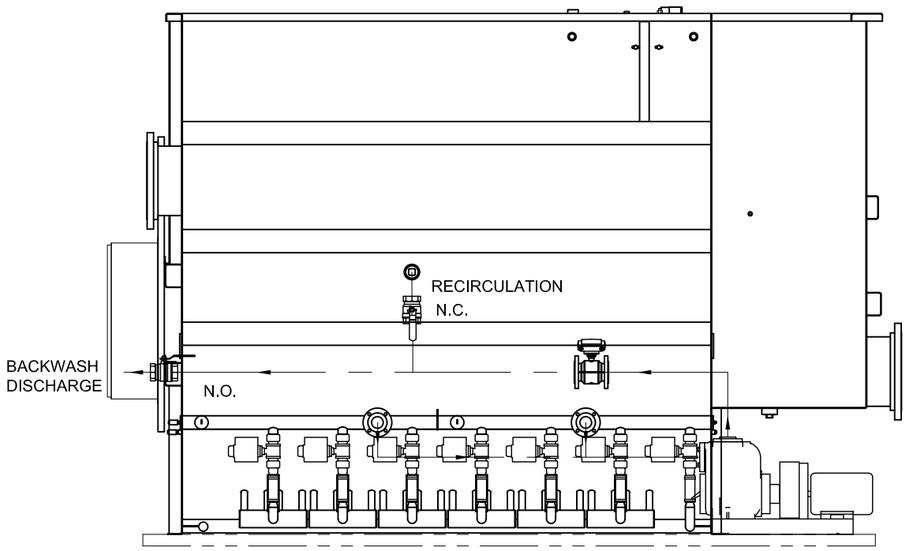


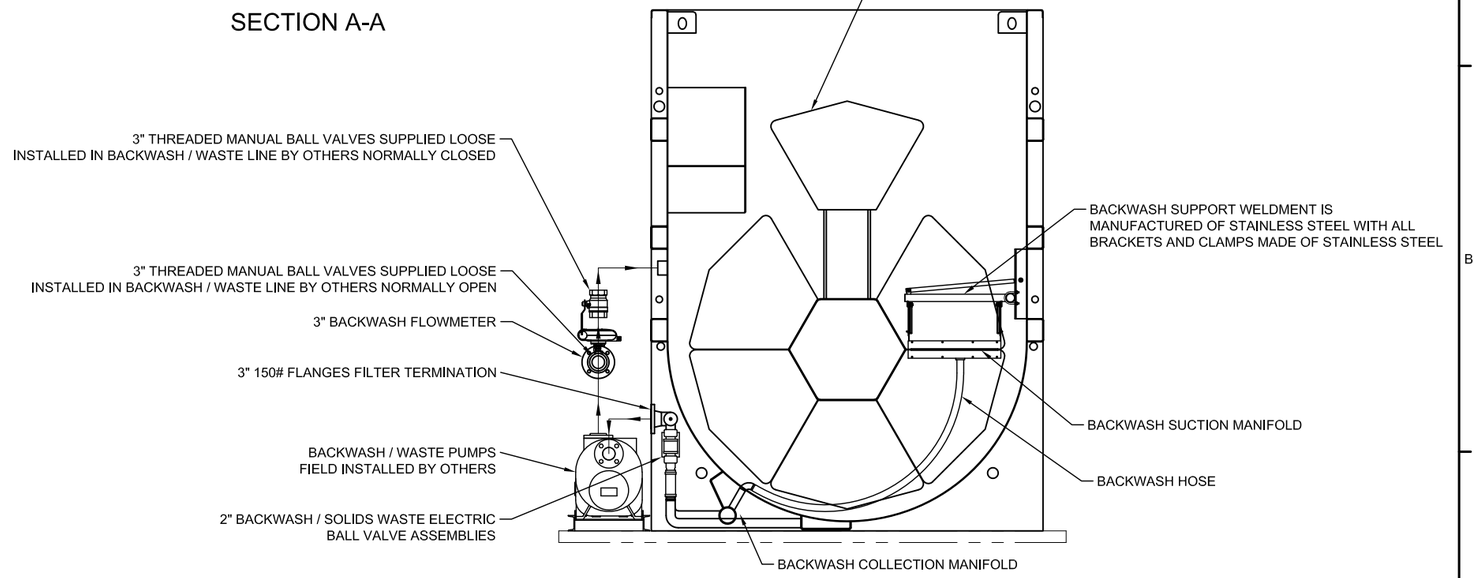
SECTION C-C
NOT TO SCALE



SECTION D-D
NOT TO SCALE

THE FILTER DISK IS COMPOSED OF (6) IDENTICAL REMOVABLE SECTIONS, EACH ONE HELD TO THE CENTERTUBE BY (2) 5/8" DIAMETER STAINLESS STEEL RODS. EACH DISK SECTION HAS A RIGID PLASTIC FRAME TO SUPPORT THE CLOTH FILTER MEDIA. THREE PLASTIC "TACK" STRIPS ARE USED TO STRETCH AND HOLD THE CLOTH FILTER MEDIA TO THE FRAME.





SECTION B-B

NOT FOR CONSTRUCTION

1 ALL EXTERNAL PIPING AND FITTINGS SHALL BE PROVIDED BY OTHERS
ACTUAL PIPING LAYOUT AND PUMP LOCATION TO BE DETERMINED BY OTHERS
WHEN THREADED OR WELDED PIPE IS USED IN LIEU OF FLANGED
PIPE, UNIONS SHALL BE USED AT EACH PUMP AND VALVE
CONNECTION TO FACILITATE SERVICE.

2 7.46 KW BACKWASH / WASTE PUMP CONNECTIONS ARE 3" N.P.T. BACKWASH / WASTE PIPING IS 3" DIAMETER.

3 THE BACKWASH / WASTE PUMP CAPABILITIES ARE AS FOLLOWS:

- HORSEPOWER: 7.46 KW (10HP)
- FLOW: 16.40 L/S (260 GPM)
- TOTAL DYNAMIC HEAD: 20.3 M (66.7 FT)
- ALLOWABLE DISCHARGE HEAD, AFTER FILTER LOSSES: 13.0 M (42.7 FT)

FOR INSTALLATIONS THAT REQUIRE MORE DISCHARGE HEAD,
ALTERNATIVE PUMPS ARE AVAILABLE. PLEASE CONSULT ENGINEERING
TO VERIFY THE SUITABILITY OF THE DISCHARGE PIPING OR FOR
SPECIAL PUMP REQUIREMENTS.

JOB NAME: NAPANEE WWTP
JOB LOCATION: ON

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES

FRACTIONAL DIMENSIONS	+/- 1/16
ALL TWO PLACE DECIMALS	+/- 0.010
ALL THREE PLACE DECIMALS	+/- 0.005
ALL ANGLES	+/- 1/2°

ANSI

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: ZJD
DATE: 2023-10-05
WEIGHT:
SHEET: OF
DRAWING NAME: FILTER DETAILS
DRAWING NUMBER: 8704419A6002
SCALE:
SIZE: D

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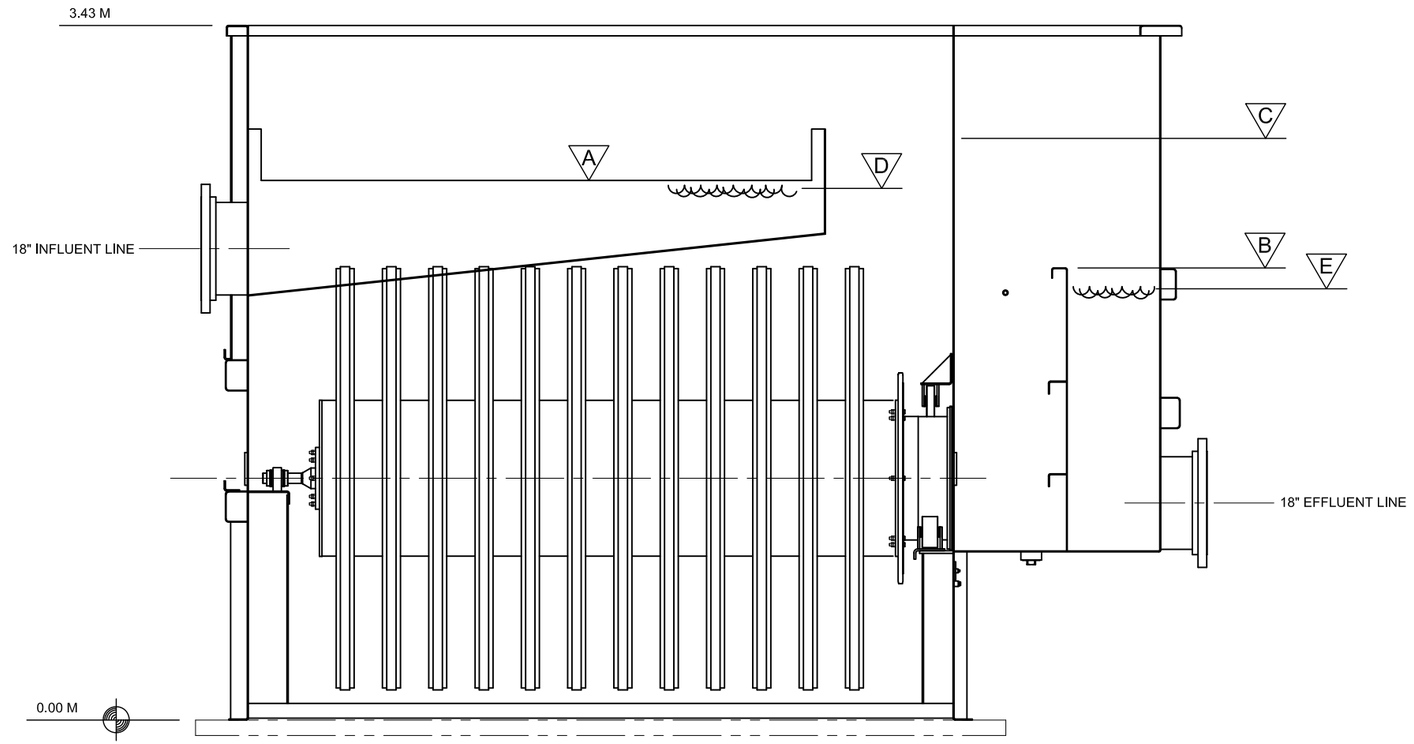

FLOW CONDITION	AVG. DESIGN	MAX. DESIGN	REDUNDANT
REDUNDANCY CRITERIA	-	-	100% MAX
QTY FILTERS ONLINE	3	3	2
PLANT FLOW (MGD)	3.04	11.18	11.18
FLOW / FILTER (MGD)	1.01	3.73	5.59
FLUX RATE (GPM/M²)	11.73	43.16	64.69

	LOCATION	FLANGE DIA (CM)	FLANGE EL (M)	WEIR LG (M)	WEIR EL (M)	NAPPE EL (M)	NAPPE EL (M)	NAPPE EL (M)
A	INFLUENT	45.72	2.33	2.72	2.66	2.71	2.76	2.80
B	EFFLUENT	45.72	1.07	2.36	2.23	2.28	2.34	2.38
C	OVERFLOW	-	-	1.62	2.87	2.93	3.01	3.06
D	BACKWASH INITIATE EL	-	-	-	2.65	-	-	-
E	MAX. DOWNSTREAM EL	-	-	-	2.08	-	-	-

NOT FOR CONSTRUCTION

JOB NAME: NAPANEE WWTP
JOB LOCATION: ON

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: ZJD
DATE: 2023-10-05
WEIGHT:
SHEET: OF:

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

DRAWING NAME: HYDRAULICS PROFILE
DRAWING NUMBER: 8704419A6003
SCALE:
SIZE: D

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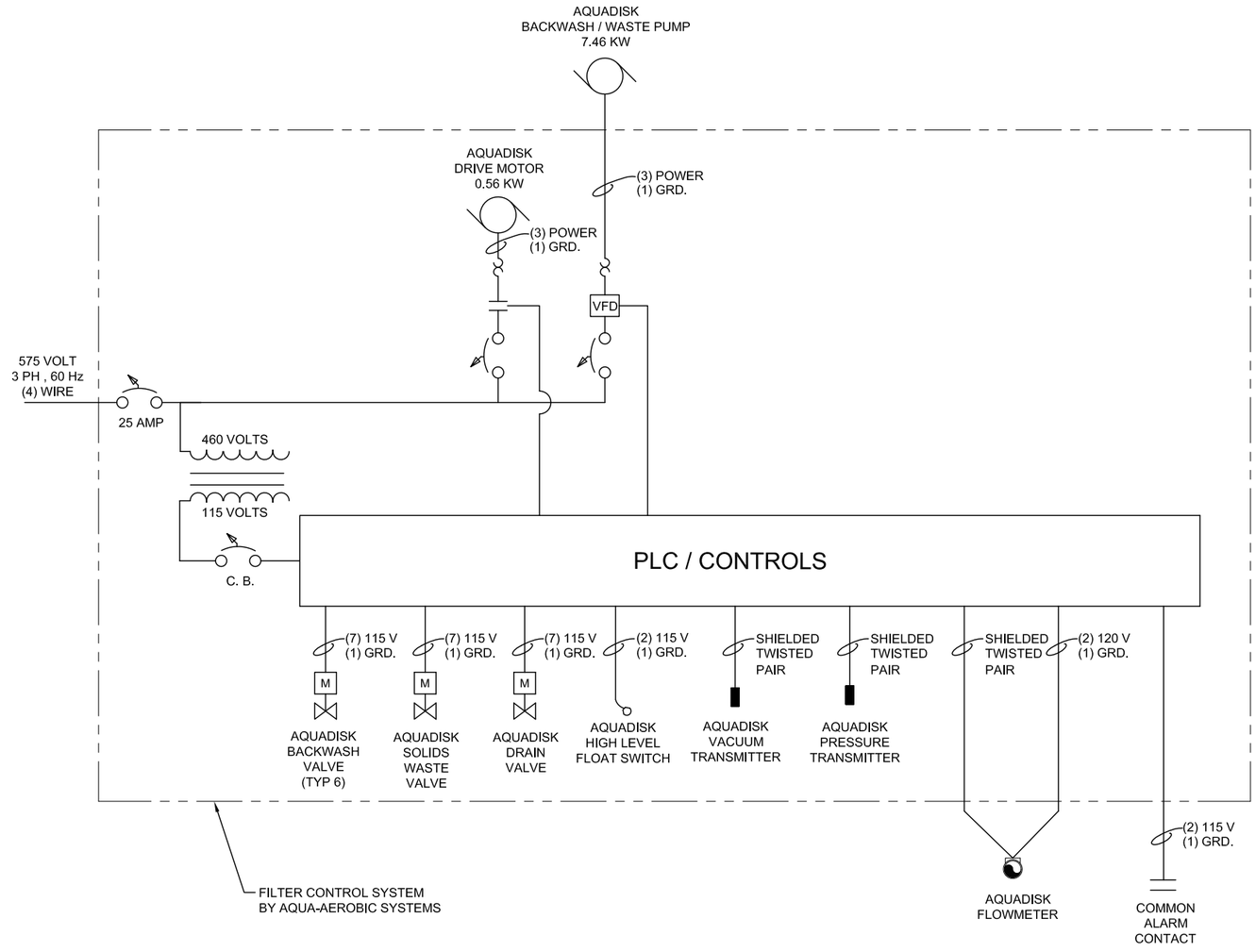
SYMBOL KEY											
	MOTOR		CIRCUIT BREAKER		ELECTRICAL DISCONNECT	VFD	VARIABLE FREQUENCY DRIVE		TRANSDUCER		STARTER CONTACTOR
M	MOTOR OPERATED VALVE		TRANSFORMER		MOTOR OVERLOAD	P	PNEUMATIC OPERATED VALVE		FUSE		FLOAT SWITCH

NOTE: SOME SYMBOLS MAY NOT BE APPLICABLE



NOT FOR CONSTRUCTION

1 CONTROL PANEL
ENCLOSURE NEMA 4X FLOOR MOUNTED 316 STAINLESS STEEL
FACTORY ASSEMBLED ON THE FILTER, DISASSEMBLED AND SHIPPED LOOSE.
REASSEMBLED ON-SITE BY CONTRACTOR.
IF THE FILTER IS LOCATED OUTSIDE, THE CONTROL PANEL
MAY BE RELOCATED TO THE SIDE OF THE FILTER
FACING NORTH TO LIMIT THE H.M.I. EXPOSURE TO DIRECT SUNLIGHT.

2 STANDARD CONTROL PANEL SIZE
62" HEIGHT X 60" WIDE X 12" DEEP

3 (1) CONTROL PANEL PER FILTER

JOB NAME: NAPANEE WWTP
JOB LOCATION: ON

AQUA-AEROBIC SYSTEMS, INC.
A Matrimetrix Company

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS ARE IN INCHES
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: ZJD
DATE: 2023-10-05
WEIGHT:
SHEET: OF
DRAWING NAME: ONE-LINE DIAGRAM
DRAWING NUMBER: 8704419A6004
SCALE:
SIZE: D

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P.& I. DIAGRAM SYMBOL KEY

XXX / XXXXX

TOP LINE INDICATES FUNCTION AS FOLLOWS:

ZSO	POSITION SWITCH OPEN
ZIO	POSITION INDICATE OPEN
ZAO	POSITION ALARM OPEN
ZSC	POSITION SWITCH CLOSE
ZIC	POSITION INDICATE CLOSE
ZAC	POSITION ALARM CLOSE
ZA	POSITION ALARM
YSR	STATUS SWITCH RUN
YIR	STATUS INDICATE RUN
YIS	STATUS INDICATE STOP
YIO	STATUS INDICATE OPEN
YIC	STATUS INDICATE CLOSE
YAR	STATUS ALARM RUN
YAS	STATUS ALARM STOP
YA	STATUS ALARM
TSH	TEMP. SWITCH HIGH
TSL	TEMP. SWITCH LOW
TAH	TEMP. ALARM HIGH
TI	TEMP. INDICATE
LSLL	LEVEL SWITCH LOW/LOW
LALL	LEVEL ALARM LOW/LOW
LSL	LEVEL SWITCH LOW
LSM	LEVEL SWITCH MID-RANGE
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH/HIGH
LAHH	LEVEL ALARM HIGH/HIGH
LT	LEVEL TRANSMITTER
LI	LEVEL INDICATOR
VT	VACUUM TRANSMITTER
VI	VACUUM INDICATOR
AIT	ANALYZER INDICATOR/TRANSMITTER
AI	ANALYZER INDICATOR
AT	ANALYZER TRANSMITTER
AAH	ANALYZER ALARM HIGH
AAL	ANALYZER ALARM LOW
ASH	ANALYZER SWITCH HIGH
ASL	ANALYZER SWITCH LOW
FE	FLOW ELEMENT
FI	FLOW INDICATOR
PI	PRESSURE INDICATION
MS	MOISTURE SENSOR
PSV	PRESSURE SAFETY VALVE

XXX / XXXXX — BOTTOM LINE TAGS EQUIPMENT IDENTIFICATION

XXXXX
- EQUIPMENT NO.
- TANK NO.
- EQUIPMENT I.D.

A0000	AERATOR
B0000	BLOWER
D0000	DECANTER
F0000	FLOAT SWITCH
I0000	INSTRUMENT
M0000	MIXER
P0000	PUMP
S0000	SOLENOID VALVE
V0000	VALVE
W0000	MISC.

XXX / XXXXX — FIELD LOCATED DEVICE (LIMIT SWITCH, TEMP. SWITCH, TRANSMITTER, ETC.)

XXX / XXXXX — CONTROL PANEL MOUNTED INDICATOR OR INSTRUMENT (RUN LIGHT, LEVEL INDICATOR, D.O. TRANSMITTER, ETC.)

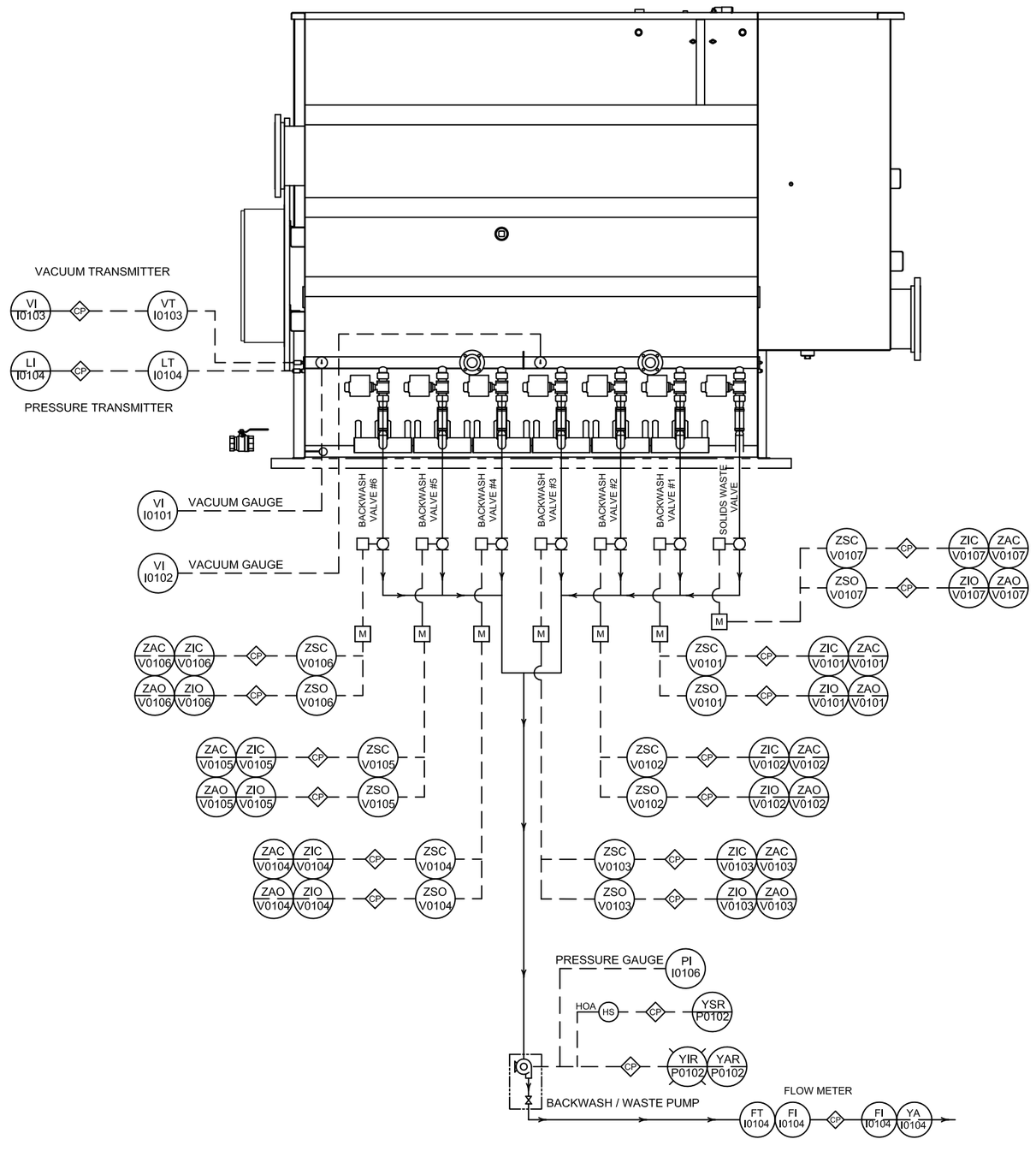
XXX / XXXXX — OPERATOR INTERFACE DISPLAY READOUT (ALARM STATUS, CYCLE STATUS, ETC.)

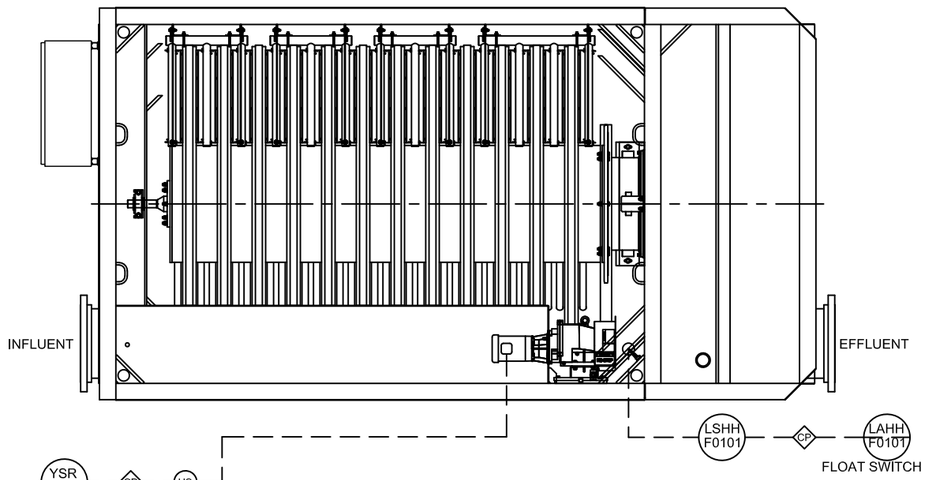
CP — CONTROL PANEL / FIELD DEVICE TRANSITION POINT

HS XXX — HAND SWITCH
- OCA OPEN/CLOSE/AUTO
- HOA HAND/OFF/AUTO
- HOAB HAND/OFF/AUTO A/AUTO B

M — MOTOR

PB — PUSH BUTTON





NOT FOR CONSTRUCTION

JOB NAME: NAPANEE WWTP
JOB LOCATION: ON

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE: TJR 2023-11-06
DRAWN BY: DATE:
WEIGHT: SHEET: 1 OF 1

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

DRAWING NAME: AQUADISK FILTER MODEL ADFSP-54 X 12E-PC P&ID
DRAWING NUMBER: 8704419A6005
SCALE:
SIZE: D

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