FACILITY PLAN AMENDMENT

Johnson Creek WWTF
Sludge Dewatering Improvements

March 2024

Prepared for:
Village of Johnson Creek

Prepared by:
Stantec Consulting Services, Inc.

Project Number:
173420148

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
1	Draft	Louis Sigtermans	3/7/2024	Peter Daniels	3/7/2024	John Friel	

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Prepared by: 

Signature

Louis Sigtermans

Louis Sigtermans

Reviewed by: 

Signature

John Friel

John Friel

Approved by: 

Signature

Peter Daniels

Peter Daniels

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Professional Certifications

PROFESSIONAL ENGINEER

I hereby certify that this Facility Plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Wisconsin.

Peter Daniels, PE

Date: March 7, 2024 License # E-45190-6

PROFESSIONAL ENGINEER

I hereby certify that this Facility Plan was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Wisconsin.

Christian Moring, PE

Date: March 7, 2024 License # E-48722

Executive Summary

The Village of Johnson Creek, Wisconsin (the Village) operates a Wastewater Treatment Facility (WWTF) that receives domestic, commercial, and industrial wastewater. The WWTF is authorized to discharge treated wastewater into the Rock River in Jefferson County under Wisconsin Pollution Discharge Elimination System (WPDES) permit number WI-0022161-09-0, issued by the Wisconsin Department of Natural Resources (WDNR).

The purpose of this report is to describe proposed improvements to the sludge dewatering portion of the WWTF. This report was prepared as an amendment to the 2017 Facility Plan. The 2017 Facility Plan recommended replacing the existing sludge dewatering system with a Bioset™ alkaline stabilization process to produce Class A biosolids. This report amends the recommended plan for sludge dewatering improvements.

This Facility Plan Amendment identifies and considers two additional biosolids disposal alternatives for the Johnson Creek WWTF, including the continued hauling of liquid biosolids offsite by third-party haulers and replacing the currently non-functional plate and frame filter press with a Volute™ press followed by a sludge dehumidification system to produce Class A biosolids that could either be land applied of landfilled. Based on a cost-effective analysis of the alternatives, the Volute™ press followed by a sludge dehumidification system is selected as the recommended alternative.

As part of this project, Stantec and Village staff toured the Marinette, WI WWTF to observe the Volute™ press and dehumidification system that was recently installed. Further information about that site visit is included in this report. Pilot testing of the proposed dewatering and drying equipment was also completed during the preparation of this Facility Plan Amendment.

The estimated construction cost for the proposed improvements is $4,050,000. This cost includes construction costs, engineering, legal/administrative, and contingency.

Next steps for this project include the following:

- Submit the Facility Plan Amendment report to WDNR.
- Hold a Public Hearing on the Facility Plan Amendment (if required – WDNR requires a public hearing if the project is expected to increase user rates by more than 20 percent).
- Finalize project financing plan (with Village financial consultant).
- Advance to final design and engineering of the recommended alternatives. Stantec will prepare a proposal for final design and bidding phase services and submit to the Village when complete.

1 Introduction

1.1 Background

The Village of Johnson Creek, Wisconsin (the Village) operates a Wastewater Treatment Facility (WWTF) that receives domestic, commercial, and industrial wastewater. The WWTF is authorized to discharge treated wastewater into the Rock River in Jefferson County under Wisconsin Pollution Discharge Elimination System (WPDES) permit number WI-0022161-09-0. A copy of the permit is attached in Appendix A.

In 2019, the Village completed liquid treatment process improvements at the WWTF, including eliminating the primary clarifiers and rotating biological contactors and constructing a new oxidation ditch system. Following the improvements to the liquid treatment processes, primary sludge was no longer produced. Following this change, the existing sludge dewatering equipment (a plate and frame filter press) soon deteriorated and became non-functional. The Village is currently contracting with a local septage hauling company to haul and dispose of liquid biosolids at the hauling company's dedicated storage/disposal facility.

The purpose of this report is to serve as an amendment to the 2017 Facility Plan, prepared by MSA Professional Services, Inc. and reviewed and approved by the Wisconsin Department of Natural Resources (WDNR). The 2017 Facility Plan recommended replacing the existing sludge dewatering system with a Bioset™ alkaline stabilization process that produces Class A biosolids. This report amends the recommended plan for sludge dewatering improvements. The 2017 Facility Plan is attached to this report in Appendix B for reference.

In 2021, Applied Technologies, Inc. (ATI) performed a Sludge Dewatering Study for the Village, which was documented in a report dated September 2021. The 2021 report considered three alternatives for sludge management: belt filter press, decanter centrifuge, and adding new sludge storage tanks to expand liquid sludge storage capacity. The 2021 study is attached to this report in Appendix C for reference.

In August 2023, the Village received proposals for a set of alternative technologies for dewatering including a Volute™ press followed by dehumidification. The Village desires to make improvements to the WWTF sludge dewatering by pursuing the Volute™ press followed by dehumidification alternative. The proposed dehumidification system will produce a Class A biosolids product and reduce water content compared to other dewatering technologies, providing improved flexibility for ultimate disposal.

The Facility Plan amendment has been prepared in accordance with Wisconsin Administrative Code NR 110.09 and applicable WDNR guidance for Facility Plan revisions.

1.2 Scope

The scope of improvements considered in this Facility Plan are presented in subsequent chapters of the report. Major proposed changes at the WWTF include replacing the existing 20-year old plate and frame filter press with a Volute™ press and dehumidification technology. Proposed modifications would mostly be within the existing Dewatering Building.

The liquid stream treatment improvements proposed in the 2017 Facility Plan were implemented as described. No changes are proposed to those portions of the Facility Plan.

2 Design Criteria

This section establishes the design criteria to be used for design of the biosolids management processes.

2.1 Population Projections

The sludge dewatering improvements are projected to be completed by 2025. Therefore, the 20-year planning period ends in a design year of 2045.

In 2017, the Village completed its Comprehensive Plan, which included population projections. The Village compared a linear model based on 2000-2015 population growth to Wisconsin Department of Administration (DOA) projections. The Village selected the linear model instead of the DOA projections. Consequently, the design basis for the sludge dewatering improvements uses the same population projections as the Village Comprehensive Plan. Note that the 2017 Facility Plan utilized the DOA projections through a design year of 2036, which projected a design population of 4,280 in 2036.

A comparison of the two projections is illustrated in Figure 2-1, along with historical population data from 2000-2023. Based on the Village's linear model, the design year 2045 flow and loading projections will be based on a population of 5,403 (an increase of 2,005 over the 2023 population).

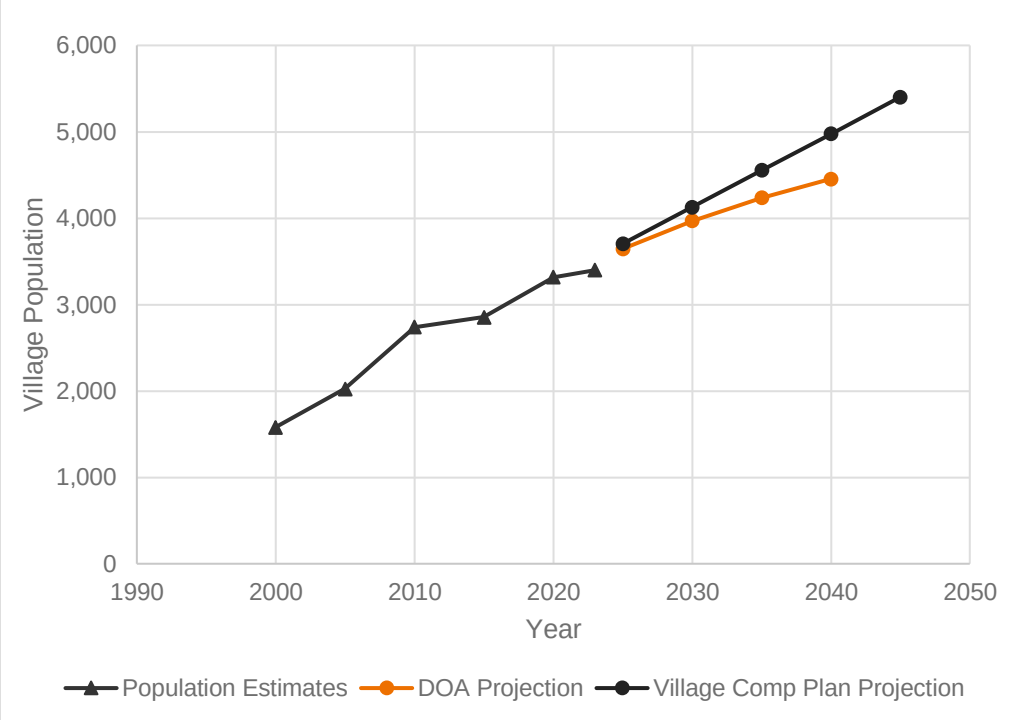


Figure 2-1: Village of Johnson Creek Population Projections

2.2 Flows and Loads

Based on conversations with Village staff, there are no current significant industrial users that contribute to the WWTF influent flows and loads. For the purposes of projecting future flows and loads, no future industrial growth or new industrial users are assumed. It is also assumed that the Village will continue to operate the aerobic digester but will no longer add lime or alum to the digested sludge. Table 2-1 shows historical and projected flows and loads for influent to the WWTF. Mass loading for all parameters is presented as pounds per day (ppd).

Also shown is the facility's permitted annual average design flow (AADF) as outlined in the facility's WPDES permit. The rated AADF capacity of the WWTF was decreased from 0.7 MGD to 0.401 MGD following the 2018 improvements. It is assumed that the decreased capacity reflects the sizing for the new liquid treatment equipment, but that the existing influent pumping and sludge management remains sized to meet the AADF of 0.7 MGD.

Note that three projections are shown for comparison – one for 2036 based on the 2017 Facility Plan projections, one utilizing the updated 2045 projections, and one based on the original rated AADF capacity of the WWTF of 0.7 MGD. An equivalent population of 6,427 was estimated from the 0.7 MGD value based on current per capita flows.

Table 2-1: Flows and Loadings, Historical and Projected

Method/Source		Current WPDES Permit	Historical[1]	2017 Facility Plan	Updated Johnson Creek Projections[2]	At WWTF Original Rated Capacity[2]
Year			2021-23	2036	2045	
Population	#		3,398	4,280	5,403	6,427
Avg Daily Flow	MGD	0.401	0.370	0.401	0.588	0.700
Influent Avg BOD5	ppd		862	1,014	1,371	1,631
Influent Avg TSS	ppd		657	1,190	1,045	1,243

1. Historical WWTF influent data is based on data from September 2021 to August 2023.
2. 2045 updated projections and WWTF original rated capacity flow and load projections are based on current per capita flows and loads.

2.3 Biosolids Management Design Criteria

Prior to deterioration of the plate and frame filter press, solids generated in the treatment process, including WAS and primary sludge, were stabilized by aerobic sludge digestion and processed in a dewatering facility which consisted of lime stabilization, a plate and frame filter press dewatering unit, and a covered cake storage bunker. The facility used a lime stabilization process as means of pathogen control. Historically, cake solids were dewatered to approximately 40% and Class B biosolids were produced. However, the Village is currently hauling away digested liquid sludge without lime addition.

Based on conversations with Village staff, changes to the existing biosolids management program are desired. A summary of the desired biosolids management considerations is presented below.

- Currently, the WPDES permit requires the facility to adhere to the Class B sludge limitations.
- Based on the typical pattern of seasonal land application in Spring and Fall, any improvements are recommended to provide at least 180 days of sludge storage onsite.
- The Village would like flexibility to either land apply or landfill a dewatered material. Volume reduction provided by dried cake biosolids is desired, to reduce hauling and disposal costs.
- Class A biosolids are desired due to limited availability of fields for Class B biosolids (which requires incorporation or other vector reduction methods). Most available land nearby is hayfield for dairies, and Class A would afford the ability to land apply with fewer restrictions. This could also allow for land application outside of the typical Spring and Fall seasons.

To achieve Class A biosolids, both pathogen requirements and vector attraction reduction requirements need to be satisfied in accordance with Wisconsin Administrative Code NR 204.07.

Table 2-2 shows historical and projected production of waste activated sludge (WAS), digested sludge (DSD), and dewatered solids assuming dewatering and drying to 90% total solids concentration.

Table 2-2: Sludge Production, Historical and Projected

Method/Source		WPDES Permit	Historical[1]	2017 Facility Plan	Updated Johnson Creek Projections	At WWTF Original Rated Capacity
Year			2021-23	2036	2045	
Population	#		3,398	4,280	5,403	6,427
Waste Activated Sludge (WAS)	dry TS ppd	N/A	788	Not detailed	1,252	1,490
	gpd	N/A	12,000		19,079	22,696
	%TS	N/A	0.79%		0.79%	0.79%
Digested Sludge (DSD, no lime)	dry TS ppd	N/A	700		1,113	1,324
	Gpd	N/A	5,597		8,899	10,586
	%TS[2]	N/A	1.5%		1.5%	1.5%
Dewatered/Dried Solids	dry TS ppd[3]	N/A	N/A		1,047	1,246
	Gpd	N/A	N/A		139	166
	%TS	N/A	N/A		90%	90%
Recommended Dried Solids Storage[4]	cf	N/A	N/A		3,357	3,993

1. WAS flow and loadings were based on data provided by Village staff for September 2023, while digested sludge (DSD) volumes and solids concentrations were based on discussions with Village Staff on digester performance/operations and on annual biosolids reports from 2021-22.
2. Based on conversations with Village staff, Aerobic Digester thickening performance is currently averaging less than 1.5%, but under more reliable wasting conditions, 1.5% total solids can be reliably achieved.

3. Assumes solids capture rates of 95% for Volute™ press and 99% for dehumidifier.
4. 180 days of storage minimum. Current bunker provides 12,600 cf based on 4 ft average sludge height.

It is recommended that the new biosolids management system be designed for the most conservative of the projections presented in Table 2-2. The highest DSD flows and loads are projected using the WWTF original rated AADF capacity of 0.7 MGD. Therefore, the equipment should be sized based on a dry solids loading rate of 1,324 lbs/day (9,270 lbs/week) and a hydraulic capacity of 10,600 gal/day (74,200 gal/week) based on 1.5% TS.

The operation hours of the new biosolids management system would be finalized based on discussions with the equipment vendor. However, Village staff have expressed the desire to have the system run continuously during the week with little to no supervision. Based on this, the proposed design is based on running the system for up to 24 hours, 6 days a week (144 hours per week) at the projected design flows. The system would be expected to run less (fewer hours per week) at current conditions and increase in the future.

3 Existing Conditions

3.1 General

Because this Facility Plan Amendment does not consider any changes to the liquid treatment train of the WWTF as described in the 2017 Facility Plan, the following sections only describe the existing conditions of the biosolids management system.

The existing conditions presented in this report are based on a visual assessment of the existing infrastructure (process, building mechanical, structural, and electrical), as well as interviews with facility staff. Documentation that was provided by the Village was also reviewed to assist in establishing our opinion on the current physical condition of the infrastructure.

This assessment formed the basis for developing opinions of cost to investigate or address physical deficiencies and to repair or replace systems and components that are past their Expected Useful Life (EUL) or are anticipated to surpass their EUL over the next ten (10) years. No physical tests were conducted.

Another facility component considered for replacement is the WWTF standby electrical power generator. This is discussed further in Section 3.5 and Chapter 4.

3.2 Aerobic Digester

The Aerobic Digester is located adjacent to the Blower Building on the north side of the WWTF. The digester was constructed in 2000. It consists of a below-grade uncovered rectangular concrete tank that receives sludge and scum from the two secondary clarifiers. The tank appears to be in good structural condition with minimal cracking or degradation visible. Air to the digester is provided by two blowers located in the adjacent blower building (constructed in 2011) and a fine bubble diffused air system located in the bottom of the digester tank. WWTF operations staff indicated that the fine bubble diffusers have required frequent maintenance. A decanter is installed within the tank with the decanter arms currently broken. The facility currently uses an external pump to pump clear water off the top of the tank after solids have settled.

Table 3-1 provides an overview of the digester dimensions and volumes. Also shown are the calculated hydraulic residence times (HRT) and solids residence times (SRT) at both current and projected future (2045) sludge loading rates.

Table 3-1: Existing Aerobic Digester Tank

Criteria	Value	Units
Length	45	ft
Width	45	ft
Top of Base Slab	790	ft
Max Design Capacity Level	805	ft
Max Design Depth	15	ft
Max Design Vol	227,205	gal
Effective Volume[1]	170,404	gal
HRT @ Current (0.78% WAS)	14.2	days
SRT @ Current (1.5% DSD)	30.4	days
HRT @ 2045 (0.78% WAS)	8.9	days
SRT @ 2045 (1.5% DSD)	19.1	days

1. Assumes that 25% of total volume is ineffective due to decanting space required (Ten States Standards paragraph 85.31).

To meet pathogen control requirements for Class B sludge, aerobic digesters must be sized to provide an SRT of between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius. If the Village desires to pursue Class A biosolids through a combination of dewatering and thermal treatment technologies, it will no longer be required to meet the Class B aerobic digestion SRT requirements. However, in general, longer digestion will lead to improved dewatering performance.

Aerobic Digester, looking northwest

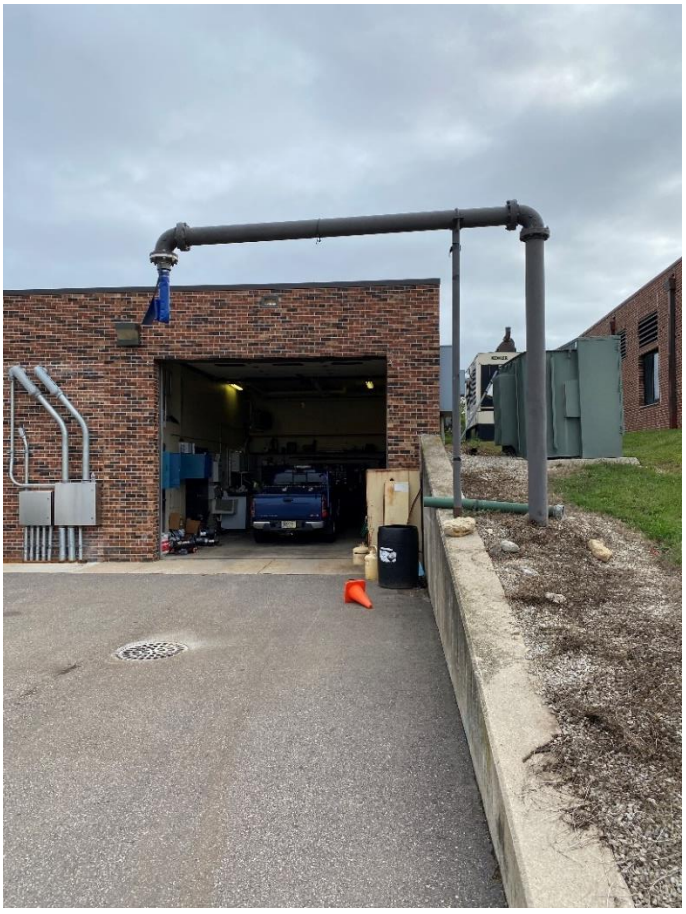
3.3 Control Building - Digested Sludge Pumps and Liquid Sludge Loadout

Process

Following aerobic digestion, digested sludge is conveyed via two double disk sludge pumps to either the Dewatering Building (via a buried 6-inch diameter ductile iron pipe) or the liquid sludge loadout station adjacent to the Control Building. The sludge pumps (7.5 HP, 230/460V, 3 ph, 60 hz) are in good condition and are located on the lower floor of the Control Building on the south side of the facility. The pumps are not on Variable Frequency Drives (VFDs). On the common pump discharge header, there is one flow meter installed that is in good condition.

Based on the design criteria established in Chapter 2, these pumps are oversized compared with the proposed dewatering system. However, per the pump manufacturer, the pumps can be modified with VFDs to meet the lowered design flow rates.

Double Disk Digested Sludge Pumps



Liquid Sludge Loadout Station

3.4 Sludge Dewatering Building and Equipment

The Sludge Dewatering Building is located on the west side of the facility and consists of a Dewatering Room, Mechanical Room, Chemical Containment Room, Lime Silo, and a covered sludge cake storage bunker. The building and storage bunker were constructed in 2001.

Architectural/Structural

The building is in good condition. The precast hollowcore roof plank shows no visible signs of distress. The CMU walls are in good condition with only minor vertical cracks at relatively even spacing along the west wall. This looks to be the result of a lack of control joints in the cast in place concrete wall below, creating constrained joints. The cast in place floor slab is in good condition with no major cracking or deterioration.

Vertical crack in west wall CMU and cast in place concrete

Storage Bunker (left) and Dewatering Building (right) exterior

Process

The Dewatering Room houses the plate and frame press, a concrete reaction tank with mixer, and a rotary lobe sludge dewatering feed pump between the reaction tank and the press. A series of screw conveyors convey sludge cake from the plate and frame press to the storage bunker. The existing sludge feed pump, press, and screw conveyors were installed in 2001 and are currently not operational.

The Mechanical Room houses the dewatering building motor control center, control panel, an air compressor, incoming water service line, and an alum dosing pump. Above the Mechanical Room is a storage mezzanine, accessible via a fixed ladder.

The Chemical Containment Room houses a bulk alum storage tank that was historically used for liquid stream phosphorus removal. However, a new chemical feed building was constructed along with the new oxidation ditch in 2019, so this bulk storage tank is no longer used.

Sludge Dewatering Room with Press on left and Reaction Tank on right

Sludge Dewatering Feed Pump

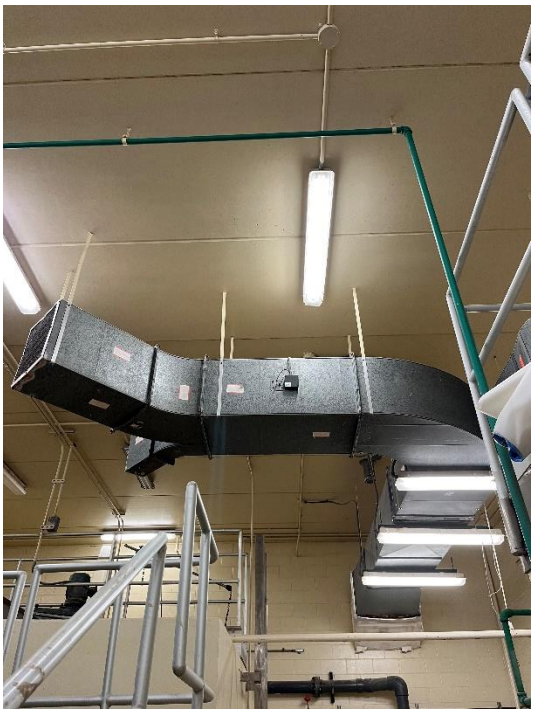
The sludge cake storage bunker has 4 ft tall concrete sidewalls and is covered with a prefinished metal awning. The bunker has a floor area of 3,150 sf. Storage capacity of the bunker is approximately 12,600 cubic ft based on an average sludge cake height of 4 ft. One foot of freeboard is anticipated at the perimeter of the bunker, but the dewatered biosolids can be piled higher in the center of the bunker. Based on the design criteria outlined in Table 2-2, the bunker is sufficiently sized to store the recommended 180 days of dewatered and dried sludge based on a total solids concentration of 90%.

Sludge Cake Storage Bunker and Screw Conveyor

Building Mechanical – HVAC

The Sludge Dewatering Building is served by an existing natural gas direct-fired heating and ventilating unit (HVU) that is approximately 10 years old and in good operating condition. The HVU is mounted vertically on a concrete pad along the building's north exterior wall and provides supply air to the Dewatering Room and Mechanical Room via metal ductwork and grilles, also in good condition. The HVU currently operates in heating-mode only and is thermostat-controlled to maintain the space temperature setpoint during winter months.

Heating and Ventilating Unit, Vertical, Pad-Mounted

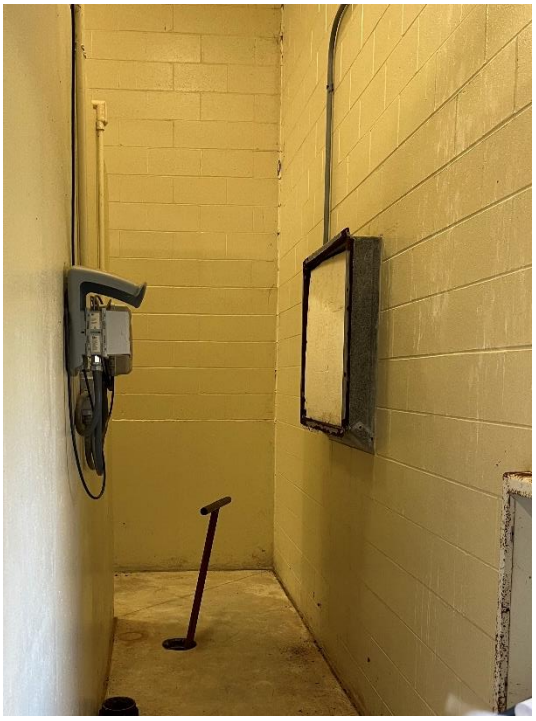


Supply Air Ductwork from HVU to Dewatering Room

Supply Air Ductwork from HVU to Mechanical Room

The Sludge Dewatering Building is not served by any mechanical cooling systems. A roof-mounted exhaust fan is located at the south end of the Dewatering Room roof. The physical condition of the fan was not observed, but it is reportedly no longer operational. An outside air intake louver with motorized damper is located close to the floor on the north exterior wall of the Dewatering Room. It is assumed that the exhaust fan and outside air intake damper were intended to operate simultaneously to provide ventilation air for non-mechanical cooling in the summer months.

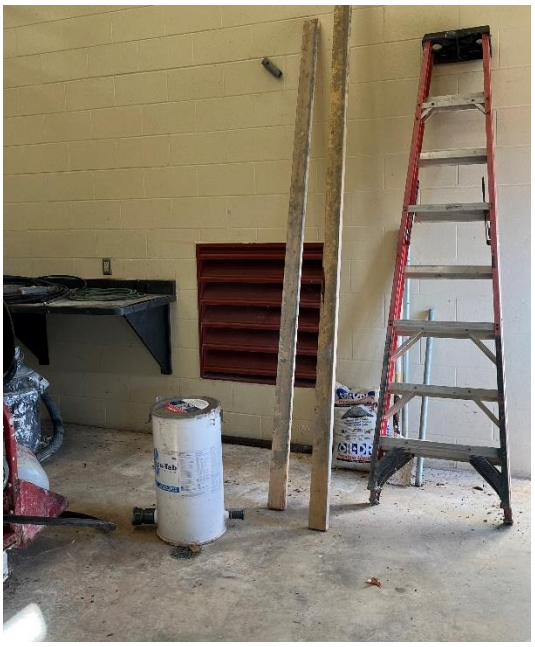
Roof Exhaust Fan Opening, Dewatering Room near South Wall



Outside Air Louver with Motorized Damper, Dewatering Room North Wall

The Chemical Containment Room contains a roof mounted exhaust fan and wall-mounted exhaust fan. The operating condition of the fans is unknown because the Chemical Containment Room is no longer

used. Fixed wall louvers (without dampers) in walls between the Dewatering Room and Chemical Containment Room and between the Mechanical Room and Chemical Containment Room allows for the free transfer of air between spaces. When previously in operation, the exhaust fans would have drawn air from adjacent rooms through the Chemical Containment Room through the fixed louvers.



Fixed Louver from Dewatering Room to Chemical Containment Room

Fixed Louver from Mechanical Room to Chemical Containment Room

Building Mechanical – Plumbing

The Dewatering Room is served by four existing floor drains and one 6-inch hub drain to receive drainage from the existing filter press. The filter press hub drain first discharges to a sampling manhole located in the Mechanical Room, then discharges by gravity to the building sanitary drainage system. Other drains discharge directly to the building sanitary drainage system. Personnel noted that floor drains are functional, but floor slopes do not effectively direct water to the floor drain adjacent to the Lime Silo doors.

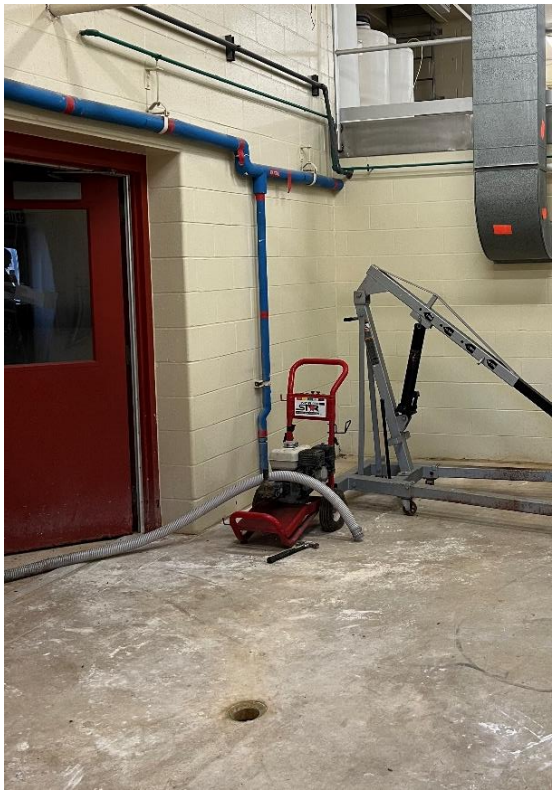
The Mechanical Room contains one floor drain and a one 4-inch hub drain below water service backflow preventers.

Sanitary drainage exits the Dewatering Building via a 6-inch sanitary main below the Mechanical Room to a sanitary manhole located east of the building.

Roof drainage is accomplished with gutters; there is no internal roof drainage piping. No roof drainage issues were reported.

6-Inch Hub Drain Under Filter Press

Sampling Manhole in Mechanical Room



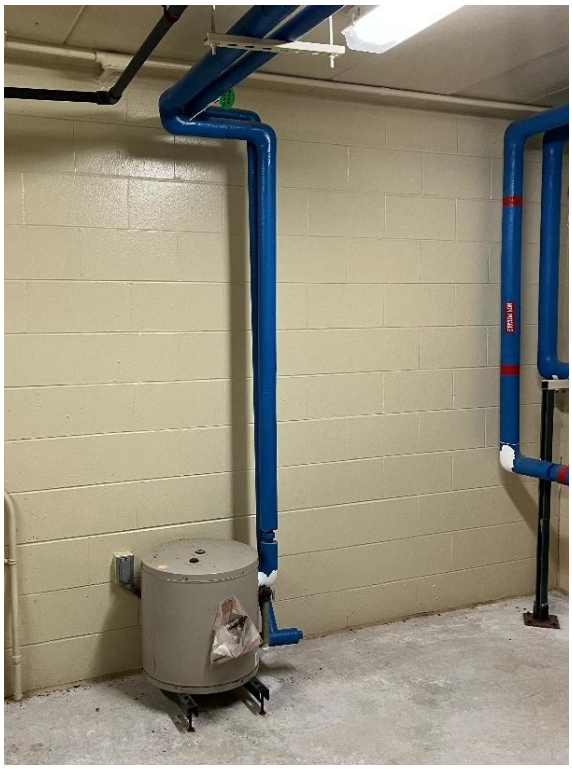
Floor Drain Adjacent to Lime Silo

Water service (2-inch) enters the Dewatering Building along the east wall of the Mechanical Room. A building water meter is followed by two backflow preventers dedicated to potable and non-potable building water services, respectively. Building water service piping and insulation appears to be in good condition throughout.

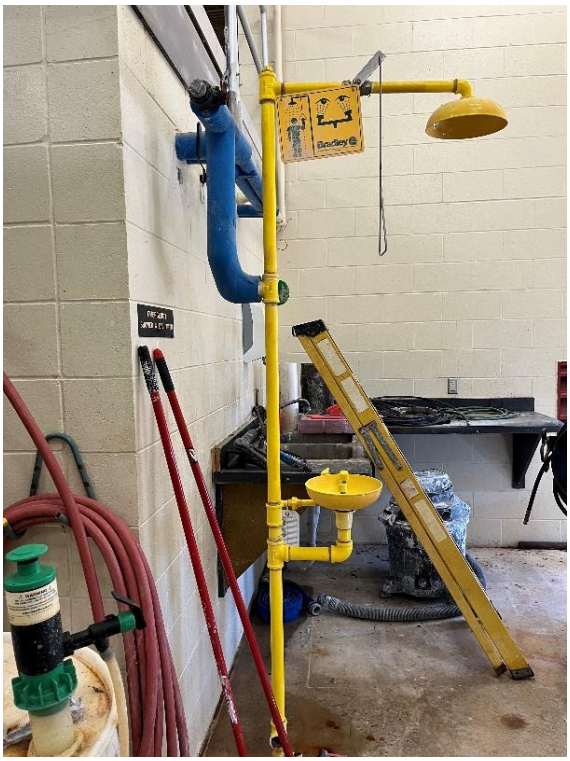
Potable water service piping serves an exterior Hose Bibb on the east wall of the Mechanical Room, a water heater located in the Mechanical Room, and a Kitchen Sink and two Emergency Shower/Eyewashes (ESE) in the Dewatering Room. The water heater appears to be small but in good condition. The ESEs appear to be in good condition. Personnel noted that the kitchen sink is useful in its current location; the counter surrounding it is in moderate condition.

Non-potable water service piping supplies two Washdown Hose Reels, a Pressure Washer, and ½-inch process connection to existing equipment in the Dewatering Room, a Washdown Hose Reel in the Lime Silo, and a Washdown Hose Reel in the Chemical Containment Room. Personnel noted that the Pressure Washer is non-functional, but that the Hose Reels are well-positioned and functional.

Building Water Service Entry in Mechanical Room



Water Heater in Mechanical Room



Emergency Eyewash/Shower and Utility Sink

Electrical

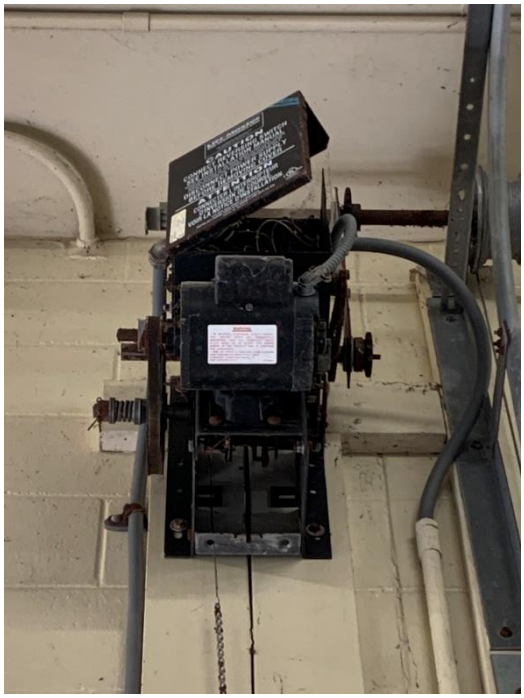
The Sludge Dewatering Building is powered by a 200A Main Circuit Breaker with a 480 Volts, 3-phase motor control center (Square D) located in the Mechanical Room. It receives electrical service from the Control Building motor control center via a 200A 480V Volts, 3-phase circuit breaker, and distributes power to the Sludge Dewatering Building electrical loads. The 200A feeder to the Sludge Dewatering Building is adequate to power the proposed new loads. This takes into account that most of the existing process loads in this building will be removed.

The motor control center enclosure exhibits significant corrosion and deterioration; however, no operational issues were reported by facility staff. OSHA danger or Arc flash labels were not observed on the Sludge Dewatering Building motor control center. Stantec recommends replacing this motor control center as part of this project and have included pricing in the report for this. If infrared thermography testing is performed on the existing MCC and the internal components show no issues, replacing the MCC could be reevaluated during the final design phase.

Dewatering Building Motor Control Center

The motorized rolling door system is non-operational, requiring replacement to increase ease of use and improve the convenience of day-to-day operations. Stantec recommends replacing the existing motorized rolling door system including motor, transmitters, and open-close-stop control station.

Dewatering Room Motorized Rolling Door System



Dewatering Room Motorized Rolling Door System

Existing interior lighting utilizes fluorescent lighting, while exterior building-mounted lighting appears to be low pressure sodium. No issues were reported with the operation of the light fixtures. Some fluorescent bulbs need to be replaced. Although not included in the scope of this project, the Village could consider replacing the existing fluorescent and low-pressure sodium lighting with new LED lighting fixtures which are more energy efficient.

Dewatering Room Interior Lighting Fixtures

Dewatering Building Exterior Lighting Fixtures

Controls

The controls in the Dewatering Building are handled by the existing control panels LCP-D and LCP-E. LCP-D is an Allen-Bradley SLC5/05 PLC based control panel located in the Mechanical Room. The panel also has an Altronex Control Systems operator interface panel on it that is not operational. LCP-E is an Allen-Bradley CompactLogix PLC base control panel with a functional operator interface. LCP-E is located on the elevated access platform adjacent to the plate and frame filter press in the Dewatering Room. LCP-D and LCP-E are linked via an ethernet connection. The Dewatering Building and the Control Building panels communicate via an Ethernet / fiber optic network with LCP-D.

Dewatering Building Control Panel LCP-D

Dewatering Building Control Panel LCP-E

The Control Building control panel is also a PLC-based panel. That PLC has been upgraded to the Allen-Bradley CompactLogix series PLC. Also in the Control Building is the SCADA computer which utilizes Wonderware as its HMI software.

3.5 Main Electrical Service and Standby Power

WWTF Main Electrical Service

The WWTF has an outdoor pad-mounted compartmental distribution transformer and metering cabinet adjacent to the Control Building. The utility company transformer is rated at 500 kVA, 15 kV Primary, 480/277 Secondary.

The transformer provides power to an indoor 1200A 480/277 Volts, 3-phase main molded case main circuit breaker with electronic trip settings (Square D) in the Control Building, routed via the electric utility company outdoor metering cabinet. The main circuit breaker enclosure appeared to be original construction, in working condition, with no reported performance issues. No corrosion or damage on the circuit breaker enclosure was evident.

No Arc flash Reduction Maintenance System (ARMS) was observed on the main circuit breaker. ARMS was first introduced in the 2011 National Electrical Code (NEC) as a solution to reduce arc flash energy and the risk of injury in the event of an arc fault. Modification or upgrade of the existing electrical equipment will require an arc flash energy strategy implementation. Arc-flash labels were not observed on the main circuit breaker enclosure, generator, transfer switch, motor control centers, transformers, or panelboards within the facility. The arc flash labeling legal requirement was first introduced in the 2002 NEC to warn qualified persons of potential electric arc flash hazards on electrical equipment that is likely to require examination, adjustment, servicing, or maintenance while energized. Modification or upgrade of the existing electrical equipment will require an Arc Flash study for electrical equipment enclosures to be labeled in accordance with the presiding NEC.

WWTF Utility Transformer and Metering Cabinet

WWTF Main Circuit Breaker Enclosure

Emergency/Back-Up Power Systems

There is an outdoor pad-mounted emergency standby power diesel generator (Kohler) located adjacent to the Control Building. The generator provides standby back-up power to the entire WWTF. The facility staff indicated that sound attenuation strategy is not a concern but expressed the desire to replace the generator.

The generator is rated at 300 kW, 480/277 Volts, 451 amps, 3-phase. Based on Stantec's interview with site staff, the generator was installed approximately in 1991 and has been maintained and exercised regularly. Corrosion on the generator enclosure was evident. OSHA danger or Arc flash labels were not observed on the generator enclosure.

Standby Diesel Generator

Control Building Electrical Equipment

The Control Building has a 1200A 480/277 Volts, 3-phase motor control center (Square D) that receives electrical service from the 1200A main circuit breaker (via 1200A 480/277 Volts, 3-phase, 3-pole (solid neutral) and automatic transfer switch, where it is then distributed throughout the WWTF, including to the Sludge Dewatering Building via a 200A 480 Volts 3-phase circuit breaker.

The automatic transfer switch was replaced approximately in 2021 and is located adjacent to the Control Building motor control center. No operational issues were reported about the transfer switch operation. The transfer switch appears to be in good overall condition. Since electric service is 1200A, it is assumed that there is ground fault protection provided on the main breaker. On a service with ground fault protection, the transfer switch should be a 4-pole switch. However, as long as the generator is not wired as a separately derived system (neutral bonded to ground at the generator), the 3-pole switch is acceptable. The neutral bonding of the generator should be confirmed during the final design phase.

Normal routine maintenance is recommended to keep the transfer switch operational. OSHA danger or Arc flash labels were not observed on the Control Building motor control center or transfer switch.

Control Building Motor Control Center

The following is a summary of the existing electric service and generator sizes and the associated spare capacities for each.

NEC calculated electrical spare capacity is based on electric utility company historic maximum peak demand (kW) power usage. The maximum peak demand (kW) power usage (provided by the electric utility company) was recorded from the year 2022 to be 174 kW.

Existing main 1200A Service and existing 300 kW Generator Spare Load Capacity Calculations:

Maximum Continuous Peak Demand:	174 kW (217.5 kVA)
25% of Maximum Continuous Peak Demand, per NEC:	54.4 kVA
Calculated Maximum Demand:	271.8 kVA
Total Load in Amps @ 480/277V 3-phase, 4 Wire:	327.2 Amps
Calculated spare capacity of 1200A main service:	72.7%
Calculated spare capacity of 300 kW (451 amps) generator:	27.5%

The 1200 amps 480/277 Volts 3-phase main electrical service is properly sized with a calculated available spare capacity of 72.7% of the main 1200 amps service to support Control Building two (2) 7.5hp digested sludge pumps & Dewatering Building volute press, dehumidifier and shaftless screw conveyors.

The 300 kW (451 amps) 480/277 Volts 3-phase generator is properly sized for the existing loads based on the calculated available spare capacity of 27.5% of the generator rating. With the additional of the new loads, especially the 67KW dehumidifier load, the generator will most likely need to be upsized to 350KW.

4 Biosolids Management Alternatives

4.1 General

As discussed previously in this report, the Village has evaluated multiple options for biosolids management processes. The Village desires to produce a Class A dewatered biosolids product, as the current liquid hauling program has been expensive. This section presents information about two options that do not require any new process equipment, and a third option that is the Village's desired option of producing a Class A biosolids product. Refer to the 2017 Facility Plan (Appendix B) and the 2021 Biosolids Report (Appendix C) for other alternatives that have been considered in the past.

4.2 Repair Plate & Frame Press

The existing plate & frame press was a suitable technology for the previous WWTF, which included primary clarifiers. Waste activated sludge generated from the new wastewater treatment process (which lacks primary clarifiers) can be dewatered most effectively using other solids dewatering processes. Plate & frame presses are generally used infrequently at domestic wastewater treatment plants. Repair of the existing plate and frame press is not recommended for the facility and is removed from further consideration.

4.3 Additional Liquid Sludge Storage

Since the plate and frame press became non-operational, the Village has been hauling out liquid biosolids for disposal by contracted third-party haulers. This operation has been very expensive for the Village compared to the previous dewatering program, and the Village hopes to end the liquid sludge hauling program as soon as possible. However, an alternative that continues the current hauling operations was evaluated for the purposes of this report.

To continue this disposal method, construction of sludge storage tanks would be required to provide added storage capacity should the existing hauler(s) not be able to provide service to the Village in a timely fashion. This alternative is described in the 2021 ATI Report included in Appendix C and would consist of the construction of two covered bolted steel sludge storage tanks southwest of the existing sludge storage bunker.

The present worth comparison included in Chapter 5 of this report provides a financial comparison of two options, including continuing with the current liquid hauling program. However, it is noted that the financial evaluation does not consider the capital costs of expanding the current aerobic digestion system, which would be required to continue to produce Class B solids at sludge production rates for the design year 2045.

4.4 Sludge Dewatering and Thermal Treatment

This alternative would include installing a new sludge dewatering and thermal treatment system. Initial dewatering will occur using a Volute™ press technology. Thermal treatment will be conducted using a dehumidification process. The new dewatering and thermal treatment system will be capable of producing Class A biosolids. The dried biosolids could be landfilled or land applied in compliance with the Class A land application requirements. Vendor proposals for each treatment technology are attached to this report in Appendix D. Further information about the proposed system is provided below.

As part of this Facility Plan process, Stantec and staff from the Village toured the Marinette, WI wastewater treatment facility, which operates the same Volute™ press and dehumidification equipment. Village staff liked that the system required little to no operator attention, needing only periodic system checks and weekly maintenance and cleaning. Some challenges unique to the Marinette system included accumulation of hairballs in the Volute™ press and issues pumping dewatered cake solids through a 4-inch pipe, which was planned for replacement with a larger diameter pipe. In general, the system at Marinette demonstrated the capabilities of the system for meeting the stated objectives of sludge weight and volume reduction and greatly reducing sludge hauling needs.

Also as part of this Facility Plan process, pilot testing of the proposed Volute™ press and dehumidification technology was conducted. Documentation from the pilot testing and results is included in Appendix G. In general, the pilot testing showed that the dewatering and drying equipment is expected to provide the desired results.

Process Modifications

The inoperable plate and frame press will be removed. The existing LCP-E control panel will be salvaged for re-use as described in the proposed controls scope. Removal of the concrete reaction tank, sludge feed pump, plate and frame press, and conveyors will provide room for the proposed sludge dewatering and thermal treatment equipment within the existing space in the Dewatering Room. The proposed sludge dewatering equipment will not require the addition of lime. No modifications to the existing chemical rooms are anticipated.

The proposed sludge dewatering technology is a Volute™ press. The new press will be sized to dewater digested sludge from 1.5% TS to 15% - 20% at 12,350 gallons per day (9 gpm) when operating at 6 days per week. The maximum capacity of the press will be 40,320 gallons per day (28 gpm) of thin sludge (<1%). To assist with dewatering, polymer will be added into a flocculation tank which is a separate piece of equipment to the press.

The Volute™ press will discharge dewatered sludge to a dehumidifier for further drying of the sludge. The concept design conservatively assumes that buffering storage of dewatered sludge will be needed between the Volute™ press and dehumidifier. A 7-foot tall storage hopper is assumed, with the Volute™ press mounted above on a structural support platform. The platform will include stairway access and elevated walkways with protective railings for personnel access to the Volute™ press vendor control panel and motor end of the equipment. A new conveyor will be installed to receive sludge from the hopper

and convey it to the intake hopper of the dehumidifier. The required dewatered sludge buffering storage volume needed will be evaluated and confirmed during the final design phase.

The proposed dehumidifier will be designed to process 4.29 tons of sludge cake per day and produce 0.86 tons of dry sludge per day at 90% TS when operating 6 days per week. Key to the performance of the dehumidifier is the inlet slitter box, which forms the dewatered sludge cake into noodle-shaped strands. The sludge “noodles” are then conveyed on two mesh belt conveyors within the dehumidifier unit. The upper mesh belt is exposed to air temperatures between 48°C and 60°C, which partially dries the sludge. The lower mesh belt is exposed to air temperatures between 70°C and 75°C, where additional drying and pathogen destruction occurs.

Based on documentation provided by the dehumidifier equipment vendor (included in Appendix E), the dehumidification system is not anticipated to create combustible dust hazards sufficient to invoke Class II electrical design for the Dewatering Room.

New shaftless screw conveyors will be installed to convey dried sludge cake out of the dehumidifier to the sludge cake storage bunker.

Filtrate from the Volute™ press and dehumidifier will drain to the facility’s influent lift station via existing underground piping in the Dewatering Building. Because the WWTF has utilized a dewatering system in the past, it is understood that the return filtrate streams from the dewatering equipment will introduce hydraulic and pollutant (especially nutrient) loading to the liquid treatment train. Because the dewatering system is designed to operate continuously, not intermittently, the return streams will also be consistent, which should prevent major operational challenges associated with intermittent high strength return streams being introduced to the head of the liquid treatment process. The operations staff should monitor the return stream flow and strength upon startup and monitor the liquid treatment train performance accordingly.

As described in Section 3.3, in consideration of the dewatering system design criteria, the digested sludge pumps will require modifications to achieve the lower design flow rates. According to the pump manufacturer, these pumps should be capable of operating at the design flow rates and heads if VFDs are added. Additionally, the belts and sheaves can be replaced to achieve the design flow rates if needed. It is envisioned that one or both pumps will remain capable of pumping to the existing liquid sludge loadout (by running at higher motor speeds using the VFDs) to provide operators the flexibility of multiple disposal options.

Based on the new maximum design flow, wet sludge velocity in the existing 6-inch buried digested sludge line will be 0.32 ft/sec. Slow velocity could lead to solids settling in the pipe that creates additional work for cleaning. To facilitate pipe cleaning, two cleanouts will be installed on the buried digested sludge line approximately halfway between the Control Building and Dewatering Building. Additionally, process piping and valves will be provided in the Dewatering Room which will bypass the Volute™ press and route directly to the drain line. This will allow for periodic flushing of the line using one or both digested sludge pumps by running them at higher speeds.

Structural/Architectural Modifications

The reaction tank walls will be demolished to two feet below the bottom of floor slab. The remaining tank portion will be filled and compacted with granular structural fill. The elevated piers for the filter press will be removed to the existing top of slab elevation. The thickened section of floor slab currently supporting the filter press will need to be widened to the east to support the new dehumidifier unit.

Building Mechanical Modifications – HVAC

NFPA 820 Standard for Fire Protection in Wastewater Treatment Collection Facilities establishes minimum requirements for protection against fire and explosion hazards presented by specific wastewater treatment processes and area types. Specifically, NFPA 820 identifies the NEC Hazardous Location Classification of a space with a given function and amount of ventilation, specified as Air Changes per Hour (ACH). The Classification dictates the characteristics of electrical and mechanical equipment located within a space which must be specified to minimize fire and explosion hazards (enclosures, spark resistance, explosion proof ratings, etc.).

NFPA 820 (2024), Table 6.2.2(a) Solids Treatment Processes, Row 12, is applicable to the Dewatering Room and indicates the following:

Row	Line	Location and Function	Fire and Explosion Hazard	Ventilation	Extent of Classified Location	NEC Hazardous Location Classification
12	a	Dewatering Buildings containing centrifuges, gravity belt thickeners, belt and vacuum filters, and filter presses Removal of water from sludge and the conveyance of sludge cake	Accumulation of Methane Gas	Continuous Ventilation at 6 ACH	Entire Room	Unclassified
	b			No ventilation, or continuous ventilation < 6 ACH	Entire Room	Division 2

To maintain a classification of Unclassified (no special requirements for equipment within the space), continuous ventilation at a minimum rate of 6 ACH is required. Ventilation is defined as simultaneous active supply of outside air and active exhaust of an equal amount. One Air Change is equal to the total volume of the space being ventilated. Ventilation requirements for the Dewatering Room are summarized below:

Area	Volume (ft^3)	ACH Required	Min. Ventilation
Dewatering Room	35300 ft^3	6	3530 CFM

The existing HVU serving the Dewatering Building is rated to provide up to 4000 CFM of ventilation supply air, which meets the minimum ventilation rate required for the Dewatering Room of approximately

3530 CFM. Therefore, because the HVU is in good working condition and reasonably has 10-15 years of service life remaining, it is recommended that the HVU remains in place to provide the required supply air ventilation, with modifications including:

- Revise HVU controls
    - Continuous operation in ventilation mode at 4000 CFM
    - Thermostat-controlled operation of natural gas burner
    - Supply air monitoring and associated alarms to verify operation
- Modify HVU ductwork to supply ventilation air only to Dewatering Room, and deliver air near floor.
- Replace existing roof exhaust fan with new roof exhaust fan to provide continuous exhaust of 4000 CFM, interlocked with HVU operation.
- Refurbish existing outside air louver and motorized damper on north Dewatering Room wall. Interlock with roof exhaust fans for emergency ventilation in case of HVU failure/maintenance.

Note that the high rate of outside air ventilation will also provide non-mechanical cooling to the Dewatering Room in the summer months.

Spaces adjacent to the Dewatering Room, including the Lime Silo, Chemical Containment Area, and Mechanical Room, must maintain separation from the Dewatering Room (otherwise, if air flows freely between spaces, they share the classification of the Dewatering Room and need to be included in the total volume used to determine minimum ventilation rate at 6 ACH). Therefore, fixed air transfer louvers between the Dewatering Room and Chemical Containment Room, and Mechanical Room and Chemical Containment Room, will be removed and infilled with solid block wall. Doors between all spaces should also remain closed.

Additionally, the Mechanical Room will be disconnected from the HVU supply air ductwork and served by a new, dedicated air conditioning system with 100% recirculation, such as a wall-mounted split system. Mechanical/electrical rooms do not require ventilation air and benefit from limiting the amount of humidity entering the space. Providing cooling also reduces humidity and maintains space temperature within the preferred parameters for electrical equipment longevity.

Finally, new exhaust louvers with motorized dampers will be provided near the location selected for the remote condenser fans associated with the sludge dehumidifier. The condenser fans will be wall-mounted near the dehumidifier, and oriented such that outlet air is directed through the louvers to reject the dehumidification process heat to the outdoors. In the winter months, the motorized dampers can be closed, and heat can be rejected to the Dewatering Room. Note that the condenser fans are not rated for direct outdoor installation.

In summary, HVAC modifications include the following:

- Revise HVU controls and ductwork and replace the roof exhaust fan to provide continuous ventilation to Dewatering Room.
- Close air transfer openings between adjacent spaces.
- Provide Mechanical Room with dedicated AC system.
- Provide exhaust louvers for heat rejection from sludge dehumidifier via remote condenser fans.

Building Mechanical Modifications – Plumbing

Floor drains in the Dewatering Room will be revised or added as required based on the final locations of the new dewatering equipment to resolve conflicts and/or provide discharge locations near condensate drains from the new sludge dehumidifier or other process drains. Floor slope revisions, particularly in the area impacted by the removal of the existing concrete tank, will be coordinated with structural to ensure proper drainage of the entire floor area. The existing filter press hub drain will be re-used for filtrate from the Volute™ press and dehumidifier. The associated sampling manhole located in the Mechanical Room will have its current cover replaced with a sealed and gasketed cover.

Water service piping will not be revised, other than to provide non-potable process taps as required for the new polymer feed system and automatic spray wash for the dewatering equipment. The non-functional pressure washer may be removed.

Electrical and Controls Modifications

The following electrical modifications are proposed for the project:

- Dewatering Building
    - Full replacement of the motor control center. If infrared thermography testing is performed on the existing MCC and the internal components show no issues, replacing the MCC could be reevaluated during the final design phase.
    - Replacement of the existing overhead door motorized opening system in the Dewatering Room.
    - Installation of new control panels and related wiring for new process and HVAC equipment.
- Control Building
    - Installation of two (2) new VFDs for the existing digested sludge pumps located in the Control Building.
    - Updates to SCADA and HMI systems to accommodate new process and HVAC equipment.
    - Replace existing standby generator.

The controls design for the proposed biosolids management system would be to connect the new Volute™ press and dehumidifier control panels via Ethernet to existing LCP-E. The proposed conveyors are not provided with their own control panels so the associated I/O will need to be hard wired to existing LCP-E.

The existing LCP-D panel will be removed, and the salvaged LCP-E will be moved to the location of the existing LCP-D. Fiber optic equipment from LCP-D will be moved into LCP-E to allow LCP-E to communicate data back to the Control Building control panel and SCADA computer via the existing fiber optic cable. The SCADA system would be programmed to monitor the run, fail status of the press, conveyors, and dehumidifier, control the new digested sludge pump VFDs (based on call signals from the press panel), and monitor all new process and mechanical equipment. The programming, HMI screens, trends, and reports would emulate those of existing plant equipment.

Miscellaneous Improvements

In addition to the improvements above, the Village would like to replace the existing exterior doors into the Sludge Dewatering Building. The existing doors show signs of significant corrosion. There are three exterior doors that will be replaced as part of this project.

5 Evaluation of Biosolids Management Alternatives

5.1 General

The previous chapter identified three biosolids management alternatives for the Johnson Creek WWTF. One alternative (Repair Plate & Frame Press) was removed from further consideration. This section provides a comparison of the remaining two alternatives from both a monetary and non-monetary standpoint. Based on these comparisons, a recommended alternative is presented.

5.2 Cost-Effective Analysis

The basic guidelines from which a cost-effective analysis must be developed are given in Wisconsin Administrative Code NR 110.09. The method of cost-effective analysis to be used is the total present worth method. The total present worth of biosolids management alternatives is the amount of money needed now in order to build, operate, and maintain the system over the planning period of 20 years. A discount rate of 2.625% was used to convert future (replacement) costs and annual (operation and maintenance) costs to present worth costs. This rate is established by WDNR.

Detailed cost estimates of the two alternatives are included in Appendix F. The capital costs include a 10% allowance for capital contingency and a 17% allowance for project engineering and administrative costs.

Engineering opinions of probable construction cost expressed in this report are partially based on consultation with industry-recognized publications on costs for materials and labor. While Stantec uses information available to us combined with our judgment and experience, the specific rationale and conditions forming the basis of contractors' bids, material or equipment pricing are beyond our knowledge and control. Stantec can therefore not be held responsible if the final costs vary from these engineering opinions of probable construction cost.

The estimated capital cost, annual O&M cost, and the 20-year present worth value of each alternative are summarized in Table 5-1. Note that capital costs for standby generator replacement are not included in the table because it is common to both alternatives.

Table 5-1: Total Estimated Costs of Alternatives

Alternative	Capital Cost	Annual O&M Cost[3]	20-Year Present Worth
Additional Liquid Sludge Storage	$3,020,000 [1]	$174,000	$5,710,000
Sludge Dewatering and Thermal Treatment	$3,710,000 [2]	$75,000	$4,870,000

1. Cost is based on the total project cost provided by the 2021 ATI Report for Alternative 3, factoring in inflation.
2. Excludes cost for replacement of standby generator, Sludge Dewatering Building overhead door equipment, and Sludge Dewatering Building exterior doors.
3. At current sludge production rates.

5.3 Non-Monetary Differences

Significant differences, which cannot be quantified in terms of dollars, may exist between the various biosolids management alternatives. The primary differences are related to operational flexibility and the methods in which biosolids are handled and disposed of. Factors considered important when evaluating the alternatives from a non-monetary standpoint are described below.

5.3.1 FLEXIBILITY OF BIOSOLIDS DISPOSAL OPTIONS

The Village is currently relying on contractors for hauling and disposal of liquid biosolids. Construction of sludge storage tanks would be required to provide added storage capacity that is needed to provide the Village time should the existing hauler(s) not be able to provide service to the Village in a timely fashion.

Constructing the proposed dewatering system will give the Village more flexibility and reliability in regards to the disposal of biosolids, as listed below. Operational flexibility can help reduce operating costs in the long-term for any community by avoiding costly short-term emergency situations.

- Can continue to haul away liquid biosolids as currently doing.
- Can produce Class A biosolids product that can be land applied and used by area farmers. It is believed that there will be strong interest from area farmers to accept the material at nearly no cost to the Village.
- Producing Class B biosolids requires additional vector attraction reduction methods, making land application options more restrictive. Additionally, expansion of the current aerobic digestion system would be required to continue to produce Class B solids at future sludge production rates.
- If land application is not desired or available, the dewatered material could be landfilled.

5.3.2 EASE OF OPERATION

Based on feedback provided by the Marinette, WI operations team, it is believed that the sludge dewatering and thermal treatment alternative would be the easiest to operate. Currently, operations staff have difficulty optimally operating the aerobic digester because the wasting schedule is dictated by the availability and schedules of sludge haulers. Currently, digested sludge solids concentrations range from 0.7-0.9%, while under a more reliable wasting schedule (as would be provided with the dewatering and thermal treatment alternative) operators would be better able to decant the digester and thicken to up to 1.5% solids. The Volute™ press and dehumidifier will be designed to run continuously during the week with little to no operator attention, requiring only brief daily system checks and a weekly cleaning/maintenance schedule.

5.4 Recommended Alternative

Based on the economic analysis and non-monetary comparison of alternatives, it is recommended that the Sludge Dewatering and Thermal Treatment alternative be implemented to meet the future biosolids

management needs of the Village. The alternative yielded a lower present worth cost compared to the Hauling Liquid Sludge alternative and scored higher in the non-monetary evaluation. The alternative can be implemented within the existing buildings at the WWTF and does not require any new exterior structures.

The estimated construction cost for the proposed improvements is $4,050,000. The proposed concept plans and sections of the recommended improvements are shown in Appendix H.

6 Environmental Assessment of Recommended Alternative

Information about the environmental assessment of the recommended alternative is provided below. This information supplements the environmental assessment that was included in the 2017 Facility Plan.

6.1 Land Use

The recommended improvements will not impact land use. No additional land is needed as the improvements are within the site boundary of the existing WWTF. There may be temporary disruption to the surrounding area during construction activities.

6.2 Water Resources

The recommended plan would not impact the Village's treated effluent quality or point of discharge. The recommended upgrades will complement the facility's existing liquid stream treatment infrastructure and contribute to the WWTF's overall purpose of maintaining high quality treatment and protecting water resources. Temporary impacts created by construction stormwater runoff would be mitigated through implementation of sediment and erosion control measures.

6.3 Air Quality

No long-term adverse effect on air quality will result from the construction of the recommended facilities. Based on documentation provided by the equipment vendor (included in Appendix E), the dehumidification system is not anticipated to result in significant dust or other air emissions.

During the construction period, there is some potential for windblown dust and exhaust fumes from construction equipment. These effects will be temporary and are deemed insignificant.

6.4 Noise

The proposed upgrades will not result in any increase in noise and may contribute to a longer-term reduction in traffic noise due to reduced sludge hauling needs. The Volute™ press and dehumidification technologies are relatively quiet equipment and all new motors will be housed within existing buildings/structures.

During the construction period, there will likely be an increase in noise from construction equipment and other related activities. These effects will be temporary and are deemed insignificant.

6.5 Aesthetics

Exterior aesthetics will not be impacted by the proposed upgrades as any visible changes will occur within existing buildings/structures.

6.6 Traffic

Long-term, the recommended plan is expected to reduce the amount of overall traffic at the WWTF due to reduced sludge hauling needs. There may be some temporary and minimal increases in traffic during construction.

6.7 Wildlife and Vegetation

No new consultations with the WDNR Bureau of Endangered Resources for an Endangered Resources Review have been conducted since this Facility Plan Amendment relies on the 2017 Facility Plan. Also, because all upgrades, except for the installation of two cleanouts, will be occurring within existing buildings/structures, it is unlikely that an Endangered Resources Review is required. The two cleanouts will be installed within the existing fenced site in routinely mowed areas.

6.8 Social and Economic Impacts

The recommended upgrades will help the Village remain in compliance with their discharge permit requirements and would allow continued development within the Village. The recommended improvements may require sewer user rates to increase to pay the debt service on project financing. However, the debt service payments may offset the increased operational costs associated with the recent liquid sludge hauling. The Village will work with their financial consultant to review utility rate changes needed related to the proposed project.

6.9 Historical and Cultural

No new consultations with the WDNR for Historic and Cultural review have been conducted since this Facility Plan Amendment relies on the 2017 Facility Plan. The recommended upgrades would be constructed within existing wastewater facilities on previously disturbed land, so no unforeseen issues are anticipated.

6.10 Energy Consumption

While energy consumption at the WWTF site is expected to increase as a result of the recommended upgrades, when accounting for the expected reduction in transportation energy costs related to sludge hauling, the recommended improvements will likely result in the same or less overall energy consumption.

7 Implementation of Recommended Alternative

7.1 Public Participation

A public hearing to discuss the content of this Facility Plan Amendment will be held in the future (if required – WDNR requires a public hearing if the project is expected to increase user rates by more than 20 percent). Notices of the Public Hearing will appear in the official newspaper for the Village of Johnson Creek. An affidavit of Public Hearing and any comments received will be forwarded to the DNR.

7.2 Project Financing

Through an evaluation of financing options, the most likely funding mechanism for the biosolids management improvements project is Clean Water Fund loans, paired with publicly issued debt instruments as needed.

7.3 Project Schedule

The proposed implementation schedule is outline below. The schedule below is approximate and subject to change. Factors that could affect the project timeline include applicable agency reviews, project financing needs, and equipment lead times.

- Submit Facility Plan Amendment report to WDNR — April 2024
- Public Hearing on Facility Plan Amendment (if required) — April 2024
- WDNR approval of Facility Plan Amendment — June 2024
- Submit plans and specifications to WDNR — August 2024
- WDNR approval of plans and specifications — October 2024
- Open bids for construction — October 2024
- Project award and construction start — November 2024
- Construction complete — November 2025

APPENDICES

Appendix A – WPDES Permit

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

VILLAGE OF JOHNSON CREEK

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
200 AZTALAN STREET, JOHNSON CREEK, WISCONSIN
to

ROCK RIVER (JOHNSON CREEK WATERSHED, UR07 – UPPER ROCK RIVER BASIN) IN JEFFERSON COUNTY

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Thomas Bauman
Wastewater Field Supervisor

_____
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - April 01, 2020 **EXPIRATION DATE - March 31, 2025**

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1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Influent: 24-Hr flow proportional composite samples shall be collected after screening in the grit tank.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Effluent: 24-Hr flow proportional composite samples shall be collected in the UV channel prior to UV disinfection and grab samples shall be collected after UV disinfection prior to discharge to the Rock River.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	236 lbs/day	3/Week	Calculated	Effective January, March, May, July, August, October, and December
Suspended Solids, Total	Weekly Avg	271 lbs/day	3/Week	Calculated	Effective February
Suspended Solids, Total	Weekly Avg	248 lbs/day	3/Week	Calculated	Effective April, June, September, and November
Suspended Solids, Total	Monthly Avg	167 lbs/day	3/Week	Calculated	Effective January, March, May, July, August, October, and December
Suspended Solids, Total	Monthly Avg	192 lbs/day	3/Week	Calculated	Effective February
Suspended Solids, Total	Monthly Avg	176 lbs/day	3/Week	Calculated	Effective April, June, September, and November
pH Field	Daily Max	9.0 su	3/Week	Grab	
pH Field	Daily Min	6.0 su	3/Week	Grab	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH_3-N) Total	Daily Max	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	May 1 through September 30
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	May 1 through September 30
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.21 lbs/day	3/Week	Calculated	Limit effective the month of January beginning January 1, 2022.
Phosphorus, Total	Monthly Avg	1.91 lbs/day	3/Week	Calculated	Limit effective the month of February beginning February 1, 2022.
Phosphorus, Total	Monthly Avg	1.97 lbs/day	3/Week	Calculated	Limit effective the month of March beginning March 1, 2022.
Phosphorus, Total	Monthly Avg	2.19 lbs/day	3/Week	Calculated	Limit effective the month of April beginning April 1, 2021.
Phosphorus, Total	Monthly Avg	2.11 lbs/day	3/Week	Calculated	Limit effective the month of May beginning May 1, 2021.
Phosphorus, Total	Monthly Avg	2.14 lbs/day	3/Week	Calculated	Limit effective the month of June beginning June 1, 2021.
Phosphorus, Total	Monthly Avg	1.81 lbs/day	3/Week	Calculated	Limit effective the month of July beginning July 1, 2021.
Phosphorus, Total	Monthly Avg	1.55 lbs/day	3/Week	Calculated	Limit effective the month of August beginning August 1, 2021.
Phosphorus, Total	Monthly Avg	1.38 lbs/day	3/Week	Calculated	Limit effective the month of September beginning September 1, 2021.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.14 lbs/day	3/Week	Calculated	Limit effective the month of October beginning October 1, 2021.
Phosphorus, Total	Monthly Avg	0.99 lbs/day	3/Week	Calculated	Limit effective the months of November and December beginning November 1, 2021.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitor Only. January 1, 2022 - December 31, 2022.
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET sections below for listed quarters and monitoring requirements.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET sections below for listed quarters and monitoring requirements.

2.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 0.401 MGD.

2.2.1.2 TSS Limitation(s)

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as weekly average and monthly average effluents limits and are effectively immediately. The approved total suspended solids TMDL limits for this permittee are included in the following table:

Total Suspended Solids (TSS) Effluent Limitations

Month	Monthly Avg TSS Effluent Limit (lbs/day)	Weekly Avg TSS Effluent Limit (lbs/day)
Jan	167	236
Feb	192	271

March	167	236
April	176	248
May	167	236
June	176	248
July	167	236
Aug	167	236
Sept	176	248
Oct	167	236
Nov	176	248
Dec	167	236

2.2.1.3 Phosphorus Limitation(s)

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as monthly average effluent limits. The approved phosphorus TMDL limits for this permittee are included in the following table:

Total Phosphorus (TP) Effluent Limitations

Month	Monthly Avg TP Effluent Limit (lbs/day)
Jan	1.21
Feb	1.91
March	1.97
April	2.19
May	2.11
June	2.14
July	1.81
Aug	1.55
Sept	1.38
Oct	1.14
Nov	0.99
Dec	0.99

2.2.1.4 Nitrogen Series Monitoring

Monitoring for Total Kjeldahl Nitrogen (TKN), Nitrite + Nitrate Nitrogen, and Total Nitrogen shall be conducted once each year in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **October 1, 2020 – December 31, 2020; January 1, 2021 – March 31, 2021; April 1, 2022 – June 30, 2022; July 1, 2023 – September 30, 2023; October 1, 2024 – December 31, 2024**

Nitrogen Series monitoring shall continue after the permit expiration date (until the permit is reissued) in accordance with the monitoring requirements specified in the last full calendar year of this permit. For example, the next test would be required in **October 1, 2025 – December 31, 2025.**

Testing: Monitoring shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during testing.

2.2.1.5 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Rock River

Instream Waste Concentration (IWC): 11%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 30, 10, 3, 1% (if the IWC ≤30%) and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted twice during the permit term in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** April 1, 2022 – June 30, 2022; October 1, 2024 – December 31, 2024

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October 1, 2025 – December 31, 2025.

Chronic tests shall be conducted twice during the permit term in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Chronic:** April 1, 2022 – June 30, 2022; October 1, 2024 – December 31, 2024

Chronic WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October 1, 2025 – December 31, 2025.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Toxic Unit - Chronic (TU_c) is greater than 9.09 for either species. The TU_c shall be calculated as follows: $TU_c = 100 \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90-day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
005	Aerobically digested, Plate pressed, Cake, Class B. Representative samples shall be collected of the Class B sludge from the cake sludge storage area. PCB monitoring is required in year 2021.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 005 - CLASS B SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	January 1, 2021 - December 31, 2021
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	January 1, 2021 - December 31, 2021
Radium 226 Dry Wt		pCi/g	Annual	Composite	
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed fo the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

3.2.1.4 Sludge Which Exceeds the High-Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high-quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2021**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	

* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

4.1 Land Application Management Plan Update

Required Action	Due Date
Management Plan Update: The permittee shall submit an update to the land spreading management plan. The management plan shall be consistent with the requirements of this permit, and ss. NR 204.07, Wis. Adm. Code. At a minimum, the plan shall describe how the application rate has been calculated as well as how the sludge will be land applied and incorporated. Record keeping and tracking of site loadings shall also be described. Requests for land spreading site approvals shall also be included.	01/31/2021

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit

the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.10 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, othe. than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred

concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.

- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.7 Fecal Coliforms

The weekly and monthly limit(s) for fecal coliforms shall be expressed as a geometric mean.

5.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

5.4.9 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.10 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;
- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:
  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)
- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;
- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as

specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permissic from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.12 Class B Sludge: Fecal Coliform Limitation

Compliance with the fecal coliform limitation for Class B sludge shall be demonstrated by calculating the geometric mean of at least 7 separate samples. (Note that a Total Solids analysis must be done on each sample). The geometr.

Appendix B – 2017 Facility Plan

Appendix C – 2021 ATI Report

ENGINEERING REPORT

SEPTEMBER 2021

JOHNSON CREEK
Crossroads With A Future

VILLAGE OF JOHNSON CREEK

Sludge Dewatering Study

Applied Technologies
Engineers - Architects

PN6465

SLUDGE DEWATERING STUDY

VILLAGE OF JOHNSON CREEK

September 2021

Prepared by:

Applied Technologies, Inc.
13400 Bishop's Lane, Suite 270
Brookfield, WI 53005
(262) 784-7690

PN6465

TABLE OF CONTENTS

Chapter 1
EXECUTIVE SUMMARY

The Village of Johnson Creek (Village) owns and operates a wastewater treatment facility (WWTF) that discharges to the Rock River in Jefferson County. The Village has determined that the current sludge dewatering equipment, a plate and frame filter press (P&F), has reached the end of its useful service life. This study specifically addresses the proposed replacement of the existing P&F dewatering process. The objectives of this project are to identify and evaluate viable options to meet the Village's needs for future biosolids processing. The alternatives considered include a belt filter press (BFP), a decanter centrifuge, or sludge storage tanks without dewatering.

As shown in Table 1, Alternative 1 had the lowest lifecycle cost, with a Total Present Worth of $2,940,000 calculated for the planning period. However, the Total Present Worth of Alternatives 1 and 2 are within 10% of each other, which are close enough to be considered equivalent. Therefore, non-monetary factors such as odor were considered to select an alternative. However, it is expected that the main sources of odors would be derived from the sludge storage areas and especially during sludge hauling. Therefore, it is anticipated that no major differences in odors within the nearby neighborhoods would occur whether Alternatives 1 or 2 would be selected.

This study concludes that either Alternative 1 or Alternative 2 would be appropriate for the Village. Based on the explanation above, it is recommended that the Village select Alternative 1 as the low-cost alternative.

Table 1
Total Present Worth Evaluation
Sludge Dewatering Study
Village of Johnson Creek WWTF

Item	Alternative 1: Belt Filter Press	Alternative 2: Decanter Centrifuge	Alternative 3: Sludge Storage Tanks
Annual Operation and Maintenance Costs	$ 97,700	$ 113,600	$ 225,400
Present Worth Factor (20 years @ 3.125%)	14.707	14.707	14.707
Present Worth O&M Costs	$ 1,440,000	$ 1,670,000	$ 3,310,000
Total Project Cost	$ 1,550,000	$ 1,620,000	$ 2,680,000
Present Worth Salvage Value	$ 51,000	$ 47,000	$ 650,000
Total Present Worth	**$ 2,940,000**	**$ 3,240,000**	**$ 5,340,000**

Chapter 2
BASIS OF DESIGN

BACKGROUND

The Village of Johnson Creek (Village) owns and operates a wastewater treatment facility (WWTF) that discharges to the Rock River in Jefferson County. The Village recently completed construction of liquid treatment process improvements, including replacing rotating biological contactors. Following the improvements to the liquid treatment processes, primary sludge was no longer produced. Following this change, the plate and frame (P&F) sludge press soon deteriorated and is currently not functional.

A second phase of construction was intended to follow the liquid treatment process improvements. With the P&F sludge press not functional, the Village issued a request for proposals (RFP) to study alternatives and recommend a plan for sludge management.

The last major improvements to the solids handling facilities occurred approximately 20 years ago. The biosolids processing system relies on a plate and frame filter press (P&F) dewatering system. The Village has determined that the P&F system has reached the end of its useful service life. This study specifically addresses the proposed replacement of the existing P&F dewatering process. The objectives of this project are to identify and evaluate viable options to meet the Village's needs for future biosolids processing.

This study includes a basis for design, which will be used in evaluating the alternatives, along with a summary of the alternatives considered. The alternatives include a belt filter press (BFP), a decanter centrifuge, or sludge storage tanks without dewatering. The lifecycle costs and a non-monetary evaluation of these alternatives was completed, along with a recommended alternative.

PROPOSED FACILITY DESIGN FLOWS AND LOADINGS

This section contains information on population and flow projections for the WWTF. The sludge dewatering improvements are projected to be completed in 2023. Therefore, the 20-year planning period ends in a design year of 2043.

Population Projections

Population data for the facility planning area (FPA) are presented in Table 2. As part of the 2017 Engineering Design Report, design year flows were based on population projections from the State of Wisconsin's Department of Administration (DOA) for 2010 to 2040.

In 2017, the Village completed its Comprehensive Plan, which included population projections. The Village compared a linear model based on 2000-2015 population growth to the DOA projections. The Village selected the linear model instead of the DOA projections. Consequently, this study proposes to use the same population projections as the Village Comprehensive Plan.

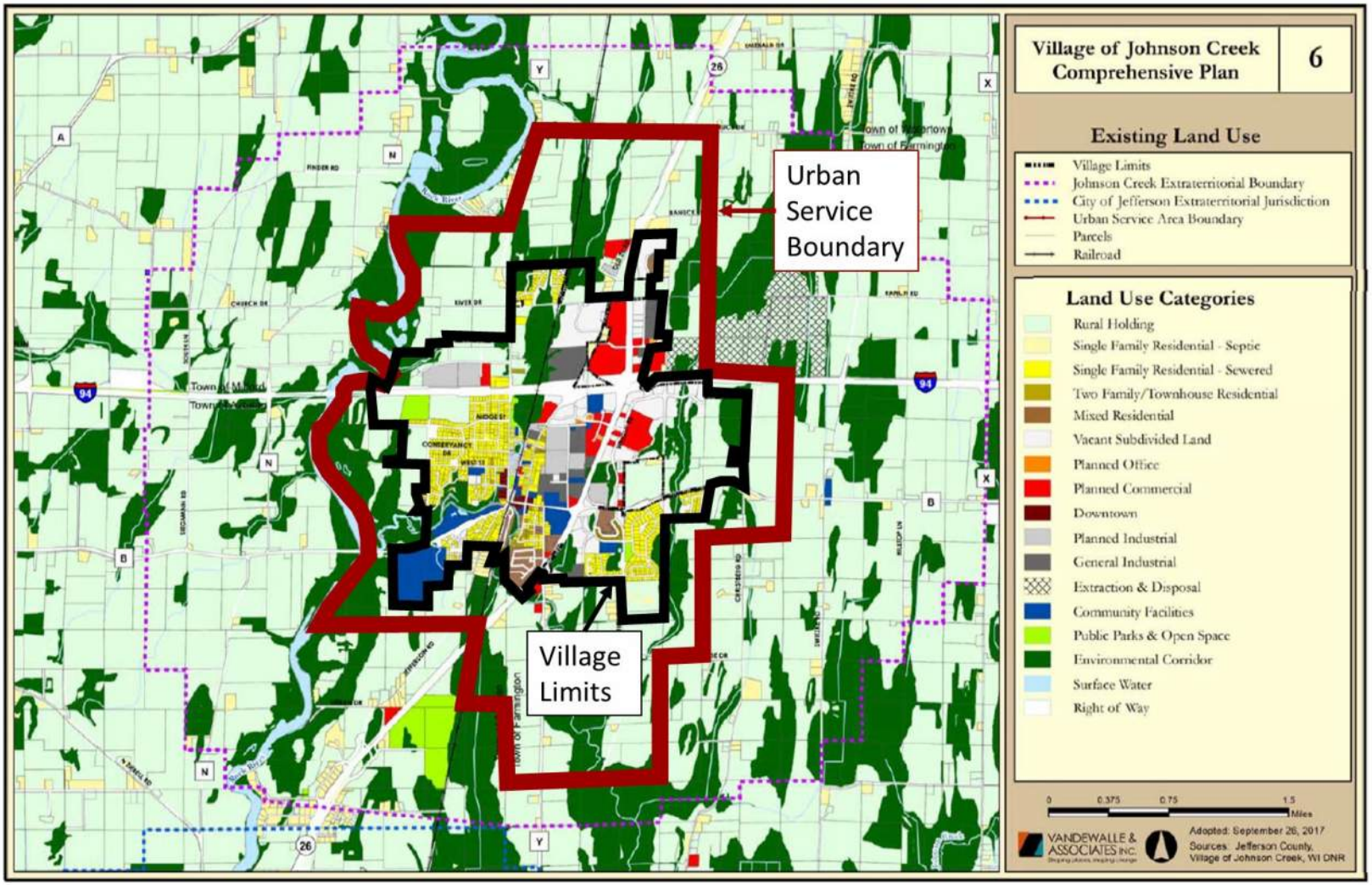
Table 2
Published Population Data - Historical and Projected

Year	Wisconsin Dept. of Administration (DOA)	Johnson Creek 2017 Comprehensive Plan
2015	2,955	
2020	3,315	3,280
2035	4,235	4,554
2036	4,270	
2040	4,455	4,978
2043	4,670	5,233
Population Increase: 2015 to 2036[1]	1,315	
Population Increase: 2020 to 2043[2]		1,953

1. From the 2017 Engineering Design Report.
2. From the 2021 Study.
3. Population estimates for 2036 and 2043 are interpolated and extrapolated, respectively.

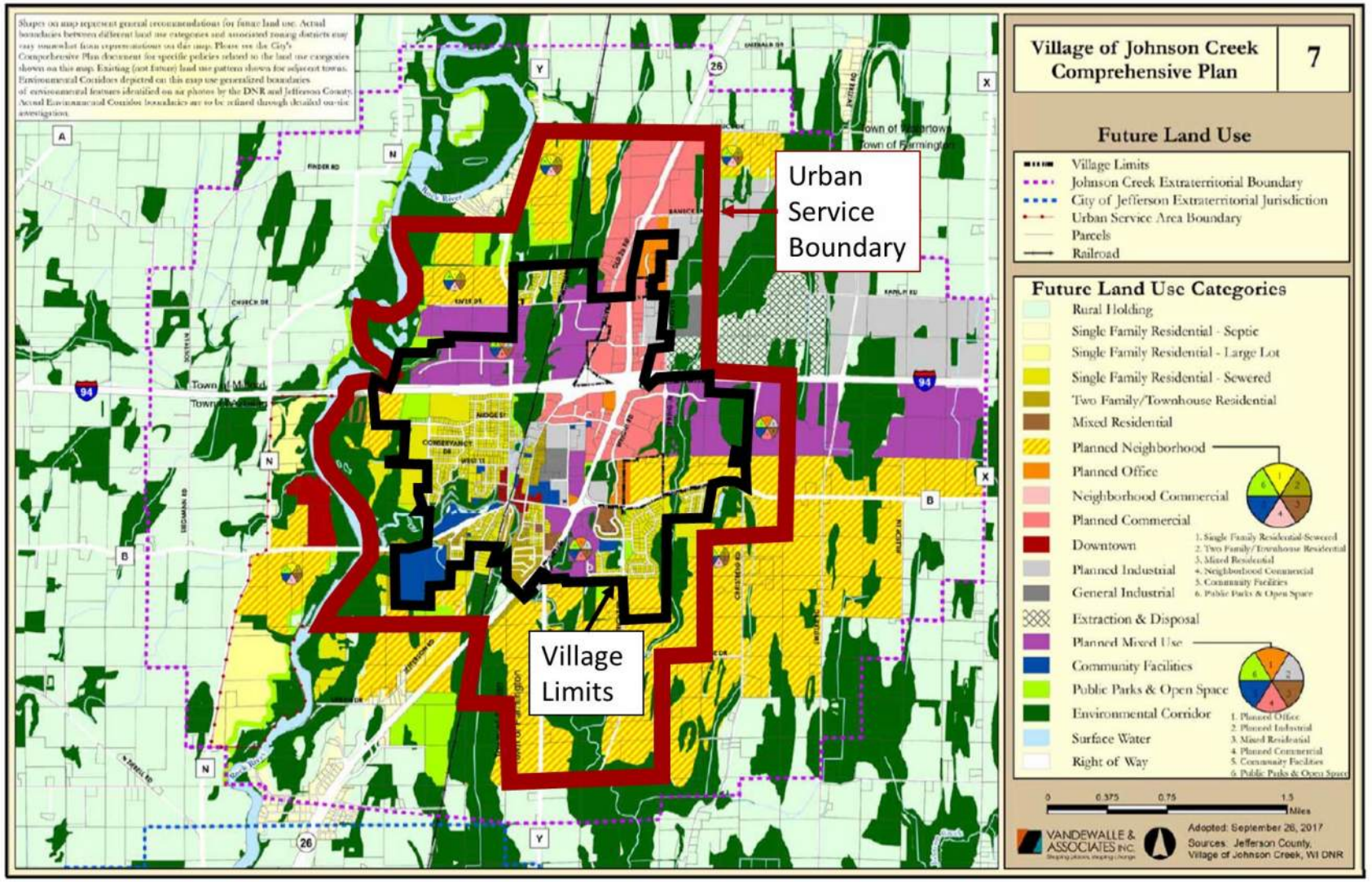
Notably, Village staff have stated that the current lots within the Village limits are 98% built-out. This is supported by Figure 1, which shows the existing land use per the 2017 Village Comprehensive Plan. As shown in Figure 2, the Comprehensive Plan anticipates Village growth in several areas that have not yet been developed. Furthermore, these new developments are within the Village's urban service boundary, suggesting that they would be added to the Village's sewer service area. Therefore, it is proposed that a population increase of 1,953 should be used to estimate increased design year 2043 flows and loadings. Figure 3 presents the linear model used in the 2017 Comprehensive Plan, as well as the DOA projections that were used in the 2017 Engineering Design Report.

FIGURE 1
Existing Land Use



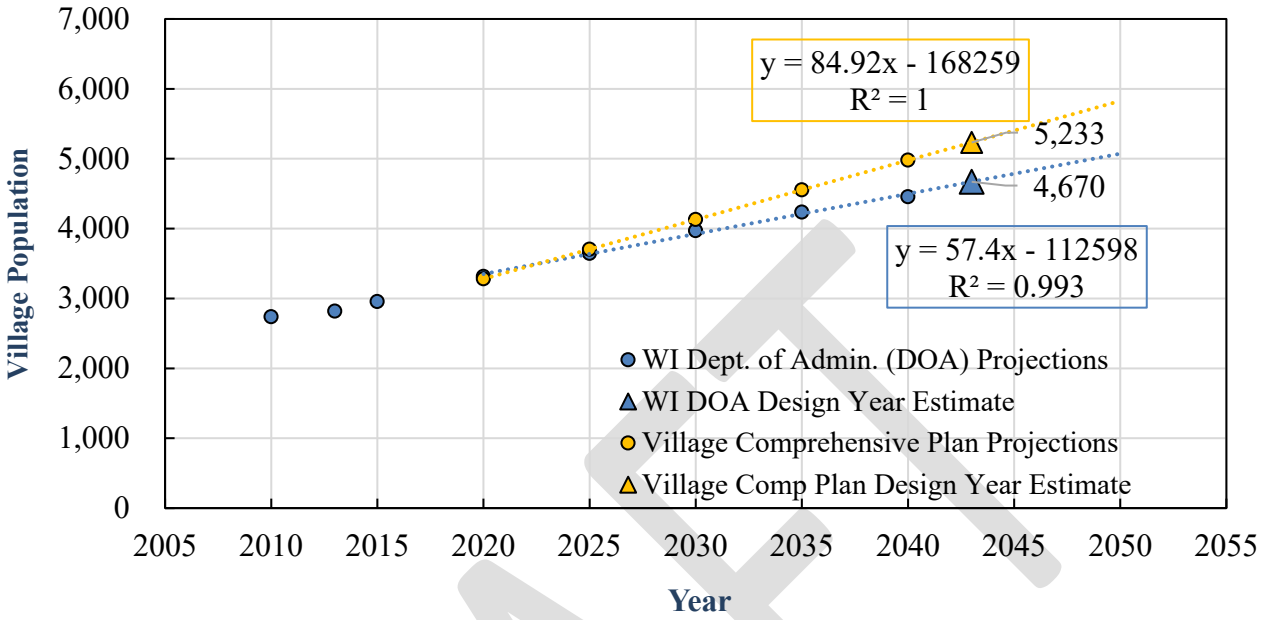
Source: 2017 Village of Johnson Creek Comprehensive Plan

FIGURE 2
Future Land Use



Source: 2017 Village of Johnson Creek Comprehensive Plan

FIGURE 3
Population Projections



Flow Projections

The facility is currently operating at an annual average flow of 0.35 mgd. The rated design average flow (DAF) capacity of the WWTF was decreased from 0.7 mgd to 0.401 mgd following the 2018 improvements. It is anticipated that the decreased capacity reflects the sizing for the new liquid treatment equipment, and that the existing influent pumping and sludge management remains sized to meet a DAF of 0.7 mgd. The values used to calculate projected flow are presented below. Table 3 presents a summary of the projected 2043 annual average flow.

Table 3
Year 2043 Flow Projections

2043 Annual Average Flow	Basis	Value (mgd)
Current Annual Average Flow	Village Data, 2020	0.350
Additional Flow from Population Increase	100 gpcd, 2020 – 2043	0.195
2043 Annual Average Flow	**2043**	**0.545**

Note: No industrial growth included in projection.

Loading Projections

Table 4 presents a summary of the projected flows and loadings, both from the 2017 Engineering Design Report and the present 2021 Sludge Dewatering Study. As detailed in the notes, the current study bases its flow projections on the Village's 2017 Comprehensive Plan, rather than the DOA estimates used in the 2017 Design Report. Waste activated sludge (WAS) loadings were estimated in a mass balance in the 2017 Design Report.

The 2017 Design Report did not estimate loadings in the digested sludge (DSD). Therefore, DSD loading estimates were based on the Village-reported sludge batches (3 per week, 10,000 gallons DSD/batch) and the DSD solids content of approximately 3.5% TS (after lime addition). The lime addition rate of 0.1 lb lime/gal was used to calculate a 2020 WAS loading rate of approximately 820 lb TS/d. This 2020 WAS loading rate of 820 lb TS/d was also determined by the mass balance from the 2017 design report, which confirmed that the mass balance could be used for Design Year 2043 loadings. The mass balance includes chemical sludge from phosphorus removal, with target effluent concentrations of 0.2 mg/L.

In the future, if the Village no longer added lime to the DSD, the DSD solids loading would be approximately equivalent to the WAS loading in Table 4, while the DSD flow would remain unchanged. This would result in a decanted DSD solids content of approximately 2.3% TS.

Table 4 Annual Average Flows and Loadings					
Item / Year	Unit	2017 Design Report		2021 Study	
		2015	2036	2020	2043
Population	#	2,955	4,270	3,280	5,233
Plant Flow	Mgd	0.263	0.401	0.350	0.545
Waste Activated Sludge (WAS)	lb/d	575	1,030	820	1,270
	gpd	6,891	12,343	9,830	15,260
	%TS	1%	1%	1%	1%
Digested Sludge (DSD, with lime)	lb/d			1,247	1,940
	gpd			4,271	6,630
	%TS			3.5%	3.5%
Digested Sludge (DSD, no lime)	lb/d			820	1,270
	gpd			4,271	6,630
	%TS			2.3%	2.3%

Notes

1. 2015 plant flow based on 2010-2015 Average, per 2017 Engineering Design Report
2. 2036 plant flow projection based on calculations from 2017 Engineering Design Report, resulting in 105 gpcd for additional per capita flow
3. 2015 and 2036 WAS loadings based on Table 4.7, 2017 Engineering Design Report
4. 2015 and 2036 DSD loadings were not calculated in the 2017 Engineering Design Report
5. 2020 and 2043 DSD loadings based on 3.5% TS after addition of 0.1 lb lime/gal
6. 2020 DSD flow based on 30,000 gallons per week
7. 2020 and 2043 WAS loadings based on 1.0% TS before addition of lime
8. 2043 WAS loading based on updated mass balance from 2017 Engineering Design Report

CONDITION OF EXISTING FACILITIES

This section summarizes the condition of the existing sludge management facilities, including building and site constraints for the alternatives.

Existing Sludge Dewatering Equipment and Building

The existing plate and frame press is now defunct and inoperable. Based on the difficulty in operation, maintenance, and getting replacement parts, it will be removed from service. As shown in Figure 4, removal of the Plate and Frame Press will provide considerable room for future sludge dewatering equipment within the existing Sludge Dewatering Building. The Sludge Dewatering building is in good condition, with minor improvements expected to provide at least another 20 years of useful life. Moreover, the existing conveyor is understood to be in good working order, with only minor modifications required to extend the life through the planning period.

Site Considerations

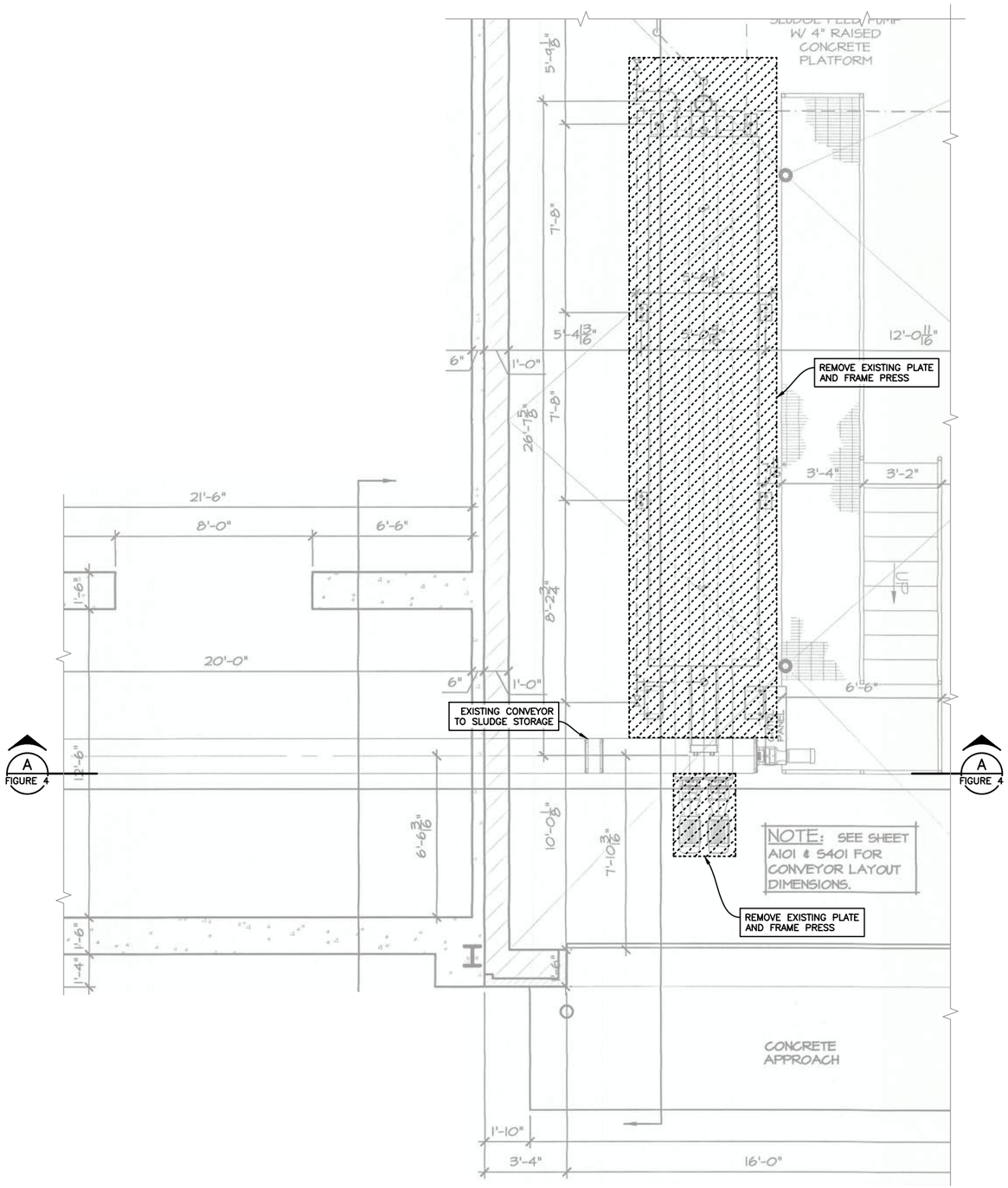
The site has sufficient room for new or expanded facilities. The recent removal of the rotating biological contactors and adjacent structures provided an area for new facility installations on the east portion of the site. However, an area immediately southwest of the existing sludge cake storage was demarcated on previous site drawings as an appropriate location for sludge storage expansion. Therefore, this study proposes to place any new sludge storage within or adjacent to the existing sludge storage footprint. A detailed discussion of the existing sludge storage capacity follows in the next section. Notably, this site is adjacent to several residential areas, which prompts the need to evaluate the impacts on odor for each feasible alternative.

BASIS OF ALTERNATIVES EVALUATION

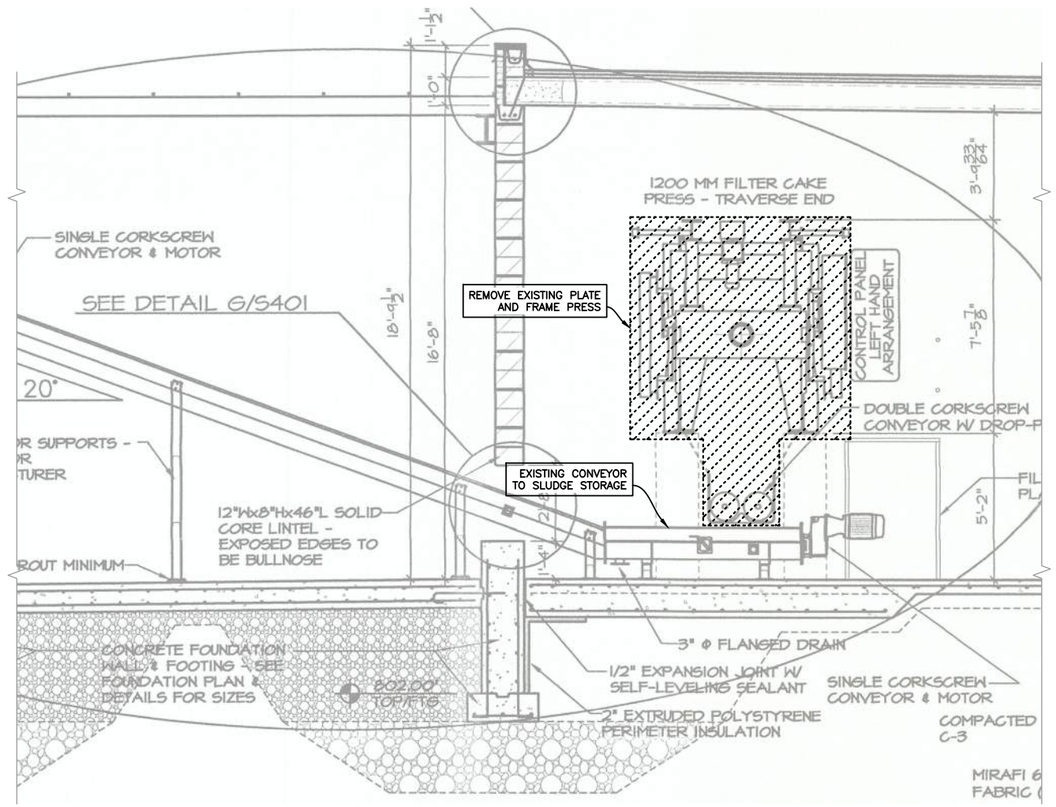
This section contains information on how alternatives will be evaluated. All alternatives will need to adhere to the sludge limitations presented in the WPDES permit. Estimated solids content values for the feed and dewatered sludge will be determined. Operation and maintenance (O&M) cost estimates are also summarized, along with applicable interest and discount rates for determining the total present worth (TPW), additional annual costs, and rate impacts. Both monetary and non-monetary factors will be considered.

Sludge Limitations

It is anticipated that with an abundance of land application sites available to the Village, Class B sludge will be the most cost-effective option. Consequently, all alternatives resulting in Class B sludge will need to adhere to the sludge limitations presented in the WPDES permit, which is presented in Appendix A. In addition, all alternatives will require at least 180 days of sludge storage onsite, as the Village will not be able to rely on their sludge hauler having sufficient storage offsite (e.g., United Liquid Waste of Clyman).



N PLAN
3/16" = 1'-0"



A FIGURE 4 SECTION
3/16" = 1'-0"

R:\SHARED FOLDERS\PROJECTS\6465 - JOHNSON CREEK SLUDGE DEWATER\11.0 GRAPHICS\11.1 FIGURES\FIGURE 4.DWG

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FIGURE 4
EXISTING PLATE AND FRAME PRESS
VILLAGE OF JOHNSON CREEK

Projected Sludge Solids Contents and Storage Volumes

As shown in Table 5, the solids contents for three alternatives vary considerably, which has major implications for the required sludge storage volume to provide at least 180 days of storage under design year conditions. By comparison, the 2001 drawings for the Village's existing sludge cake storage facilities show that the Village currently has approximately 12,600 cubic feet of sludge cake storage, based on a sludge height of 4 feet.

Table 5
Feed and Dewatered Solids Content (%TS) and Proposed Sludge Storage Volumes

Item	Existing Plate and Frame Filter Press	Alternative 1 Belt Filter Press	Alternative 2 Decanter Centrifuge	Alternative 3 Sludge Storage Tanks
Feed Solids	2.3% w/o lime (3.5% w/ lime)	2.3%	2.3%	2.3%
Dewatered Solids	~36% w/ lime (35-50%)	16.5% (15-18%)	18.5% (17-20%)	2.3% (No dewatering)
Min. Sludge Storage Volume (180 days)	10,000 cf	22,200 cf	19,800 cf	1,200,000 gallons (160,000 cf)
Existing Sludge Storage	4 ft height x 3,150 sf floor area = 12,600 cf volume			N/A
Additional Sludge Storage Needed (height x area = volume)	N/A	3.0 ft x 3,150 sf = 9,600 cf	2.3 ft x 3,150 sf = 7,200 cf	(2) 66 ft int. dia. x 23 ft working = 60,000 cf
Proposed Sludge Storage Volumes (height x area = volume)	N/A	8 ft x 3,150 sf = 25,200 cf	7 ft x 3,150 sf = 22,100 cf	(2) 68 ft dia. x 25 ft = 160,000 cf

Notes:
1. Sources: Alfa Laval, Village of Johnson Creek 2017 Facilities Plan and Design Report, and Village of Johnson Creek 2001 Sludge Dewatering Building Drawings.
2. Per manufacturer's recommendation, lime addition is not recommended for Alternatives 1 or 2, and lime addition does not add a benefit for Alternative 3.
3. For the basis of design, the additional height provided in the sludge storage bed will be rounded up to the next nearest whole foot.
4. For the basis of design, at least 18" of freeboard must be added to the working height of each sludge storage tank, and each tank exterior diameter is expected to exceed its interior diameter by two feet.

Monetary Evaluation

The total present worth (TPW) will be used to evaluate the monetary cost of each alternative. The TPW includes capital, operating and maintenance (O&M), and salvage values for the 20-year planning period. The effect on user rates will also be determined, based on the current Clean Water Fund Program (CWFP) loan interest rates and anticipated O&M costs. After a preliminary review of the Village's eligibility, principal forgiveness was not included for sludge dewatering or storage improvements. Appendix B provides O&M cost estimates, including for the now-defunct plate and frame filter press, as well as the applicable discount and interest rates.

Chapter 3
ALTERNATIVES CONSIDERED

Several alternatives were considered to meet the Village's design year 2043 sludge management needs. These alternatives include removing the existing plate and frame filter press and installing: 1) a belt filter press; 2) a decanter centrifuge; 3) two sludge storage tanks without dewatering; or taking 4) no action.

FEASIBLE ALTERNATIVES

ALTERNATIVE 1: BELT FILTER PRESS

A belt filter press (BFP) is an established sludge dewatering technology commonly used at wastewater treatment facilities. In this alternative, the decanted digested sludge (DSD) would be pumped from the aerobic digester to the BFP feed at approximately 2.3% TS. Notably, manufacturer recommendations would eliminate the use of lime addition, as they are not conducive to belt life. By adding polymer in addition to sludge conditioners (e.g. ferric), the dewatered solids would have an expected %TS range from 15-18%. For this evaluation, the average value of this range (16.5% TS) was used. Key operational estimates from the manufacturer included:

- 3.5 hours of operator time per workday, including startup/shutdown, 5 days/week
- 12-15 lbs of polymer per ton of sludge
- 6.7 kWh/day operation for the 3 hp electrical draw for the BFP

As shown in Figure 5, a 1-meter wide belt filter press would be installed in the same location of the existing plate and frame press. The footprint of the BFP would be approximately 16-ft long by 8-ft wide (including motors and other protrusions), although the belt is only approximately 1-meter wide. The existing building is sufficiently tall to house the BFP, with a BFP height of only approximately 8-ft compared to the taller existing plate and frame press.

Additional sludge storage volume would be efficiently accomplished by increasing the wall height of the existing sludge cake storage beds. Previous design efforts included providing additional sludge storage area to the southwest of the existing building. However, a preliminary evaluation concluded that expanding the sludge storage area footprint instead of increasing the sludge storage height would require approximately twice the capital cost.

As compared to the higher solids content of the cake from the plate and frame filter press, the cake from the BFP will flow instead of stack. Therefore, sludge storage bed wall improvements will be required around the entire perimeter of the existing storage. The proposed dimensions of the new sludge storage area were described in the previous section. An additional conveyor system is also proposed to aid in efficiently moving sludge to the north portion of the sludge storage area.

Finally, the manufacturer stated that while ventilation hoods can be installed to partially reduce local odors, all odors cannot be captured during dewatering because the BFP is an open machine.

ALTERNATIVE 2: DECANTER CENTRIFUGE

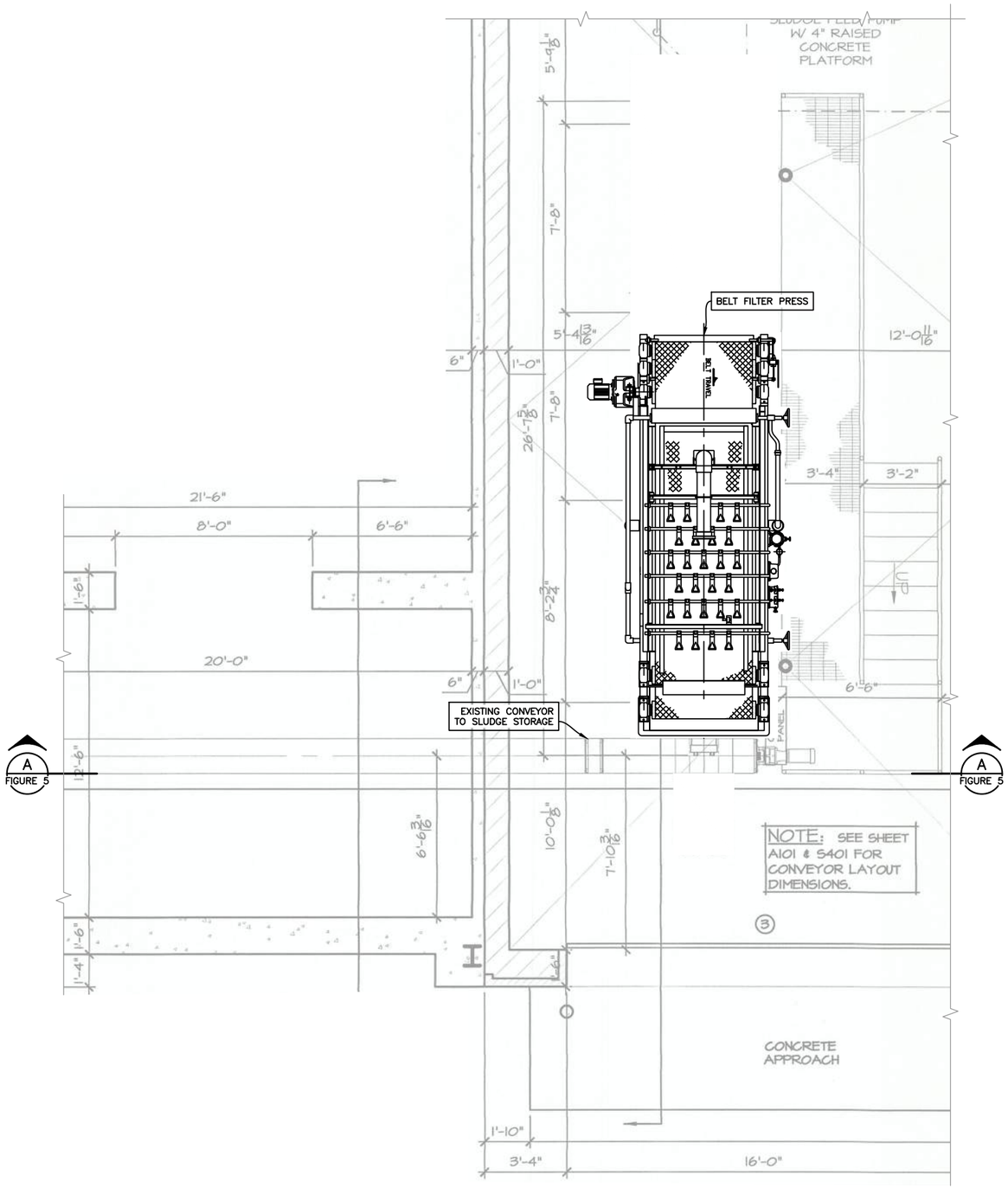
A decanter centrifuge is another sludge dewatering technology increasingly used at wastewater treatment facilities. In this alternative, the decanted digested sludge (DSD) would be pumped from the aerobic digester to the decanter centrifuge feed at approximately 2.3% TS. Notably, manufacturer recommendations would eliminate the use of lime addition. By adding polymer in addition to sludge conditioners (e.g. ferric), the dewatered solids would have an expected %TS range from 17-20%. For this evaluation, the average value of this range (18.5% TS) was used. Key operational estimates from the manufacturer included:

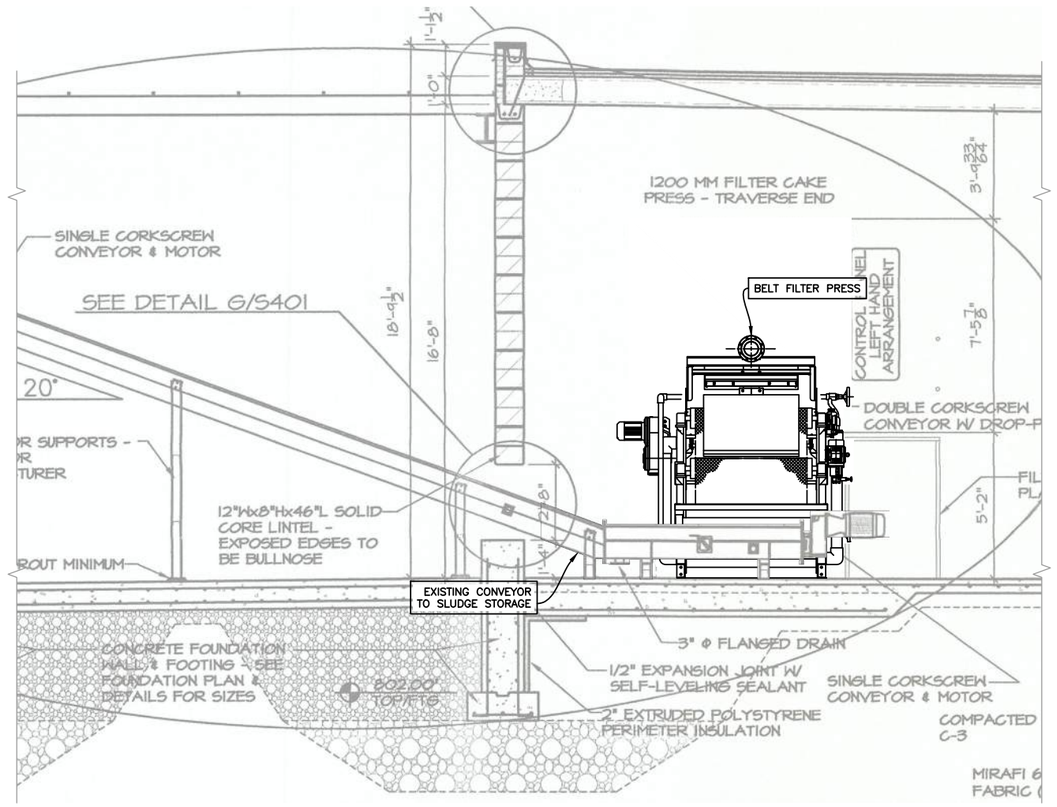
- 4 hours of operator time per workday, including startup/shutdown, 5 days/week
- 20-30 lbs of polymer per ton of sludge
- 100.5 kWh/day operation for the 33.5 kW electrical draw for the decanter centrifuge

As shown in Figure 6, the decanter centrifuge would be installed in the same location of the existing plate and frame press, albeit in less than half the footprint. The footprint of the decanter centrifuge would be approximately 15-ft long by 4-ft wide (including motors and other protrusions. The existing building is sufficiently tall to house the decanter centrifuge, with a height of only approximately 6-ft when open compared to the much taller existing plate and frame press.

Additional sludge storage volume would be efficiently accomplished by increasing the wall height of the existing sludge cake storage beds. Previous design efforts included providing additional sludge storage area to the southwest of the existing building. However, a preliminary evaluation concluded that expanding the sludge storage area footprint instead of increasing the sludge storage height would require approximately twice the capital cost.

As compared to the higher solids content of the sludge cake from the plate and frame press, the sludge cake from the decanter centrifuge will flow instead of stack. Therefore, sludge storage bed wall improvements will be required around the entire perimeter of the existing storage. The proposed dimensions of the new sludge storage area were described in the previous section. An additional conveyor system is also proposed to aid in efficiently moving sludge to the north portion of the sludge storage area.





R:\SHARED FOLDERS\PROJECTS\6465 - JOHNSON CREEK SLUDGE DEWATER\11.0 GRAPHICS\11.1 FIGURES\FIGURE 5.DWG

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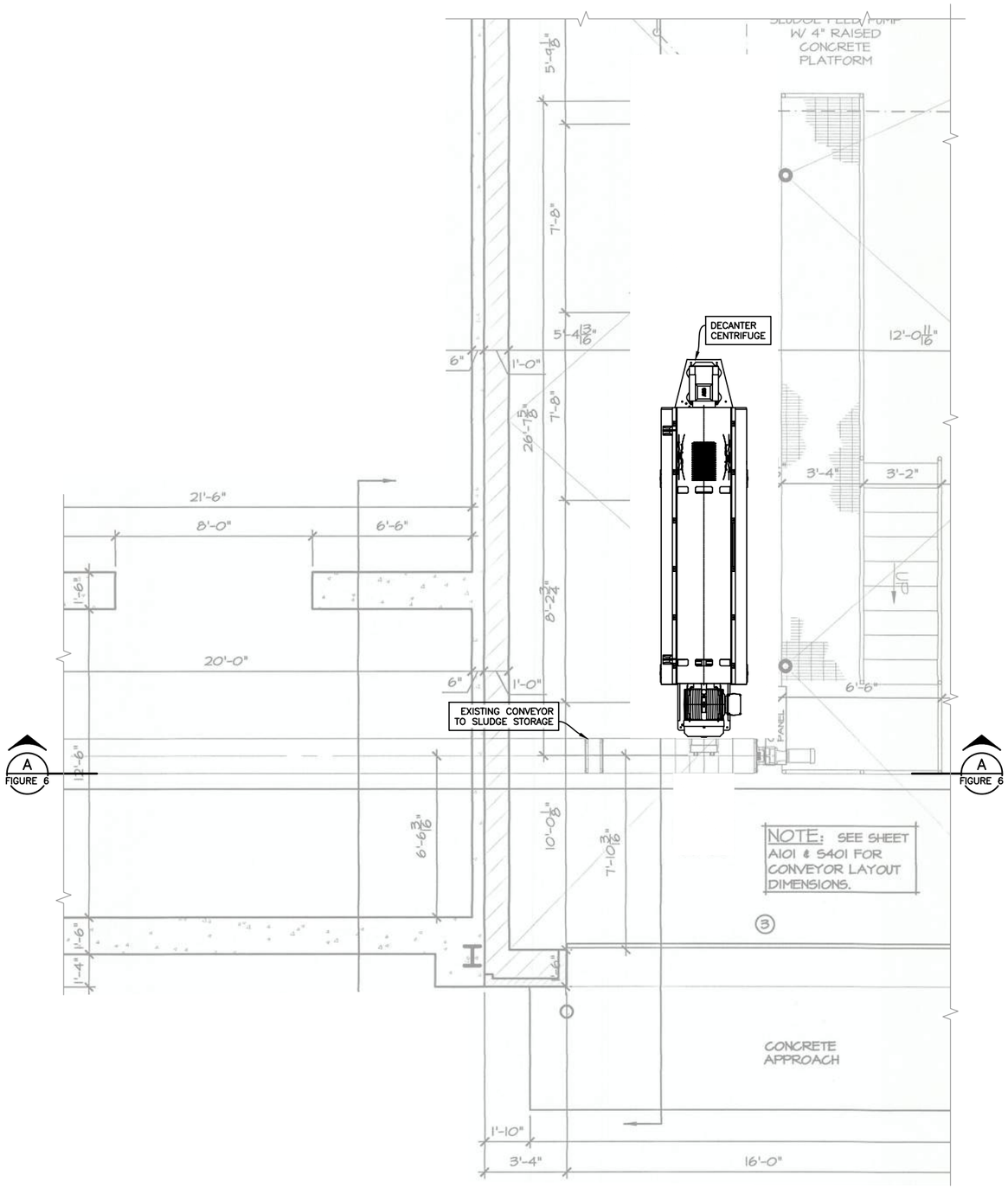
FIGURE 5
ALTERNATIVE 1 - BELT FILTER PRESS
VILLAGE OF JOHNSON CREEK



N PLAN
3/16" = 1'-0"

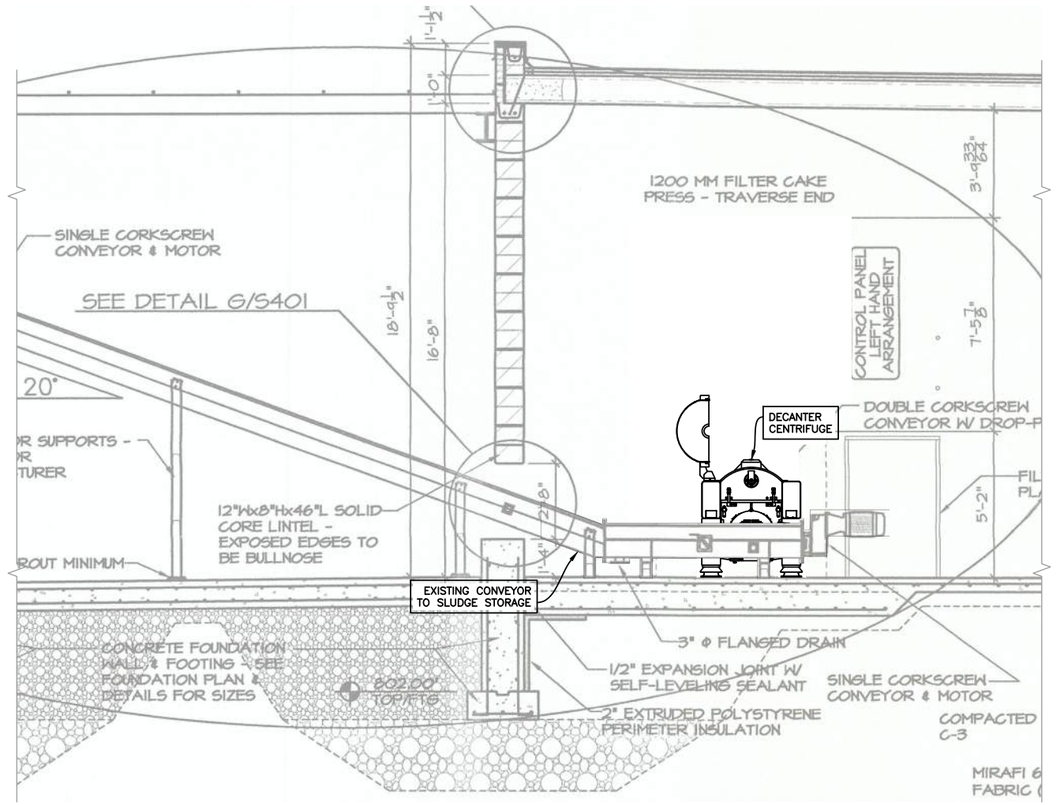


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FIGURE 6 3/16" = 1'-0"

R:\SHARED FOLDERS\PROJECTS\6465 - JOHNSON CREEK SLUDGE DEWATER\11.0 GRAPHICS\11.1 FIGURES\FIGURE 6.DWG

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FIGURE 6
ALTERNATIVE 2 - DECANTER CENTRIFUGE
VILLAGE OF JOHNSON CREEK

ALTERNATIVE 3: SLUDGE STORAGE TANKS

Alternative 3 would remove sludge dewatering from the Village's WWTF. In this alternative, the decanted digested sludge (DSD) would be pumped from the aerobic digester to sludge storage tanks at approximately 2.3% TS. The tanks would be covered, with storage of at least 180 days under design year conditions. Sludge would then be land applied approximately twice per year.

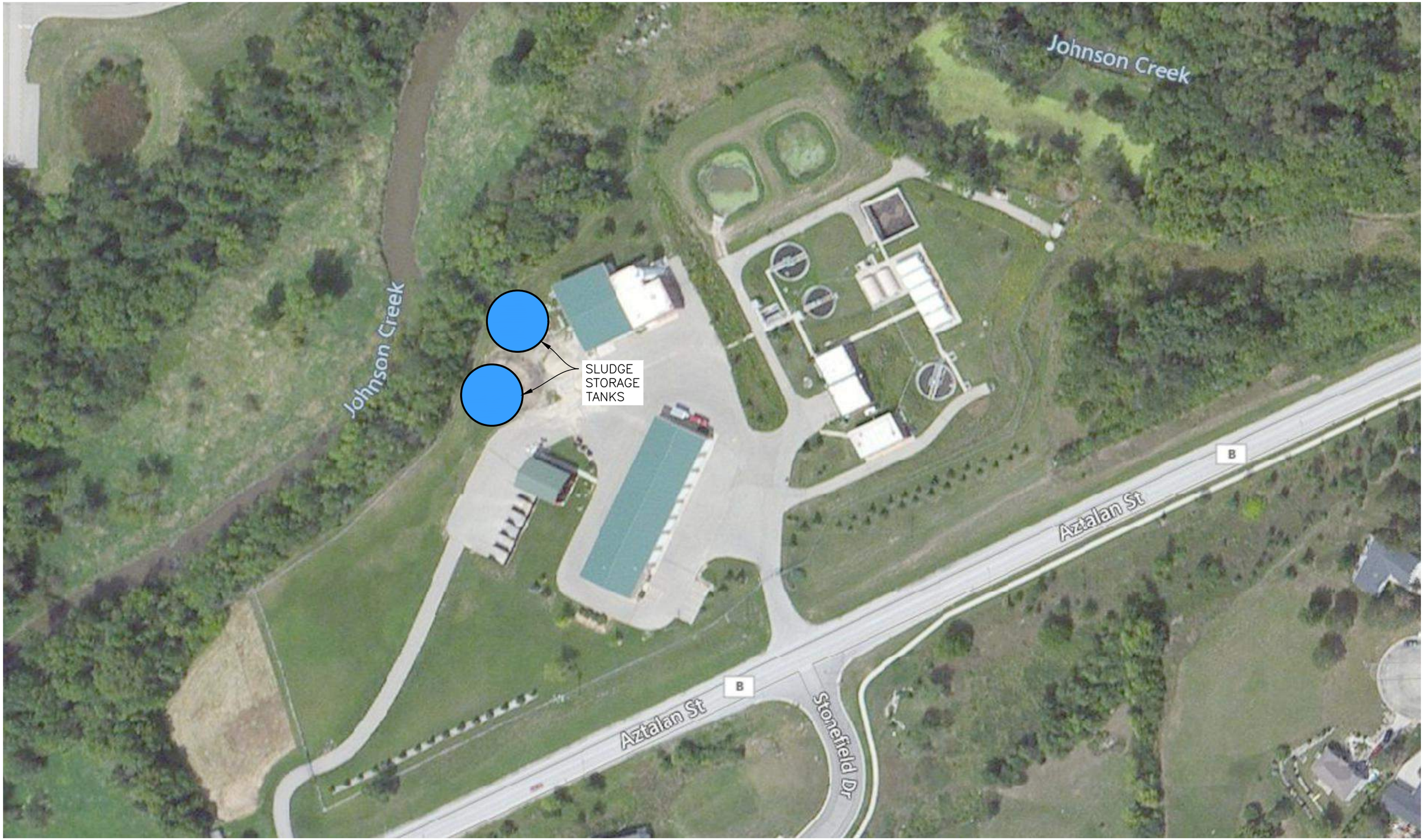
Current liquid sludge hauling and disposal costs are $0.07/gal when the sludge can be immediately land applied, and $0.10/gal when the sludge cannot be immediately land applied. Based on the increasing difficulty for reliably immediate land application in the Spring and Fall, an average was selected ($0.085/gal), assuming one sludge hauling per year would be charged at the lower rate, and one sludge hauling per year would be charged at the higher rate.

As shown in Figure 7, it is proposed that two covered 68-ft diameter by 25-ft high bolted steel sludge storage tanks would be installed to the southwest of the existing sludge storage area. Sludge mixing and pumping would the major mechanical improvements, with new yard piping likely extending the digested sludge piping from the east edge of the sludge dewatering building to the new sludge storage tanks. This option would result in increased truck traffic on local roads for land application.

NON-FEASIBLE ALTERNATIVE

NO ACTION

This alternative represents continued operation of the existing WWTP with no significant additions to the facility and no significant changes to present operation and maintenance procedures. This alternative is not feasible due to concerns with present conditions at the facility. The facility is currently operating with a solids concentration that is too high for sustained high-quality treatment. Although major improvements occurred to the liquid treatment facilities very recently, the only major improvements to the sludge management occurred in 2001. Consequently, the wastewater treatment plant is being operated with inoperable infrastructure and equipment. To continue to meet the requirements of the Wisconsin Department of Natural Resources and the Village's discharge permit, the facility would require upgrades to continue operating. Therefore, the no action alternative is not feasible and was removed from consideration.



N PLAN

0 50' 100' 150' 200'

GRAPHIC SCALE

FIGURE 7
ALTERNATIVE 3 - SLUDGE STORAGE TANKS
VILLAGE OF JOHNSON CREEK

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R: \SHARED FOLDERS\PROJECTS\6465 - JOHNSON CREEK SLUDGE DEWATER\11.0 GRAPHICS\11.1 FIGURES\FIGURE 7.DWG

Chapter 4
COST ESTIMATES

Total project capital costs and annual operation and maintenance costs were estimated for the feasible alternatives.

COST ESTIMATING METHODOLOGY

Construction costs were developed for each alternative. Costs were developed by applying unit prices to the quantity takeoffs determined for each facility. Unit costs were taken from cost estimating references, recent bid tabs, vendor quotations, and recent experience with wastewater treatment projects in Wisconsin.

CONSTRUCTION COST ESTIMATE

Alternative 1 – Belt Filter Press

Total project cost for Alternative 1 is shown in Table 6. Annual operation and maintenance costs, along with the salvage value, are presented in Appendix B.

Table 6 Total Project Cost - Alternative 1: Belt Filter Press	
Item	**Total Cost**
Belt Filter Press	$ 410,000
Polymer Addition Equipment	$ 20,000
Sludge Cake Conveyor	$ 150,000
Sludge Cake Storage Modifications	$ 110,000
Equipment Cost Subtotal	**$ 690,000**
Sitework	$ 10,000
Mechanical	$ 93,000
Electrical	$ 116,000
Instrumentation and Controls	$ 87,000
Subtotal Construction Costs	**$ 996,000**
Contingencies	$ 249,000
Subtotal	$ 1,245,000
General Conditions, Bonds, and Insurance	$ 100,000
Construction Cost	$ 1,350,000
Engineering, Legal, and Admin	$ 200,000
Total Project Cost	**$ 1,550,000**

Alternative 2 – Decanter Centrifuge

Total project cost for Alternative 2 is shown in Table 7. Annual operation and maintenance costs, along with the salvage value, are presented in Appendix B.

Table 7
Total Project Cost - Alternative 2: Decanter Centrifuge

Item	Total Cost
Decanter Centrifuge	$ 450,000
Polymer Addition Equipment	$ 20,000
Sludge Cake Conveyor	$ 150,000
Sludge Cake Storage Modifications	$ 100,000
Equipment Cost Subtotal	**$ 720,000**
Sitework	$ 10,000
Mechanical	$ 99,000
Electrical	$ 124,000
Instrumentation and Controls	$ 93,000
Subtotal Construction Costs	**$ 1,046,000**
Contingencies	$ 262,000
Subtotal	$ 1,308,000
General Conditions, Bonds, and Insurance	$ 105,000
Construction Cost	$ 1,410,000
Engineering, Legal, and Admin	$ 210,000
Total Project Cost	**$ 1,620,000**

Alternative 3 – Sludge Storage Tanks

Total project cost for Alternative 3 is shown in Table 8. Annual operation and maintenance costs, along with the salvage value, are presented in Appendix B.

Table 8
Total Project Cost - Alternative 3: Sludge Storage Tanks

Item	Total Cost
Sludge Storage Tanks	$ 1,190,000
Sludge Tank Mixers	$ 100,000
Sludge Pumps	$ 55,000
Equipment Cost Subtotal	**$ 1,345,000**
Sitework	$ 120,000
Yard Piping	$ 180,000
Mechanical	$ 25,000
Electrical	$ 31,000
Instrumentation and Controls	$ 23,000
Subtotal Construction Costs	**$ 1,724,000**
Contingencies	$ 431,000
Subtotal	$ 2,155,000
General Conditions, Bonds, and Insurance	$ 172,000
Construction Cost	$ 2,330,000
Engineering, Legal, and Admin	$ 350,000
Total Project Cost	**$ 2,680,000**

Chapter 5
RECOMMENDED ALTERNATIVE

LIFE CYCLE COST ANALYSIS

Table 9 shows the net present value comparison for the three alternatives. The net present value was calculated as the sum of the capital cost (C) plus the present worth of the uniform series of annual operating and maintenance (USPW (O&M)) costs minus the single payment present worth of the salvage value (SPPW(S)):

$$NPV = C + USPW\ (O\&M) - SPPW\ (S)$$

Table 9
Total Present Worth Evaluation
Sludge Dewatering Study

Item	Alternative 1: Belt Filter Press	Alternative 2: Decanter Centrifuge	Alternative 3: Sludge Storage Tanks
Annual Operation and Maintenance Costs	$ 97,700	$ 113,600	$ 225,400
Present Worth Factor (20 years @ 3.125%)	14.707	14.707	14.707
Present Worth O&M Costs	$ 1,440,000	$ 1,670,000	$ 3,310,000
Total Project Cost	$ 1,550,000	$ 1,620,000	$ 2,680,000
Present Worth Salvage Value	$ 51,000	$ 47,000	$ 650,000
Total Present Worth	**$ 2,940,000**	**$ 3,240,000**	**$ 5,340,000**

As shown in Table 9, Alternative 1 was the low-cost alternative, with a Total Present Worth of $2,940,000 calculated for the planning period. However, the Total Present Worth of Alternatives 1 and 2 are within 10% of each other. For alternatives analyses, alternatives with Total Present Worth values with a difference of 10% or less are considered to be essentially equivalent. Therefore, non-monetary factors may be considered to select an alternative.

NON-MONETARY FACTORS

As shown in Table 10, the three alternatives have considerable differences in their non-monetary advantages and disadvantages. These differences include sludge storage and dewatering equipment footprints, staffing and maintenance, noise, odors, and other factors. Village staff have emphasized the priority that minimal odor will take among these non-monetary factors, based on the proximity of the WWTF to residential neighborhoods.

Based on the BFP being an open machine, it would be much more difficult to contain odors *during dewatering* from Alternative 1 than from Alternative 2. However, it is expected that the main sources of odors that may cause neighbor complaints would actually be derived from the sludge storage areas and especially during sludge hauling. A major change for all three alternatives compared to the existing is the elimination of lime addition. Lime volatilizes ammonia due to its high pH, which may be responsible for some of the previous odor concerns. However, other odors may be responsible, which may increase or decrease without lime addition. Therefore, it is anticipated that no major differences in odors within the nearby neighborhoods would occur whether Alternative 1 or Alternative 2 would be selected.

RECOMMENDED ALTERNATIVE

This study concludes that either Alternative 1 or Alternative 2 would be appropriate for the Village of Johnson Creek. Based on the above, it is recommended that the Village select Alternative 1 based on a slightly lower Total Present Worth and roughly equivalent non-monetary factors.

Table 10 Non-Monetary Evaluation				
Item		**Alternative 1** **Belt Filter Press**	**Alternative 2** **Centrifuge**	**Alternative 3** **Haul Liquid Waste**
Advantages	Site Impacts	Same footprint as existing	Same footprint as existing	-
	Equipment Floor Space	-	Small floor space for dewatering	No new dewatering equipment
	Staffing	Low staffing (if one shift)	Minimal operator attention (during steady-state)	Least staffing
	Maintenance	Simple maintenance, except belt (~2,700 hours)	Easy to clean and remove/ replace maint. Items	Least maintenance
	Startup/ Shutdown	Easy startup/shutdown	-	No startup/shutdown
	Noise	Less noise than centrifuges	-	Least noise, except haul-out
	Odor	-	Lowest exposure to pathogens, odors during dewatering	-
	Other	-	Capacity beyond design loads by adding polymer	-
Disadvantages	Site Impacts	-	-	Largest sludge storage footprint, limits ability for future sludge cake bed expansion
	Equipment Floor Space	Relatively larger equipment floor space	Structural considerations	-
	Staffing	More staffing if feed %TS varies	Difficult to monitor, experience required	-
	Maintenance	Oil & grease can blind	Repair work performed by mfr, expensive spare parts	-
	Startup/ Shutdown	Washing requires time at end of shift (0.5 hour manufacturer estimate)	Slow startup/shutdown (1 hour manufacturer estimate)	-
	Noise	-	More noise than BFP	Haul-out noise
	Odor	Expected during dewatering and sludge hauling	Some odor expected during sludge hauling	Possible odors from sludge storage during sludge hauling
	Other	Solids need to be screened	High power consumption	Truck traffic on local roads

Source: Alfa Laval, Environmental Protection Agency Biosolids Technology Fact Sheets

APPENDIX A

WPDES Permit

WISCONSIN
DEPT. OF NATURAL RESOURCES

WPDES PERMIT

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

VILLAGE OF JOHNSON CREEK

is permitted, under the authority of Chapter 283, Wisconsin Statutes, to discharge from a facility located at
200 AZTALAN STREET, JOHNSON CREEK, WISCONSIN
to

ROCK RIVER (JOHNSON CREEK WATERSHED, UR07 – UPPER ROCK RIVER BASIN) IN JEFFERSON COUNTY

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application shall be filed for reissuance of this permit, according to Chapter NR 200, Wis. Adm. Code, at least 180 days prior to the expiration date given below.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Thomas Bauman
Wastewater Field Supervisor

_____
Date Permit Signed/Issued

PERMIT TERM: EFFECTIVE DATE - April 01, 2020 **EXPIRATION DATE - March 31, 2025**

TABLE OF CONTENTS

1 Influent Requirements

1.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
701	Influent: 24-Hr flow proportional composite samples shall be collected after screening in the grit tank.

1.2 Monitoring Requirements

The permittee shall comply with the following monitoring requirements.

1.2.1 Sampling Point 701 - INFLUENT

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total		mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total		mg/L	3/Week	24-Hr Flow Prop Comp	

2 Surface Water Requirements

2.1 Sampling Point(s)

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
001	Effluent: 24-Hr flow proportional composite samples shall be collected in the UV channel prior to UV disinfection and grab samples shall be collected after UV disinfection prior to discharge to the Rock River.

2.2 Monitoring Requirements and Effluent Limitations

The permittee shall comply with the following monitoring requirements and limitations.

2.2.1 Sampling Point (Outfall) 001 - EFFLUENT

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Flow Rate		MGD	Daily	Continuous	
BOD_5, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
BOD_5, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	45 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Monthly Avg	30 mg/L	3/Week	24-Hr Flow Prop Comp	
Suspended Solids, Total	Weekly Avg	236 lbs/day	3/Week	Calculated	Effective January, March, May, July, August, October, and December
Suspended Solids, Total	Weekly Avg	271 lbs/day	3/Week	Calculated	Effective February
Suspended Solids, Total	Weekly Avg	248 lbs/day	3/Week	Calculated	Effective April, June, September, and November
Suspended Solids, Total	Monthly Avg	167 lbs/day	3/Week	Calculated	Effective January, March, May, July, August, October, and December
Suspended Solids, Total	Monthly Avg	192 lbs/day	3/Week	Calculated	Effective February
Suspended Solids, Total	Monthly Avg	176 lbs/day	3/Week	Calculated	Effective April, June, September, and November
pH Field	Daily Max	9.0 su	3/Week	Grab	
pH Field	Daily Min	6.0 su	3/Week	Grab	

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonia (NH_3-N) Total	Daily Max	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Nitrogen, Ammonia (NH_3-N) Total	Weekly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Nitrogen, Ammonia (NH_3-N) Total	Monthly Avg	24 mg/L	3/Week	24-Hr Flow Prop Comp	Monitoring year-round. Limits in effect from November 1 through April 30
Fecal Coliform	Geometric Mean - Wkly	656 #/100 ml	Weekly	Grab	May 1 through September 30
Fecal Coliform	Geometric Mean - Monthly	400 #/100 ml	Weekly	Grab	May 1 through September 30
Phosphorus, Total	Monthly Avg	1.0 mg/L	3/Week	24-Hr Flow Prop Comp	
Phosphorus, Total	Monthly Avg	1.21 lbs/day	3/Week	Calculated	Limit effective the month of January beginning January 1, 2022.
Phosphorus, Total	Monthly Avg	1.91 lbs/day	3/Week	Calculated	Limit effective the month of February beginning February 1, 2022.
Phosphorus, Total	Monthly Avg	1.97 lbs/day	3/Week	Calculated	Limit effective the month of March beginning March 1, 2022.
Phosphorus, Total	Monthly Avg	2.19 lbs/day	3/Week	Calculated	Limit effective the month of April beginning April 1, 2021.
Phosphorus, Total	Monthly Avg	2.11 lbs/day	3/Week	Calculated	Limit effective the month of May beginning May 1, 2021.
Phosphorus, Total	Monthly Avg	2.14 lbs/day	3/Week	Calculated	Limit effective the month of June beginning June 1, 2021.
Phosphorus, Total	Monthly Avg	1.81 lbs/day	3/Week	Calculated	Limit effective the month of July beginning July 1, 2021.
Phosphorus, Total	Monthly Avg	1.55 lbs/day	3/Week	Calculated	Limit effective the month of August beginning August 1, 2021.
Phosphorus, Total	Monthly Avg	1.38 lbs/day	3/Week	Calculated	Limit effective the month of September beginning September 1, 2021.

Monitoring Requirements and Effluent Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Phosphorus, Total	Monthly Avg	1.14 lbs/day	3/Week	Calculated	Limit effective the month of October beginning October 1, 2021.
Phosphorus, Total	Monthly Avg	0.99 lbs/day	3/Week	Calculated	Limit effective the months of November and December beginning November 1, 2021.
Nitrogen, Total Kjeldahl		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
Nitrogen, Nitrite + Nitrate Total		mg/L	See Listed Qtr(s)	24-Hr Flow Prop Comp	Annual in rotating quarters. See Nitrogen Series Monitoring section below.
Nitrogen, Total		mg/L	See Listed Qtr(s)	Calculated	Annual in rotating quarters. See Nitrogen Series Monitoring section below. Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen.
Chloride		mg/L	Monthly	24-Hr Flow Prop Comp	Monitor Only. January 1, 2022 - December 31, 2022.
Acute WET		TU_a	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET sections below for listed quarters and monitoring requirements.
Chronic WET		TUc	See Listed Qtr(s)	24-Hr Flow Prop Comp	See WET sections below for listed quarters and monitoring requirements.

2.2.1.1 Annual Average Design Flow

The annual average design flow of the permittee's wastewater treatment facility is 0.401 MGD.

2.2.1.2 TSS Limitation(s)

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as weekly average and monthly average effluents limits and are effectively immediately. The approved total suspended solids TMDL limits for this permittee are included in the following table:

Total Suspended Solids (TSS) Effluent Limitations

Month	Monthly Avg TSS Effluent Limit (lbs/day)	Weekly Avg TSS Effluent Limit (lbs/day)
Jan	167	236
Feb	192	271

March	167	236
April	176	248
May	167	236
June	176	248
July	167	236
Aug	167	236
Sept	176	248
Oct	167	236
Nov	176	248
Dec	167	236

2.2.1.3 Phosphorus Limitation(s)

The Rock River TMDL for Total Phosphorus (TP) and Total Suspended Solids (TSS) was approved by the Environmental Protection Agency (EPA) in September 2011. The TMDL-derived limits are expressed as monthly average effluent limits. The approved phosphorus TMDL limits for this permittee are included in the following table:

Total Phosphorus (TP) Effluent Limitations

Month	Monthly Avg TP Effluent Limit (lbs/day)
Jan	1.21
Feb	1.91
March	1.97
April	2.19
May	2.11
June	2.14
July	1.81
Aug	1.55
Sept	1.38
Oct	1.14
Nov	0.99
Dec	0.99

2.2.1.4 Nitrogen Series Monitoring

Monitoring for Total Kjeldahl Nitrogen (TKN), Nitrite + Nitrate Nitrogen, and Total Nitrogen shall be conducted once each year in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **October 1, 2020 – December 31, 2020; January 1, 2021 – March 31, 2021; April 1, 2022 – June 30, 2022; July 1, 2023 – September 30, 2023; October 1, 2024 – December 31, 2024**

Nitrogen Series monitoring shall continue after the permit expiration date (until the permit is reissued) in accordance with the monitoring requirements specified in the last full calendar year of this permit. For example, the next test would be required in **October 1, 2025 – December 31, 2025.**

Testing: Monitoring shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during testing.

2.2.1.5 Whole Effluent Toxicity (WET) Testing

Primary Control Water: Rock River

Instream Waste Concentration (IWC): 11%

Dilution series: At least five effluent concentrations and dual controls must be included in each test.

- **Acute:** 100, 50, 25, 12.5, 6.25% and any additional selected by the permittee.
- **Chronic:** 100, 30, 10, 3, 1% (if the IWC ≤30%) and any additional selected by the permittee.

WET Testing Frequency:

Acute tests shall be conducted twice during the permit term in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Acute:** April 1, 2022 – June 30, 2022; October 1, 2024 – December 31, 2024

Acute WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October 1, 2025 – December 31, 2025.

Chronic tests shall be conducted twice during the permit term in rotating quarters in order to collect seasonal information about the discharge. Tests are required during the following quarters.

- **Chronic:** April 1, 2022 – June 30, 2022; October 1, 2024 – December 31, 2024

Chronic WET testing shall continue after the permit expiration date (until the permit is reissued) in accordance with the WET requirements specified for the last full calendar year of this permit. For example, the next test would be required in October 1, 2025 – December 31, 2025.

Testing: WET testing shall be performed during normal operating conditions. Permittees are not allowed to turn off or otherwise modify treatment systems, production processes, or change other operating or treatment conditions during WET tests.

Reporting: The permittee shall report test results on the Discharge Monitoring Report form, and also complete the "Whole Effluent Toxicity Test Report Form" (Section 6, "*State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition*"), for each test. The original, complete, signed version of the Whole Effluent Toxicity Test Report Form shall be sent to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., P.O. Box 7921, Madison, WI 53707-7921, within 45 days of test completion. The Discharge Monitoring Report (DMR) form shall be submitted electronically by the required deadline.

Determination of Positive Results: An acute toxicity test shall be considered positive if the Toxic Unit - Acute (TU_a) is greater than 1.0 for either species. The TU_a shall be calculated as follows: $TU_a = 100 \div LC_{50}$. A chronic toxicity test shall be considered positive if the Toxic Unit - Chronic (TU_c) is greater than 9.09 for either species. The TU_c shall be calculated as follows: $TU_c = 100 \div IC_{25}$.

Additional Testing Requirements: Within 90 days of a test which showed positive results, the permittee shall submit the results of at least 2 retests to the Biomonitoring Coordinator on "Whole Effluent Toxicity Test Report Forms". The 90-day reporting period shall begin the day after the test which showed a positive result. The retests shall be completed using the same species and test methods specified for the original test (see the Standard Requirements section herein).

3 Land Application Requirements

3.1 Sampling Point(s)

The discharge(s) shall be limited to land application of the waste type(s) designated for the listed sampling point(s) on Department approved land spreading sites or by hauling to another facility.

Sampling Point Designation	
Sampling Point Number	**Sampling Point Location, WasteType/Sample Contents and Treatment Description (as applicable)**
005	Aerobically digested, Plate pressed, Cake, Class B. Representative samples shall be collected of the Class B sludge from the cake sludge storage area. PCB monitoring is required in year 2021.

3.2 Monitoring Requirements and Limitations

The permittee shall comply with the following monitoring requirements and limitations.

3.2.1 Sampling Point (Outfall) 005 - CLASS B SLUDGE

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
PCB Total Dry Wt	Ceiling	50 mg/kg	Once	Composite	January 1, 2021 - December 31, 2021
PCB Total Dry Wt	High Quality	10 mg/kg	Once	Composite	January 1, 2021 - December 31, 2021
Radium 226 Dry Wt		pCi/g	Annual	Composite	
Solids, Total		Percent	Annual	Composite	
Arsenic Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Arsenic Dry Wt	High Quality	41 mg/kg	Annual	Composite	
Cadmium Dry Wt	Ceiling	85 mg/kg	Annual	Composite	
Cadmium Dry Wt	High Quality	39 mg/kg	Annual	Composite	
Copper Dry Wt	Ceiling	4,300 mg/kg	Annual	Composite	
Copper Dry Wt	High Quality	1,500 mg/kg	Annual	Composite	
Lead Dry Wt	Ceiling	840 mg/kg	Annual	Composite	
Lead Dry Wt	High Quality	300 mg/kg	Annual	Composite	
Mercury Dry Wt	Ceiling	57 mg/kg	Annual	Composite	
Mercury Dry Wt	High Quality	17 mg/kg	Annual	Composite	
Molybdenum Dry Wt	Ceiling	75 mg/kg	Annual	Composite	
Nickel Dry Wt	Ceiling	420 mg/kg	Annual	Composite	
Nickel Dry Wt	High Quality	420 mg/kg	Annual	Composite	
Selenium Dry Wt	Ceiling	100 mg/kg	Annual	Composite	
Selenium Dry Wt	High Quality	100 mg/kg	Annual	Composite	
Zinc Dry Wt	Ceiling	7,500 mg/kg	Annual	Composite	
Zinc Dry Wt	High Quality	2,800 mg/kg	Annual	Composite	
Nitrogen, Total Kjeldahl		Percent	Annual	Composite	

Monitoring Requirements and Limitations					
Parameter	**Limit Type**	**Limit and Units**	**Sample Frequency**	**Sample Type**	**Notes**
Nitrogen, Ammonium (NH_4-N) Total		Percent	Annual	Composite	
Phosphorus, Total		Percent	Annual	Composite	
Phosphorus, Water Extractable		% of Tot P	Annual	Composite	
Potassium, Total Recoverable		Percent	Annual	Composite	

Other Sludge Requirements	
Sludge Requirements	**Sample Frequency**
List 3 Requirements – Pathogen Control: The requirements in List 3 shall be met prior to land application of sludge.	**Annual**
List 4 Requirements – Vector Attraction Reduction: The vector attraction reduction shall be satisfied prior to, or at the time of land application as specified in List 4.	**Annual**

3.2.1.1 List 2 Analysis

If the monitoring frequency for List 2 parameters is more frequent than "Annual" then the sludge may be analyzed fo the List 2 parameters just prior to each land application season rather than at the more frequent interval specified.

3.2.1.2 Changes in Feed Sludge Characteristics

If a change in feed sludge characteristics, treatment process, or operational procedures occurs which may result in a significant shift in sludge characteristics, the permittee shall reanalyze the sludge for List 1, 2, 3 and 4 parameters each time such change occurs.

3.2.1.3 Multiple Sludge Sample Points (Outfalls)

If there are multiple sludge sample points (outfalls), but the sludges are not subject to different sludge treatment processes, then a separate List 2 analysis shall be conducted for each sludge type which is land applied, just prior to land application, and the application rate shall be calculated for each sludge type. In this case, List 1, 3, and 4 and PCBs need only be analyzed on a single sludge type, at the specified frequency. If there are multiple sludge sample points (outfalls), due to multiple treatment processes, List 1, 2, 3 and 4 and PCBs shall be analyzed for each sludge type at the specified frequency.

3.2.1.4 Sludge Which Exceeds the High-Quality Limit

Cumulative pollutant loading records shall be kept for all bulk land application of sludge which does not meet the high-quality limit for any parameter. This requirement applies for the entire calendar year in which any exceedance of Table 3 of s. NR 204.07(5)(c), is experienced. Such loading records shall be kept for all List 1 parameters for each site land applied in that calendar year. The formula to be used for calculating cumulative loading is as follows:

[(Pollutant concentration (mg/kg) x dry tons applied/ac) ÷ 500] + previous loading (lbs/acre) = cumulative lbs pollutant per acre

When a site reaches 90% of the allowable cumulative loading for any metal established in Table 2 of s. NR 204.07(5)(b), the Department shall be so notified through letter or in the comment section of the annual land application report (3400-55).

3.2.1.5 Sludge Analysis for PCBs

The permittee shall analyze the sludge for Total PCBs one time during **2021**. The results shall be reported as "PCB Total Dry Wt". Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with Table EM in s. NR 219.04, Wis. Adm. Code and the conditions specified in Standard Requirements of this permit. PCB results shall be submitted by January 31, following the specified year of analysis.

3.2.1.6 Lists 1, 2, 3, and 4

List 1 **TOTAL SOLIDS AND METALS** See the Monitoring Requirements and Limitations table above for monitoring frequency and limitations for the List 1 parameters
Solids, Total (percent)
Arsenic, mg/kg (dry weight)
Cadmium, mg/kg (dry weight)
Copper, mg/kg (dry weight)
Lead, mg/kg (dry weight)
Mercury, mg/kg (dry weight)
Molybdenum, mg/kg (dry weight)
Nickel, mg/kg (dry weight)
Selenium, mg/kg (dry weight)
Zinc, mg/kg (dry weight)

List 2 **NUTRIENTS** See the Monitoring Requirements and Limitations table above for monitoring frequency for the List 2 parameters
Solids, Total (percent)
Nitrogen Total Kjeldahl (percent)
Nitrogen Ammonium (NH4-N) Total (percent)
Phosphorus Total as P (percent)
Phosphorus, Water Extractable (as percent of Total P)
Potassium Total Recoverable (percent)

List 3
PATHOGEN CONTROL FOR CLASS B SLUDGE

The permittee shall implement pathogen control as listed in List 3. The Department shall be notified of the pathogen control utilized and shall be notified when the permittee decides to utilize alternative pathogen control.

The following requirements shall be met prior to land application of sludge.

Parameter	Unit	Limit
Fecal Coliform*	MPN/gTS or CFU/gTS	2,000,000
OR, ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent Process	

* The Fecal Coliform limit shall be reported as the geometric mean of 7 discrete samples on a dry weight basis.

List 4
VECTOR ATTRACTION REDUCTION

The permittee shall implement any one of the vector attraction reduction options specified in List 4. The Department shall be notified of the option utilized and shall be notified when the permittee decides to utilize an alternative option.

One of the following shall be satisfied prior to, or at the time of land application as specified in List 4.

Option	Limit	Where/When it Shall be Met
Volatile Solids Reduction	≥38%	Across the process
Specific Oxygen Uptake Rate	≤1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic bench-scale test	<17 % VS reduction	On anaerobic digested sludge
Aerobic bench-scale test	<15 % VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, Temp >40°C and Avg. Temp > 45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	During the process
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent Process	Approved by the Department	Varies with process
Injection	-	When applied
Incorporation	-	Within 6 hours of application

3.2.1.7 Daily Land Application Log

Daily Land Application Log		
Discharge Monitoring Requirements and Limitations The permittee shall maintain a daily land application log for biosolids land applied each day when land application occurs. The following minimum records must be kept, in addition to all analytical results for the biosolids land applied. The log book records shall form the basis for the annual land application report requirements.		
Parameters	**Units**	**Sample Frequency**
DNR Site Number(s)	Number	Daily as used
Outfall number applied	Number	Daily as used
Acres applied	Acres	Daily as used
Amount applied	As appropriate * /day	Daily as used
Application rate per acre	unit */acre	Daily as used
Nitrogen applied per acre	lb/acre	Daily as used
Method of Application	Injection, Incorporation, or surface applied	Daily as used

*gallons, cubic yards, dry US Tons or dry Metric Tons

4 Schedules

4.1 Land Application Management Plan Update

Required Action	Due Date
Management Plan Update: The permittee shall submit an update to the land spreading management plan. The management plan shall be consistent with the requirements of this permit, and ss. NR 204.07, Wis. Adm. Code. At a minimum, the plan shall describe how the application rate has been calculated as well as how the sludge will be land applied and incorporated. Record keeping and tracking of site loadings shall also be described. Requests for land spreading site approvals shall also be included.	01/31/2021

5 Standard Requirements

NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(2), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements. Some of these requirements are outlined in the Standard Requirements section of this permit. Requirements not specifically outlined in the Standard Requirement section of this permit can be found in ss. NR 205.07(1) and NR 205.07(2).

5.1 Reporting and Monitoring Requirements

5.1.1 Monitoring Results

Monitoring results obtained during the previous month shall be summarized and reported on a Department Wastewater Discharge Monitoring Report. The report may require reporting of any or all of the information specified below under 'Recording of Results'. This report is to be returned to the Department no later than the date indicated on the form. A copy of the Wastewater Discharge Monitoring Report Form or an electronic file of the report shall be retained by the permittee.

Monitoring results shall be reported on an electronic discharge monitoring report (eDMR). The eDMR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

If the permittee monitors any pollutant more frequently than required by this permit, the results of such monitoring shall be included on the Wastewater Discharge Monitoring Report.

The permittee shall comply with all limits for each parameter regardless of monitoring frequency. For example, monthly, weekly, and/or daily limits shall be met even with monthly monitoring. The permittee may monitor more frequently than required for any parameter.

5.1.2 Sampling and Testing Procedures

Sampling and laboratory testing procedures shall be performed in accordance with Chapters NR 218 and NR 219, Wis. Adm. Code and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149, Wis. Adm. Code. Groundwater sample collection and analysis shall be performed in accordance with ch. NR 140, Wis. Adm. Code. The analytical methodologies used shall enable the laboratory to quantitate all substances for which monitoring is required at levels below the effluent limitation. If the required level cannot be met by any of the methods available in NR 219, Wis. Adm. Code, then the method with the lowest limit of detection shall be selected. Additional test procedures may be specified in this permit.

5.1.3 Recording of Results

The permittee shall maintain records which provide the following information for each effluent measurement or sample taken:

- the date, exact place, method and time of sampling or measurements;
- the individual who performed the sampling or measurements;
- the date the analysis was performed;
- the individual who performed the analysis;
- the analytical techniques or methods used; and
- the results of the analysis.

5.1.4 Reporting of Monitoring Results

The permittee shall use the following conventions when reporting effluent monitoring results:

- Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 0.1 mg/L, report the pollutant concentration as < 0.1 mg/L.

- Pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified.

- For purposes of calculating NR 101 fees, the 2 mg/l lower reporting limits for BOD_5 and Total Suspended Solids shall be considered to be limits of quantitation

- For the purposes of reporting a calculated result, average or a mass discharge value, the permittee may substitute a 0 (zero) for any pollutant concentration that is less than the limit of detection. However, if the effluent limitation is less than the limit of detection, the department may substitute a value other than zero for results less than the limit of detection, after considering the number of monitoring results that are greater than the limit of detection and if warranted when applying appropriate statistical techniques.

5.1.5 Compliance Maintenance Annual Reports

Compliance Maintenance Annual Reports (CMAR) shall be completed using information obtained over each calendar year regarding the wastewater conveyance and treatment system. The CMAR shall be submitted and certified by the permittee in accordance with ch. NR 208, Wis. Adm. Code, by June 30, each year on an electronic report form provided by the Department.

In the case of a publicly owned treatment works, a resolution shall be passed by the governing body and submitted as part of the CMAR, verifying its review of the report and providing responses as required. Private owners of wastewater treatment works are not required to pass a resolution; but they must provide an Owner Statement and responses as required, as part of the CMAR submittal.

The CMAR shall be certified electronically by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The certification verifies that the electronic report is true, accurate and complete.

5.1.6 Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings or electronic data records for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit for a period of at least 3 years from the date of the sample, measurement, report or application. All pertinent sludge information, including permit application information and other documents specified in this permit or s. NR 204.06(9), Wis. Adm. Code shall be retained for a minimum of 5 years.

5.1.7 Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or correct information to the Department.

5.1.8 Reporting Requirements – Alterations or Additions

The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

- The alteration or addition to the permitted facility may meet one of the criteria for determining whether a facility is a new source.
- The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification requirement applies to pollutants which are not subject to effluent limitations in the existing permit.
- The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use of disposal sites not reported during the permit application process nor reported pursuant to an approved land application plan. Additional sites may not be used for the land application of sludge until department approval is received.

5.2 System Operating Requirements

5.2.1 Noncompliance Reporting

Sanitary sewer overflows and sewage treatment facility overflows shall be reported according to the 'Sanitary Sewer Overflows and Sewage Treatment Facility Overflows' section of this permit.

The permittee shall report the following types of noncompliance by a telephone call to the Department's regional office within 24 hours after becoming aware of the noncompliance:

- any noncompliance which may endanger health or the environment;
- any violation of an effluent limitation resulting from a bypass;
- any violation of an effluent limitation resulting from an upset; and
- any violation of a maximum discharge limitation for any of the pollutants listed by the Department in the permit, either for effluent or sludge.

A written report describing the noncompliance shall also be submitted to the Department's regional office within 5 days after the permittee becomes aware of the noncompliance. On a case-by-case basis, the Department may waive the requirement for submittal of a written report within 5 days and instruct the permittee to submit the written report with the next regularly scheduled monitoring report. In either case, the written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times; the steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance; and if the noncompliance has not been corrected, the length of time it is expected to continue.

A scheduled bypass approved by the Department under the 'Scheduled Bypass' section of this permit shall not be subject to the reporting required under this section.

NOTE: Section 292.11(2)(a), Wisconsin Statutes, requires any person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance to notify the Department of Natural Resources **immediately** of any discharge not authorized by the permit. **The discharge of a hazardous substance that is not authorized by this permit or that violates this permit may be a hazardous substance spill. To report a hazardous substance spill, call DNR's 24-hour HOTLINE at 1-800-943-0003.**

5.2.2 Flow Meters

Flow meters shall be calibrated annually, as per s. NR 218.06, Wis. Adm. Code.

5.2.3 Raw Grit and Screenings

All raw grit and screenings shall be disposed of at a properly licensed solid waste facility or picked up by a licensed waste hauler. If the facility or hauler are located in Wisconsin, then they shall be licensed under chs. NR 500-555, Wis. Adm. Code.

5.2.4 Sludge Management

All sludge management activities shall be conducted in compliance with ch. NR 204 "Domestic Sewage Sludge Management", Wis. Adm. Code.

5.2.5 Prohibited Wastes

Under no circumstances may the introduction of wastes prohibited by s. NR 211.10, Wis. Adm. Code, be allowed into the waste treatment system. Prohibited wastes include those:

- which create a fire or explosion hazard in the treatment work;
- which will cause corrosive structural damage to the treatment work;
- solid or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment work;
- wastewaters at a flow rate or pollutant loading which are excessive over relatively short time periods so as to cause a loss of treatment efficiency; and
- changes in discharge volume or composition from contributing industries which overload the treatment works or cause a loss of treatment efficiency.

5.2.6 Bypass

This condition applies only to bypassing at a sewage treatment facility that is not a scheduled bypass, approved blending as a specific condition of this permit, a sewage treatment facility overflow or a controlled diversion as provided in the sections titled 'Scheduled Bypass', 'Blending' (if approved), 'SSO's and Sewage Treatment Facility Overflows' and 'Controlled Diversions' of this permit. Any other bypass at the sewage treatment facility is prohibited and the Department may take enforcement action against a permittee for such occurrences under s. 283.89, Wis. Stats. The Department may approve a bypass if the permittee demonstrates all the following conditions apply:

- The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
- There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance. When evaluating feasibility of alternatives, the department may consider factors such as technical achievability, costs and affordability of implementation and risks to public health, the environment and, where the permittee is a municipality, the welfare of the community served; and
- The bypass was reported in accordance with the Noncompliance Reporting section of this permit.

5.2.7 Scheduled Bypass

Whenever the permittee anticipates the need to bypass for purposes of efficient operations and maintenance and the permittee may not meet the conditions for controlled diversions in the 'Controlled Diversions' section of this permit

the permittee shall obtain prior written approval from the Department for the scheduled bypass. A permittee's written request for Department approval of a scheduled bypass shall demonstrate that the conditions for bypassing specified in the above section titled 'Bypass' are met and include the proposed date and reason for the bypass, estimated volume and duration of the bypass, alternatives to bypassing and measures to mitigate environmental harm caused by the bypass. The department may require the permittee to provide public notification for a scheduled bypass if it is determined there is significant public interest in the proposed action and may recommend mitigation measures to minimize the impact of such bypass.

5.2.8 Controlled Diversions

Controlled diversions are allowed only when necessary for essential maintenance to assure efficient operation. Sewage treatment facilities that have multiple treatment units to treat variable or seasonal loading conditions may shut down redundant treatment units when necessary for efficient operation. The following requirements shall be met during controlled diversions:

- Effluent from the sewage treatment facility shall meet the effluent limitations established in the permit. Wastewater that is diverted around a treatment unit or treatment process during a controlled diversion shall be recombined with wastewater that is not diverted prior to the effluent sampling location and prior to effluent discharge;
- A controlled diversion does not include blending as defined in s. NR 210.03(2e), Wis. Adm. Code, and as may only be approved under s. NR 210.12. A controlled diversion may not occur during periods of excessive flow or other abnormal wastewater characteristics;
- A controlled diversion may not result in a wastewater treatment facility overflow; and
- All instances of controlled diversions shall be documented in sewage treatment facility records and such records shall be available to the department on request.

5.2.9 Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training as required in ch. NR 114, Wis. Adm. Code, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

5.2.10 Operator Certification

The wastewater treatment facility shall be under the direct supervision of a state certified operator. In accordance with s. NR 114.53, Wis. Adm. Code, every WPDES permitted treatment plant shall have a designated operator-in-charge holding a current and valid certificate. The designated operator-in-charge shall be certified at the level and in all subclasses of the treatment plant, except laboratory. Treatment plant owners shall notify the department of any changes in the operator-in-charge within 30 days. Note that s. NR 114.52(22), Wis. Adm. Code, lists types of facilities that are excluded from operator certification requirements (i.e. private sewage systems, pretreatment facilities discharging to public sewers, industrial wastewater treatment that consists solely of land disposal, agricultural digesters and concentrated aquatic production facilities with no biological treatment).

5.3 Sewage Collection Systems

5.3.1 Sanitary Sewage Overflows and Sewage Treatment Facility Overflows

5.3.1.1 Overflows Prohibited

Any overflow or discharge of wastewater from the sewage collection system or at the sewage treatment facility, othe. than from permitted outfalls, is prohibited. The permittee shall provide information on whether any of the following conditions existed when an overflow occurred:

- The sanitary sewer overflow or sewage treatment facility overflow was unavoidable to prevent loss of life, personal injury or severe property damage;
- There were no feasible alternatives to the sanitary sewer overflow or sewage treatment facility overflow such as the use of auxiliary treatment facilities or adequate back-up equipment, retention of untreated wastes, reduction of inflow and infiltration, or preventative maintenance activities;
- The sanitary sewer overflow or the sewage treatment facility overflow was caused by unusual or severe weather related conditions such as large or successive precipitation events, snowmelt, saturated soil conditions, or severe weather occurring in the area served by the sewage collection system or sewage treatment facility; and
- The sanitary sewer overflow or the sewage treatment facility overflow was unintentional, temporary, and caused by an accident or other factors beyond the reasonable control of the permittee.

5.3.1.2 Permittee Response to Overflows

Whenever a sanitary sewer overflow or sewage treatment facility overflow occurs, the permittee shall take all feasible steps to control or limit the volume of untreated or partially treated wastewater discharged, and terminate the discharge as soon as practicable. Remedial actions, including those in NR 210.21 (3), Wis. Adm. Code, shall be implemented consistent with an emergency response plan developed under the CMOM program.

5.3.1.3 Permittee Reporting

Permittees shall report all sanitary sewer overflows and sewage treatment overflows as follows:

- The permittee shall notify the department by telephone, fax or email as soon as practicable, but no later than 24 hours from the time the permittee becomes aware of the overflow;
- The permittee shall, no later than five days from the time the permittee becomes aware of the overflow, provide to the department the information identified in this paragraph using department form number 3400-184. If an overflow lasts for more than five days, an initial report shall be submitted within 5 days as required in this paragraph and an updated report submitted following cessation of the overflow. At a minimum, the following information shall be included in the report:

  ◦The date and location of the overflow;
  ◦The surface water to which the discharge occurred, if any;
  ◦The duration of the overflow and an estimate of the volume of the overflow;
  ◦A description of the sewer system or treatment facility component from which the discharge occurred such as manhole, lift station, constructed overflow pipe, or crack or other opening in a pipe;
  ◦The estimated date and time when the overflow began and stopped or will be stopped;
  ◦The cause or suspected cause of the overflow including, if appropriate, precipitation, runoff conditions, areas of flooding, soil moisture and other relevant information;
  ◦Steps taken or planned to reduce, eliminate and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
  ◦A description of the actual or potential for human exposure and contact with the wastewater from the overflow;
  ◦Steps taken or planned to mitigate the impacts of the overflow and a schedule of major milestones for those steps;
  ◦To the extent known at the time of reporting, the number and location of building backups caused by excessive flow or other hydraulic constraints in the sewage collection system that occurred

concurrently with the sanitary sewer overflow and that were within the same area of the sewage collection system as the sanitary sewer overflow; and
◦The reason the overflow occurred or explanation of other contributing circumstances that resulted in the overflow event. This includes any information available including whether the overflow was unavoidable to prevent loss of life, personal injury, or severe property damage and whether there were feasible alternatives to the overflow.

NOTE: A copy of form 3400-184 for reporting sanitary sewer overflows and sewage treatment facility overflows may be obtained from the department or accessed on the department's web site at http://dnr.wi.gov/topic/wastewater/SSOreport.html. As indicated on the form, additional information may be submitted to supplement the information required by the form.

- The permittee shall identify each specific location and each day on which a sanitary sewer overflow or sewage treatment facility overflow occurs as a discrete sanitary sewer overflow or sewage treatment facility overflow occurrence. An occurrence may be more than one day if the circumstances causing the sanitary sewer overflow or sewage treatment facility overflow results in a discharge duration of greater than 24 hours. If there is a stop and restart of the overflow at the same location within 24 hours and the overflow is caused by the same circumstance, it may be reported as one occurrence. Sanitary sewer overflow occurrences at a specific location that are separated by more than 24 hours shall be reported as separate occurrences; and
- A permittee that is required to submit wastewater discharge monitoring reports under NR 205.07 (1) (r) shall also report all sanitary sewer overflows and sewage treatment facility overflows on that report.

5.3.1.4 Public Notification

The permittee shall notify the public of any sanitary sewer and sewage treatment facility overflows consistent with its emergency response plan required under the CMOM (Capacity, Management, Operation and Maintenance) section of this permit and s. NR 210.23 (4) (f), Wis. Adm. Code. Such public notification shall occur promptly following any overflow event using the most effective and efficient communications available in the community. At minimum, a daily newspaper of general circulation in the county(s) and municipality whose waters may be affected by the overflow shall be notified by written or electronic communication.

5.3.2 Capacity, Management, Operation and Maintenance (CMOM) Program

- The permittee shall have written documentation of the Capacity, Management, Operation and Maintenance (CMOM) program components in accordance with s. NR 210.23(4), Wis. Adm. Code. Such documentation shall be available for Department review upon request. The Department may request that the permittee provide this documentation or prepare a summary of the permittee's CMOM program at the time of application for reissuance of the WPDES permit.
- The permittee shall implement a CMOM program in accordance with s. NR 210.23, Wis. Adm. Code.
- The permittee shall at least annually conduct a self-audit of activities conducted under the permittee's CMOM program to ensure CMOM components are being implemented as necessary to meet the general standards of s. NR 210.23(3), Wis. Adm. Code.

5.3.3 Sewer Cleaning Debris and Materials

All debris and material removed from cleaning sanitary sewers shall be managed to prevent nuisances, run-off, ground infiltration or prohibited discharges.

- Debris and solid waste shall be dewatered, dried and then disposed of at a licensed solid waste facility.
- Liquid waste from the cleaning and dewatering operations shall be collected and disposed of at a permitted wastewater treatment facility.

- Combination waste including liquid waste along with debris and solid waste may be disposed of at a licensed solid waste facility or wastewater treatment facility willing to accept the waste.

5.4 Surface Water Requirements

5.4.1 Permittee-Determined Limit of Quantitation Incorporated into this Permit

For pollutants with water quality-based effluent limits below the Limit of Quantitation (LOQ) in this permit, the LOQ calculated by the permittee and reported on the Discharge Monitoring Reports (DMRs) is incorporated by reference into this permit. The LOQ shall be reported on the DMRs, shall be the lowest quantifiable level practicable, and shall be no greater than the minimum level (ML) specified in or approved under 40 CFR Part 136 for the pollutant at the time this permit was issued, unless this permit specifies a higher LOQ.

5.4.2 Appropriate Formulas for Effluent Calculations

The permittee shall use the following formulas for calculating effluent results to determine compliance with average concentration limits and mass limits and total load limits:

Weekly/Monthly/Six-Month/Annual Average Concentration = the sum of all daily results for that week/month/six-month/year, divided by the number of results during that time period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Weekly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the week.

Monthly Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the month.

Six-Month Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the six-month period. [Note: When a six-month average effluent limit is specified for Total Phosphorus the applicable periods are May through October and November through April.]

Annual Average Mass Discharge (lbs/day): Daily mass = daily concentration (mg/L) x daily flow (MGD) x 8.34, then average the daily mass values for the entire year.

Total Monthly Discharge: = monthly average concentration (mg/L) x total flow for the month (MG/month) x 8.34.

Total Annual Discharge: = sum of total monthly discharges for the calendar year.

12-Month Rolling Sum of Total Monthly Discharge: = the sum of the most recent 12 consecutive months of Total Monthly Discharges.

5.4.3 Effluent Temperature Requirements

Weekly Average Temperature – The permittee shall use the following formula for calculating effluent results to determine compliance with the weekly average temperature limit (as applicable): Weekly Average Temperature = the sum of all daily maximum results for that week divided by the number of daily maximum results during that time period.

Cold Shock Standard – Water temperatures of the discharge shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock. 'Cold Shock' means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavior or physiological performance and may lead to death.

Rate of Temperature Change Standard – Temperature of a water of the state or discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

5.4.4 Visible Foam or Floating Solids

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.4.5 Surface Water Uses and Criteria

In accordance with NR 102.04, Wis. Adm. Code, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

d) Substances in concentrations or in combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

5.4.6 Percent Removal

During any 30 consecutive days, the average effluent concentrations of BOD_5 and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively. This requirement does not apply to removal of total suspended solids if the permittee operates a lagoon system and has received a variance for suspended solids granted under NR 210.07(2), Wis. Adm. Code.

5.4.7 Fecal Coliforms

The weekly and monthly limit(s) for fecal coliforms shall be expressed as a geometric mean.

5.4.8 Seasonal Disinfection

Disinfection shall be provided from May 1 through September 30 of each year. Monitoring requirements and the limitation for fecal coliforms apply only during the period in which disinfection is required. Whenever chlorine is used for disinfection or other uses, the limitations and monitoring requirements for residual chlorine shall apply. A dechlorination process shall be in operation whenever chlorine is used.

5.4.9 Whole Effluent Toxicity (WET) Monitoring Requirements

In order to determine the potential impact of the discharge on aquatic organisms, static-renewal toxicity tests shall be performed on the effluent in accordance with the procedures specified in the *"State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd Edition" (PUB-WT-797*, November 2004) as required by NR 219.04, Table A, Wis. Adm. Code). All of the WET tests required in this permit, including any required retests, shall be conducted on the *Ceriodaphnia dubia* and fathead minnow species. Receiving water samples shall not be collected from any point in contact with the permittee's mixing zone and every attempt shall be made to avoid contact with any other discharge's mixing zone.

5.4.10 Whole Effluent Toxicity (WET) Identification and Reduction

Within 60 days of a retest which showed positive results, the permittee shall submit a written report to the Biomonitoring Coordinator, Bureau of Water Quality, 101 S. Webster St., PO Box 7921, Madison, WI 53707-7921, which details the following:

- A description of actions the permittee has taken or will take to remove toxicity and to prevent the recurrence of toxicity;
- A description of toxicity reduction evaluation (TRE) investigations that have been or will be done to identify potential sources of toxicity, including some or all of the following actions:
  (a) Evaluate the performance of the treatment system to identify deficiencies contributing to effluent toxicity (e.g., operational problems, chemical additives, incomplete treatment)
  (b) Identify the compound(s) causing toxicity
  (c) Trace the compound(s) causing toxicity to their sources (e.g., industrial, commercial, domestic)
  (d) Evaluate, select, and implement methods or technologies to control effluent toxicity (e.g., in-plant or pretreatment controls, source reduction or removal)
- Where corrective actions including a TRE have not been completed, an expeditious schedule under which corrective actions will be implemented;
- If no actions have been taken, the reason for not taking action.

The permittee may also request approval from the Department to postpone additional retests in order to investigate the source(s) of toxicity. Postponed retests must be completed after toxicity is believed to have been removed.

5.5 Land Application Requirements

5.5.1 Sludge Management Program Standards And Requirements Based Upon Federally Promulgated Regulations

In the event that new federal sludge standards or regulations are promulgated, the permittee shall comply with the new sludge requirements by the dates established in the regulations, if required by federal law, even if the permit has not yet been modified to incorporate the new federal regulations.

5.5.2 General Sludge Management Information

The General Sludge Management Form 3400-48 shall be completed and submitted prior to any significant sludge management changes.

5.5.3 Sludge Samples

All sludge samples shall be collected at a point and in a manner which will yield sample results which are representative of the sludge being tested, and collected at the time which is appropriate for the specific test.

5.5.4 Land Application Characteristic Report

Each report shall consist of a Characteristic Form 3400-49 and Lab Report. The Characteristic Report Form 3400-49 shall be submitted electronically by January 31 following each year of analysis.

Following submittal of the electronic Characteristic Report Form 3400-49, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as

specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report is true, accurate and complete. The Lab Report must be sent directly to the facility's DNR sludge representative or basin engineer unless approval for not submitting the lab reports has been given.

The permittee shall use the following convention when reporting sludge monitoring results: Pollutant concentrations less than the limit of detection shall be reported as < (less than) the value of the limit of detection. For example, if a substance is not detected at a detection limit of 1.0 mg/kg, report the pollutant concentration as < 1.0 mg/kg .

All results shall be reported on a dry weight basis.

5.5.5 Calculation of Water Extractable Phosphorus

When sludge analysis for Water Extractable Phosphorus is required by this permit, the permittee shall use the following formula to calculate and report Water Extractable Phosphorus:
Water Extractable Phosphorus (% of Total P) =
[Water Extractable Phosphorus (mg/kg, dry wt) ÷ Total Phosphorus (mg/kg, dry wt)] x 100

5.5.6 Monitoring and Calculating PCB Concentrations in Sludge

When sludge analysis for "PCB, Total Dry Wt" is required by this permit, the PCB concentration in the sludge shall be determined as follows.

Either congener-specific analysis or Aroclor analysis shall be used to determine the PCB concentration. The permittee may determine whether Aroclor or congener specific analysis is performed. Analyses shall be performed in accordance with the following provisions and Table EM in s. NR 219.04, Wis. Adm. Code.

- EPA Method 1668 may be used to test for all PCB congeners. If this method is employed, all PCB congeners shall be delineated. Non-detects shall be treated as zero. The values that are between the limit of detection and the limit of quantitation shall be used when calculating the total value of all congeners. All results shall be added together and the total PCB concentration by dry weight reported. **Note**: It is recognized that a number of the congeners will co-elute with others, so there will not be 209 results to sum.
- EPA Method 8082A shall be used for PCB-Aroclor analysis and may be used for congener specific analysis as well. If congener specific analysis is performed using Method 8082A, the list of congeners tested shall include at least congener numbers 5, 18, 31, 44, 52, 66, 87, 101, 110, 138, 141, 151, 153, 170, 180, 183, 187, and 206 plus any other additional congeners which might be reasonably expected to occur in the particular sample. For either type of analysis, the sample shall be extracted using the Soxhlet extraction (EPA Method 3540C) (or the Soxhlet Dean-Stark modification) or the pressurized fluid extraction (EPA Method 3545A). If Aroclor analysis is performed using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.11 mg/kg as possible. Reporting protocol, consistent with s. NR 106.07(6)(e), should be as follows: If all Aroclors are less than the LOD, then the Total PCB Dry Wt result should be reported as less than the highest LOD. If a single Aroclor is detected then that is what should be reported for the Total PCB result. If multiple Aroclors are detected, they should be summed and reported as Total PCBs. If congener specific analysis is done using Method 8082A, clean up steps of the extract shall be performed as necessary to remove interference and to achieve as close to a limit of detection of 0.003 mg/kg as possible for each congener. If the aforementioned limits of detection cannot be achieved after using the appropriate clean up techniques, a reporting limit that is achievable for the Aroclors or each congener for the sample shall be determined. This reporting limit shall be reported and qualified indicating the presence of an interference. The lab conducting the analysis shall perform as many of the following methods as necessary to remove interference:

3620C – Florisil	3611B - Alumina
3640A - Gel Permeation	3660B - Sulfur Clean Up (using copper shot instead of powder)
3630C - Silica Gel	3665A - Sulfuric Acid Clean Up

5.5.7 Annual Land Application Report

Land Application Report Form 3400-55 shall be submitted electronically by January 31, each year whether or not non-exceptional quality sludge is land applied. Non-exceptional quality sludge is defined in s. NR 204.07(4), Wis. Adm. Code. Following submittal of the electronic Annual Land Application Report Form 3400-55, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.8 Other Methods of Disposal or Distribution Report

The permittee shall submit electronically the Other Methods of Disposal or Distribution Report Form 3400-52 by January 31, each year whether or not sludge is hauled, landfilled, incinerated, or exceptional quality sludge is distributed or land applied. Following submittal of the electronic Report Form 3400-52, this form shall be certified electronically via the 'eReport Certify' page by a responsible executive or municipal officer, manager, partner or proprietor as specified in s. 283.37(3), Wis. Stats., or a duly authorized representative of the officer, manager, partner or proprietor that has been delegated signature authority pursuant to s. NR 205.07(1)(g)2, Wis. Adm. Code. The 'eReport Certify' page certifies that the electronic report form is true, accurate and complete.

5.5.9 Approval to Land Apply

Bulk non-exceptional quality sludge as defined in s. NR 204.07(4), Wis. Adm. Code, may not be applied to land without a written approval letter or Form 3400-122 from the Department unless the Permittee has obtained permissic from the Department to self approve sites in accordance with s. NR 204.06 (6), Wis. Adm. Code. Analysis of sludge characteristics is required prior to land application. Application on frozen or snow covered ground is restricted to the extent specified in s. NR 204.07(3) (l), Wis. Adm. Code.

5.5.10 Soil Analysis Requirements

Each site requested for approval for land application must have the soil tested prior to use. Each approved site used for land application must subsequently be soil tested such that there is at least one valid soil test in the four years prior to land application. All soil sampling and submittal of information to the testing laboratory shall be done in accordance with UW Extension Bulletin A-2100. The testing shall be done by the UW Soils Lab in Madison or Marshfield, WI or at a lab approved by UW. The test results including the crop recommendations shall be submitted to the DNR contact listed for this permit, as they are available. Application rates shall be determined based on the crop nitrogen recommendations and with consideration for other sources of nitrogen applied to the site.

5.5.11 Land Application Site Evaluation

For non-exceptional quality sludge, as defined in s. NR 204.07(4), Wis. Adm. Code, a Land Application Site Request Form 3400-053 shall be submitted to the Department for the proposed land application site. The Department will evaluate the proposed site for acceptability and will either approve or deny use of the proposed site. The permittee may obtain permission to approve their own sites in accordance with s. NR 204.06(6), Wis. Adm. Code.

5.5.12 Class B Sludge: Fecal Coliform Limitation

Compliance with the fecal coliform limitation for Class B sludge shall be demonstrated by calculating the geometric mean of at least 7 separate samples. (Note that a Total Solids analysis must be done on each sample). The geometr.

APPENDIX B

Cost Estimates

Table B-1 Operating and Maintenance Cost Estimating Criteria Village of Johnson Creek WWTF	
Item	Cost
DATE OF CURRENT COST ESTIMATE	August 2021
OPERATION AND MAINTENANCE COSTS (O & M)	
Labor	
Operators/Technicians/Mechanics (w/ benefits)	$50/hr
Electrical Energy (Incl. Demand Charge)	$0.10/kWh
Natural Gas	$0.52/therm
Liquid Sludge Hauling and Disposal	$0.085/gal
Cake Sludge Hauling and Disposal	$0.089/cubic foot ($1,800/year current)
Polymer	$22.03/gal
Ferric	$2.54/gal
Lime	$0.092/lb
Annual Maintenance Cost (% of Equipment Cost)	2.0%
PRESENT WORTH ANALYSIS	
Clean Water Fund Loan Interest Rate	1.485%
Present Worth Discount Rate	3.125%
Present Worth Factors (20 years)	
Present Worth of Salvage Value	0.540
Present Worth of Annual O&M Costs	14.707
Monetary Cost Planning Period	20 years
Useful Life	
Sewers & Force Mains	50 years
Structures, Piping & Valves	40 years
Process Equipment, Electrical, I&C	20 years

Notes:

1. Current liquid sludge hauling and disposal costs are $0.07/gal when the sludge can be immediately land applied, and $0.10/gal when the sludge cannot be immediately land applied. Based on the increasing difficulty for reliably immediate land application in the Spring and Fall, an average was selected, assuming one sludge hauling per year would be charged at the lower rate, and one sludge hauling per year would be charged at the higher rate.

Table B-2 Plate and Frame Filter Press O&M Costs Village of Johnson Creek WWTF	
Item	**Total Cost**
Annual Power Cost	$ 5,900
Ferric Usage	$ 9,500
Lime	$ 14,400
Biosolids Hauling and Disposal	$ 1,800
Equipment Maintenance	$ 10,000
Labor	$ 15,800
Annual O&M Costs	**$ 57,400**
Present Worth Factor (20 year at 3.125 %)	14.707
Total Present Worth O&M Costs	**$ 840,000**

Notes:

1. Equipment maintenance of 2% of equipment cost per year to be used for all alternatives, and estimate was based on an initial P&F filter press cost of approximately $500,000.
2. Power cost determined by difference between reported total 2020 operating costs and costs per batch for ferric, lime, and labor.

Table B-3 Annual Operation & Maintenance (O&M) Costs Alternative 1: Belt Filter Press Village of Johnson Creek WWTF	
Item	**Total Cost**
Annual Power Cost	$ 700
Ferric Usage	$ 15,000
Polymer	$ 9,000
Biosolids Hauling and Disposal	$ 4,000
Equipment Maintenance	$ 15,000
Operator Labor – Sludge Management	$ 54,000
Annual O&M Costs	**$ 97,700**
Present Worth Factor (20 year at 3.125 %)	14.707
Total Present Worth O&M Costs	**$ 1,440,000**

Table B-4 Salvage Value - Alternative 1: Belt Filter Press Village of Johnson Creek WWTF						
Item	**Initial Cost**	**Project Cost**	**Life (Years)**	**Salvage Value**	**Present Worth Factor**	**Present Worth Salvage Value**
Belt Filter Press	$ 410,000	$ 637,000	20	$ 0	0.540	$ 0
Polymer Addition Equipment	$ 20,000	$ 31,000	20	$ 0	0.540	$ 0
Sludge Cake Conveyor	$ 150,000	$ 233,000	20	$ 0	0.540	$ 0
Sludge Cake Storage Modifications	$ 110,000	$ 171,000	40	$ 86,000	0.540	$ 46,000
Sitework	$ 10,000	$ 16,000	50	$ 10,000	0.540	$ 5,000
Mechanical	$ 93,000	$ 144,000	20	$ 0	0.540	$ 0
Electrical	$ 116,000	$ 180,000	20	$ 0	0.540	$ 0
I&C	$ 87,000	$ 135,000	20	$ 0	0.540	$ 0
Contingencies	$ 249,000					
General Conditions, Bonds, and Insurance	$ 100,000					
Engineering, Legal, and Admin	$ 200,000					
Total	**$1,550,000**	**$1,550,000**		**$ 96,000**		**$ 51,000**

Notes:

1. Project Cost includes proportional distribution of non-equipment costs.
2. Salvage Value based on installed equipment value after 20 years.
3. Present Worth Salvage Value based on Present Worth Factor (20 years @ 3.125%).

Table B-5 Annual Operation & Maintenance (O&M) Costs Alternative 2: Decanter Centrifuge Village of Johnson Creek WWTF	
Item	**Total Cost**
Annual Power Cost	$ 3,100
Ferric Usage	$ 15,000
Polymer	$ 16,000
Biosolids Hauling and Disposal	$ 3,600
Equipment Maintenance	$ 16,000
Operator Labor – Sludge Management	$ 60,000
Annual O&M Costs	**$ 113,600**
Present Worth Factor (20 year at 3.125 %)	14.707
Total Present Worth O&M Costs	**$ 1,670,000**

Table B-6 Salvage Value - Alternative 2: Decanter Centrifuge Village of Johnson Creek WWTF						
Item	**Initial Cost**	**Project Cost**	**Life (Years)**	**Salvage Value**	**Present Worth Factor**	**Present Worth Salvage Value**
Decanter Centrifuge	$ 450,000	$ 699,000	20	$ 0	0.540	$ 0
Polymer Addition Equipment	$ 20,000	$ 31,000	20	$ 0	0.540	$ 0
Sludge Cake Conveyor	$ 150,000	$ 233,000	20	$ 0	0.540	$ 0
Sludge Cake Storage Modifications	$ 100,000	$ 155,000	40	$ 78,000	0.540	$ 42,000
Sitework	$ 10,000	$ 16,000	50	$ 10,000	0.540	$ 5,000
Mechanical	$ 99,000	$ 154,000	20	$ 0	0.540	$ 0
Electrical	$ 124,000	$ 193,000	20	$ 0	0.540	$ 0
I&C	$ 93,000	$ 144,000	20	$ 0	0.540	$ 0
Contingencies	$ 262,000					
General Conditions, Bonds, and Insurance	$ 105,000					
Engineering, Legal, and Admin	$ 210,000					
Total	**$1,620,000**	**$1,620,000**		**$ 88,000**		**$ 47,000**

Notes:

1. Project Cost includes proportional distribution of non-equipment costs.
2. Salvage Value based on installed equipment value after 20 years.
3. Present Worth Salvage Value based on Present Worth Factor (20 years @ 3.125%).

Table B-7 Annual Operation & Maintenance (O&M) Costs Alternative 3: Sludge Storage Tanks Village of Johnson Creek WWTF	
Item	**Total Cost**
Annual Power Cost	$ 400
Ferric Usage	$ 15,000
Biosolids Hauling and Disposal	$ 205,000
Equipment Maintenance	$ 5,000
Annual O&M Costs	**$ 225,400**
Present Worth Factor (20 year at 3.125 %)	14.707
Total Present Worth O&M Costs	**$ 3,310,000**

Table B-8 Salvage Value - Alternative 3: Sludge Storage Tanks Village of Johnson Creek WWTF						
Item	**Initial Cost**	**Project Cost**	**Life (Years)**	**Salvage Value**	**Present Worth Factor**	**Present Worth Salvage Value**
Sludge Storage Tanks	$1,190,000	$1,850,000	40	$ 924,000	0.540	$ 500,000
Sludge Tank Mixers	$ 100,000	$ 155,000	20	$ 0	0.540	$ 0
Sludge Pumps	$ 55,000	$ 85,000	20	$ 0	0.540	$ 0
Sitework	$ 120,000	$ 186,000	50	$ 112,000	0.540	$ 60,000
Yard Piping	$ 180,000	$ 279,000	50	$ 167,000	0.540	$ 90,000
Mechanical	$ 25,000	$ 39,000	20	$ 0	0.540	$ 0
Electrical	$ 31,000	$ 48,000	20	$ 0	0.540	$ 0
I&C	$ 23,000	$ 36,000	20	$ 0	0.540	$ 0
Contingencies	$ 431,000					
Subtotal	$2,155,000					
General Conditions, Bonds, and Insurance	$ 172,000					
Engineering, Legal, and Admin	$ 350,000					
Total	**$2,680,000**	**$2,680,000**		**$1,203,000**		**$ 650,000**

Notes:

1. Project Cost includes proportional distribution of non-equipment costs.
2. Salvage Value based on installed equipment value after 20 years.
3. Present Worth Salvage Value based on Present Worth Factor (20 years @ 3.125%).

APPENDIX C
Equipment Information

Project Name: Johnson Creek, WI

Model: ALDEC 75 Decanter Centrifuge

Alfa Laval USA Inc.
Food & Water Division

September 1, 2021

Dear Mr. Kucek,

Thank you for your enquiry. We are pleased to enclose our non-binding Budget Quotation for **One (1) ALDEC 75 Decanter Centrifuge** which is recommended by Alfa Laval to meet the performance requirements of the **Johnson Creek, WI** project.

The equipment described in this proposal is recommended on the basis of the requirements outlined in the RFQ. A few clarifications are listed for a better understanding of the offer.

As part of our continuous decanter development we have established the ALDEC Decanter as the industry benchmark for decanter centrifuges for wastewater treatment:

- **ALDEC gives you a choice.** More sludge treated more efficiently –higher capacity or dryer sludge cake, reducing sludge disposal costs.
- **Low energy consumption.** Optimized drive allows low installed power and low energy consumption.
- **Low maintenance costs.** Requires only a small amount of planned maintenance. Wear parts can be replaced simply and easily.

We have unrivalled after sales capability and we are as close as your phone! Our local Service Engineers can be on your site for maintenance, repairs and installation optimization in a very short period. Spare parts are stored at our Distribution Center in Indianapolis.

As requested, we have included the requested scope of supply, process guarantees based on the influent sludge parameters defined, technical details and dimensioned drawing for the proposed centrifuge including weights and other dimensions. The bowl dimension, speed, installed power, power consumption and G-Force are also indicated in the proposal.

We trust that we have interpreted your requirements correctly and shall be pleased to provide any additional information which may be required in support of our proposal.

Yours faithfully

Chuck Shaw
Account Manager
Water Separation Sales

CONTENTS

1. PROCESS DETAILS AND SIZING

The following budget proposal is based on our standard ALDEC 75 Centrifuge.

Design Year 2043 with lime
2720 lbs/day, 4 hours a day operation
680 lbs/hr
40 gpm

Centrifuge: Aldec 75

Current Year with lime
2910 lbs/day, 4 hours a day operation
728 lbs/hr
42 gpm

Centrifuge: Aldec 75

Design Year 2043 without lime
1780 lbs/day, 3 hours per day operation
593 lbs/hr
52 gpm

Centrifuge: Aldec 75

Current Year without lime
1910 lbs/day, 3 hours per day operation
637 lbs/hr
55 gpm

Centrifuge: Aldec 75

2. ALDEC CENTRIFUGE GENERAL DESCRIPTION

2.1 Basic Centrifuge

The ALDEC Decanter Centrifuge model **ALDEC 75** is an open, non-pressured horizontal decanter centrifuge. It features a solid horizontal bowl and scroll type conveyor, with counter current flow design. The centrifuge is designed and built to operate continuously at a maximum g-force of 3,550 G. All parts of the centrifuge in contact with the process material are made of type Duplex stainless steel or AISI 316 stainless steel except O-rings, seals, feed tube and abrasion resistant materials. Process seals and other O-rings and seals are made of nitrile rubber, unless otherwise specified. The feed tube is fabricated from AISI 316 stainless steel.

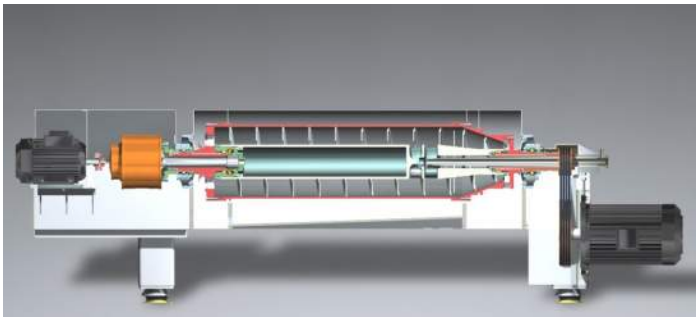
ALDEC High Performance Decanter Model ALDEC 75 (*For Dimensions refer Drawing*)

2.1.1 Gearbox

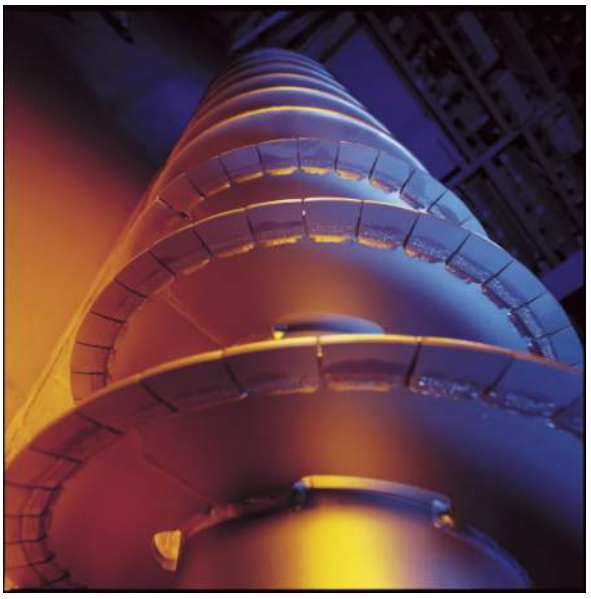
The gearbox is an Alfa Laval proprietary multi-stage planetary gear reducer unit, of “direct drive” design, which controls the maximum differential speed between the centrifuge bowl and conveyor. The gearbox has a torque capacity of 8 kNm with a gear ratio of 1:100.8

2.1.2 Frame and Casing Assembly

The frame and casing is a box beam profile type with integral casing with hinges. The material of the casing and cover is AISI 316 stainless steel. The inside surface of the casing consists of stainless steel liners in the discharge areas and a painted surface in the neutral compartment. Casing gaskets are of nitrile rubber. The material of the frame is painted mild steel.



2.1.3 Conveyor Assembly

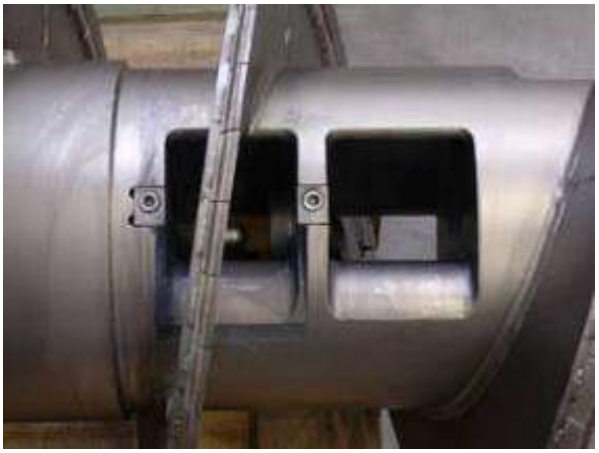


The conveyor is fabricated from AISI 316 stainless steel, equipped with single lead windowed quasiaxial flights, and is concentrically suspended within the centrifuge bowl. 8mm Duplex flights in tiles length and the remaining sections are fabricated from AISI 316 stainless steel. The conveyor includes a feed zone of a high capacity design with field replaceable tungsten carbide wear liners.

2.1.4 Bowl Assembly

The bowl assembly is manufactured from Duplex stainless steel. The bowl shell and its end-hubs are manufactured from centrifugally cast duplex stainless steel. Prior to final machining, all surfaces are examined for cracks, shrinkage, porosity or other defects. The pool depth in the centrifuge bowl is adjustable, to suit process requirements, through the use of plate dams at the large diameter end of the bowl where the liquid is discharged.
The centrifuge bowl is 69.3” long (from hub to hub) with an inside diameter of 17.3” nominal.

2.1.5 Wear Protection



The conveyor flights are protected against abrasion wear with a series of welded-on sintered tungsten carbide tile assemblies from two wraps beyond the feed zone through the solids discharge end and with flame sprayed tungsten carbide for the remaining section. The conveyor feed zone is equipped with field replaceable tungsten carbide wear liners.
The bowl is equipped with stainless steel strips to secure against abrasion. The solids discharge area of the casing is protected with wear liners of stainless steel.
The solids discharge ports shall be protected from abrasion by field replaceable tungsten carbide wear saddles. A replaceable stainless steel or urethane insert shall protect the solids discharge casing.

2.1.6 Hinged Cover:

The case top shall have spring loaded hinges to allow for ease of opening during maintenance or inspection (spring loading prevents cover from closing on its own). These can be located on the left or right side. The hinged cover provides the opeartor with easy of access with the requirement of overhead crane and additional manpower for routine inspections and maintenance.

2.1.7 OPTIONAL FEATURE – Power tubes/Plates

Power tube weirs shall be utilized for maximum energy efficiency. The power tube weirs will direct the centrate in the opposite direction of the bowl rotation to provide additional propulsion for bowl rotation. The pond depth shall be adjusted by simply rotating the power tube.

2.1.8 OPTIONAL FEATURE – Automatic Greasing System:

An automatic greasing system shall be provided for the main bearings. System shall consist of a frame mounted grease pump and tubing. Pump will allow for separate greasing levels for each of the main bearings and provide a low level grease alarm. Control of the pump; duration between greasing and length of grease cycle, is from the decanter centrifuge control panel.

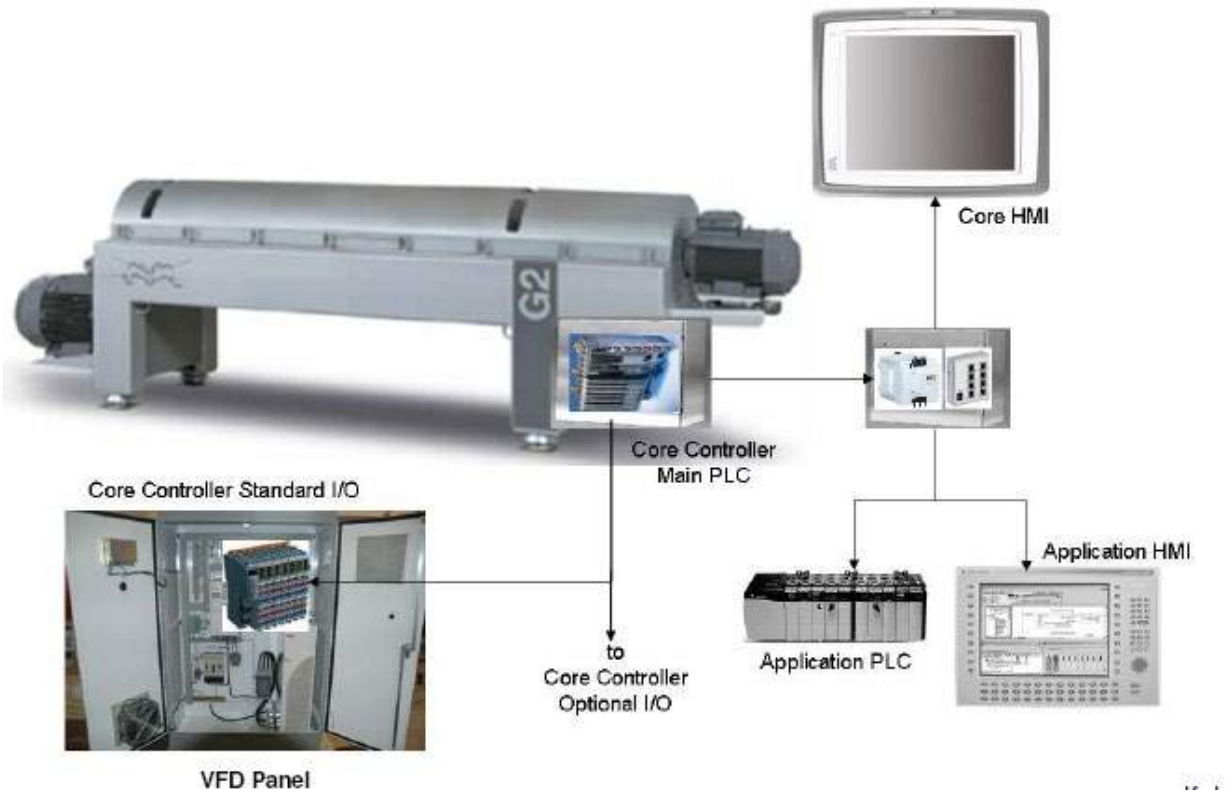
2.2. Electrical Assembly and Controls

2.2.1 Electrical Assembly

The electrical assembly consists of a main-drive motor and a back-drive motor. The selected main-drive motor is 60 HP and the back-drive motor is 15 HP both for VFD controlled, for 460 Volt, 60 Hz, 3 phase power supply.

2.2.2 Controls

The controls consist of an Alfa Laval's **Decanter Connect Control Package** that regulates the conveying torque or differential speed between the conveyor and the bowl via the VFD-controlled back-drive motor, and also controls associated equipments (e.g. sludge macerator, sludge feed pump, diverter-gate, cake-conveyor, flushing valve, etc., starter-panels of these to be provided by others). Centrifuge vibration sensor control and PT 100 for main bearings temperature control are incorporated for added safety of the machine.



Alfa Laval Decanter Connect Control Package –Overview

2.2.3 Decanter Connect Control System – Key Features

a) Allen Bradley CompactLogix PLC (Optional addeer - ControlLogix PLC)

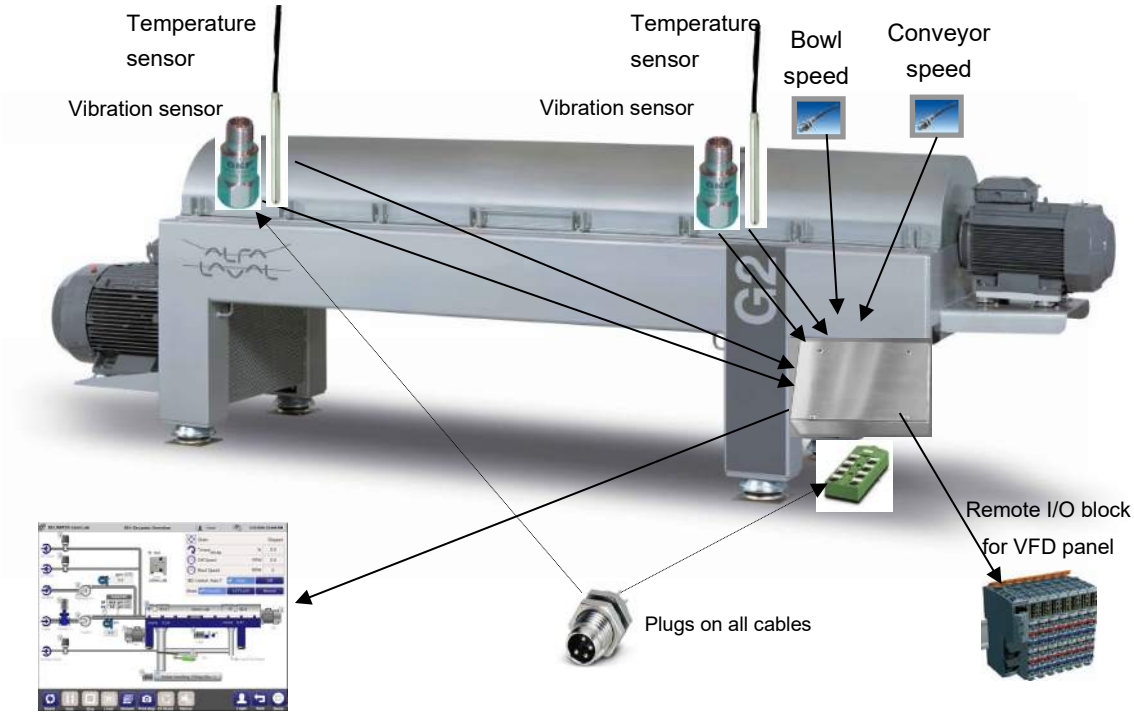
b) Uses ABB ACS 880 series VFDs

c) PanelView 7 Performance HMI – 10” (Optional adder - 15”HMI)

d) SCADA Communication to Allen Bradley protocols (Delta V,ProfiNet, or Modbus protocols are optional)

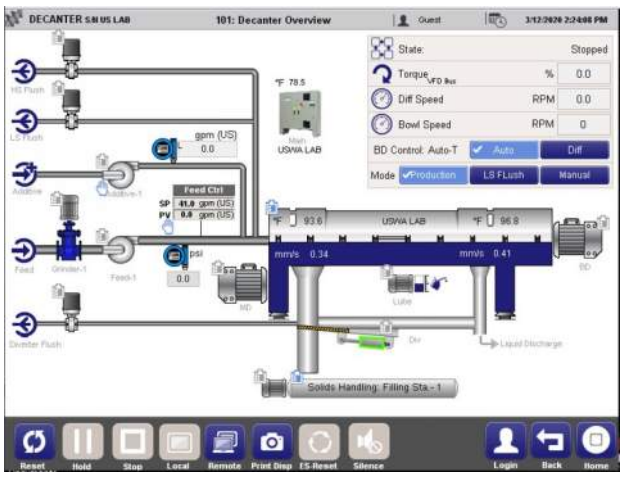
e) Fully assembled & wired to centrifuge instrumentation

f) Pre-wired and tested with all core centrifuge instrumentation: Speed sensors, backdrive torque sensor, main bearing vibration sensors, and main bearing PT-100 temperature sensors



g) Large Touch-screen HMI-Display (10”)

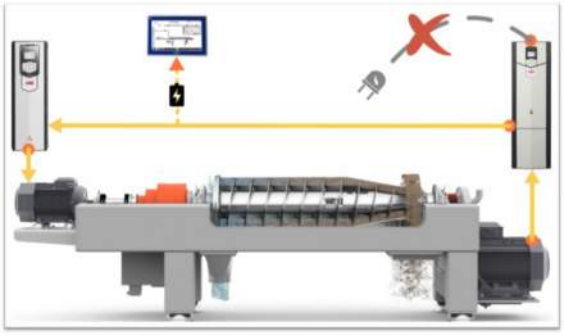
- Easy Navigation.
- Machine animated overview screen
- Analog, Digital and Multi centrifuges data display



h) Rich user experience
- Alarms
- Trend curves

i) Control of centrifuge during power loss or outage:

The control of centrifuge during power loss or outage will allow the centrifuge to run through a short duration power blip, generally defined as 3-5 seconds. If the power outage extends past the 3-5 seconds the system will shut down the feed pump and polymer pump and put the centrifuge into the production standby mode for a programmed set time. If power is restored during this time the feed pump and polymer pump will automatically restart and production will resume.



Should the power not be restored, the control system will allow the centrifuge to be brought to a stop in a normal shutdown mode (as if it had power) maintaining the differential speed during the coast down period. This system will allow the centrifuge to scroll the solids out and be available for an immediate restart, once power is restored.

j) Control Panels
- Different configurations for Local and Starter panels
- NEMA 12 or NEMA 4X
- VFD ABB Type ACS800 for Main Motor
- VFD ABB Type ACS800 for Back-drive Motor
- Power supply Source: 460 V / 60 Hz / 3 Ph
- For locating within “safe” non-hazardous area,

3. SCOPE OF SUPPLY

One (1) ALDEC 75 Centrifuge will come complete and include the following scope of supply:

- Modular frame with process contact areas in 316 SS
- Vibration isolators
- Singular cover in 316 SS (covers belts, rotating assembly and gearbox)
- Abrasion protection (Tungsten Carbide on wear surfaces)
- Rotating assembly complete with 8 kNm DD gearbox and pillow block bearings
- All bearings grease lubricated
- Vibration and temperature sensors in main bearing housings
- Main drive Motor: 60 Hp AC VFD
- Back drive Motor: 15 Hp AC VFD
- Starter Panel: NEMA 12 Free-Standing
- Local Control Panel: NEMA 4 X (304 SS) Wall mounted
- PLC: Allen Bradley CompactLogix
- HMI: Allen Bradley – 10 inch
- Main Drive VFD: ABB ACS880
- Back drive VFD: ABB ACS880
- Control of centrifuge during power loss or outage
- Flexible connectors
- Solids discharge chute
- Centrate discharge chute
- Factory Paint System
- One (1) set required lubricants
- One (1) set of required spares
- Freight to jobsite, FCA (Krakow, Poland) Incoterms 2020 (unloaded by others)

Also included with pricing:

- One (1) year warranty against defects in workmanship
- Up to Ten (10) days of service and Two (2) round trips for on Start-up, Training, and Testing
- Submittals and O&M Manuals
- Required Tools including bowl lifter and conveyor lifter

Not included in pricing:

- Field wiring, conduit, flexible connections
- Piping, Venting & Valves
- Anchor bolts
- Polymer & Polymer System
- Flow meters and Pressure gauges
- Conveyor/Diverter gate
- Feed pump and Grinder/Macerator
- Laboratory Fees
- Unloading at jobsite
- Installation
- Storage and Handling fees
- Taxes and bonds

Control of centrifuge during power loss or outage:

The control of centrifuge during power loss or outage will allow the centrifuge to run through a short duration power blip, generally defined as 3-5 seconds. If the power outage extends past the 3-5 seconds the system will shut down the feed pump and polymer pump and put the centrifuge into the production standby mode for a programmed set time. If power is restored during this time the feed pump and polymer pump will automatically restart and production will resume.

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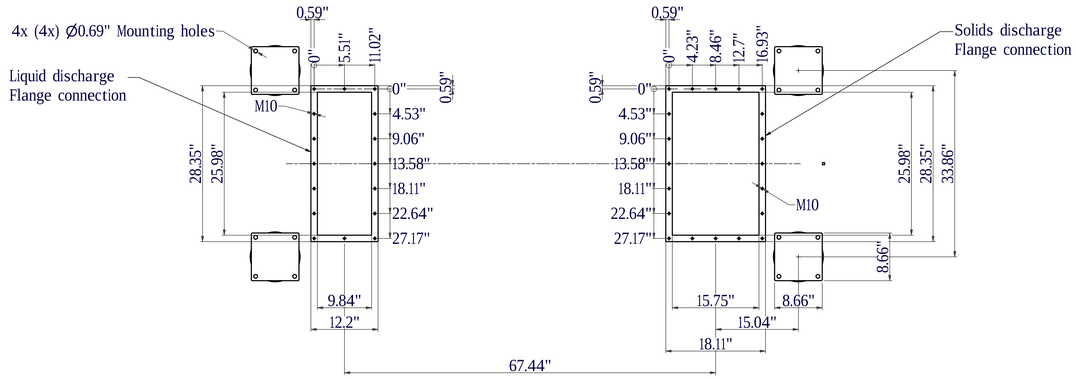
4. PRICING, PAYMENT TERMS & DELIVERY TIME

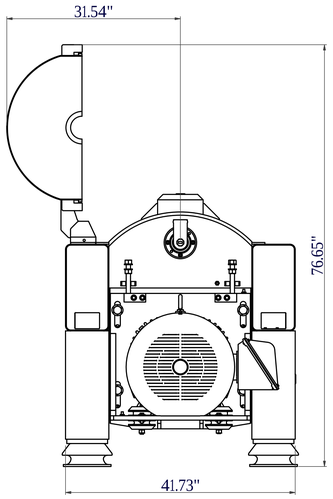
BUDGET PRICE FOR ONE ALDEC 75 CENTRIFUGE, AS DESCRIBED ABOVE	**$ 297,000.00***
PAYMENT TERMS	**10% with PO** **10% upon Submittal Approval, NET 30 days** **75% upon Delivery, NET 30 days** **5% upon Final Acceptance, NET 30 days**
PRICE VALIDITY	**30 days**
ESTIMATED DELIVERY TIME	**Submittals: 8 -12 weeks from fully executed PO** **Centrifuge: 34 – 38 weeks from release to manufacturing**

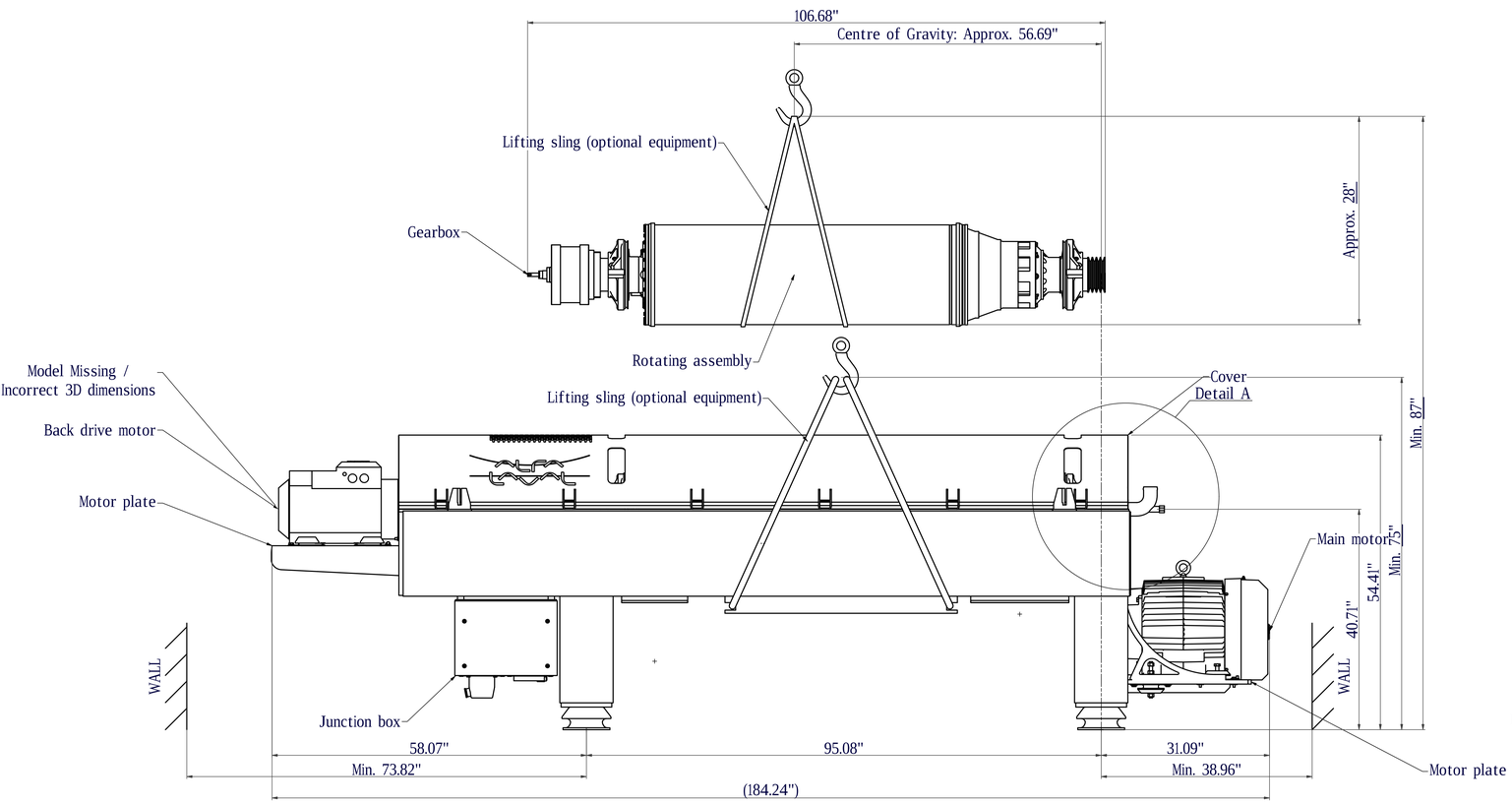
* Given the current volatility in steel prices over the past twelve months, Alfa Laval has made this offer based upon pricing at the time of this budget quote.

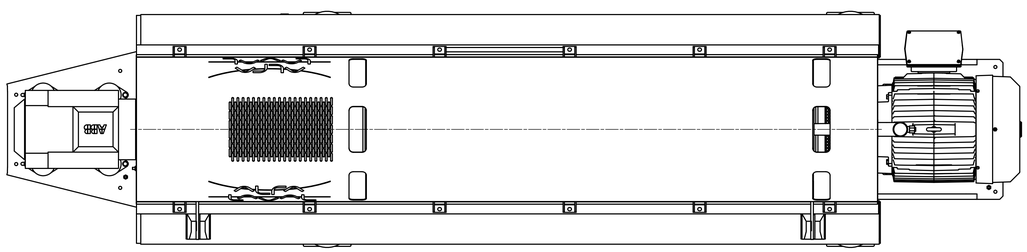
5. DIMENSIONED DRAWING

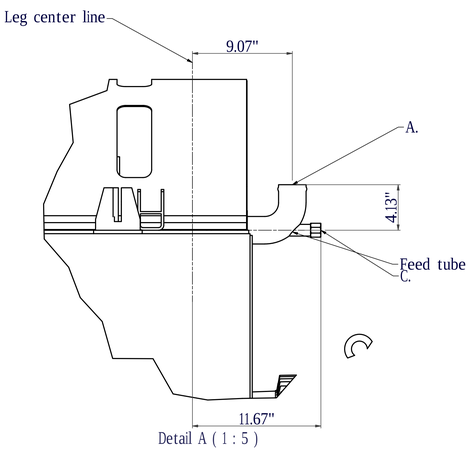
- ALDEC 75 Dimension Drawing











All dimensions in inches (inch)

www.alfalaval.com

ALDEC 75-2 phase-2.5kNm

First angle projection

Sales configuration id:
Date: 04-02-2020
Revision: 0 Scale[A0]: 1:10

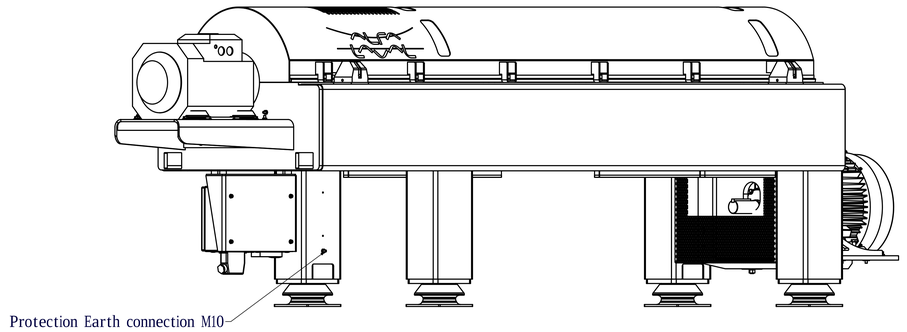
Approximate weights:

	Value:
Total weight of empty decanter	8157 lbs
Rotating assembly	1764 lbs
Cover	309 lbs
Gear box	161 lbs
Main motor	814 lbs
Crane lifting capacity for rotating assembly (Lifting weight with blocked bowl)	4409 lbs

Foundation loads:

Max. static load	
Vertical	8475 lbf
Horizontal	0 lbf
Max. dynamic load at run-down	
Vertical	± 4496 lbf
Horizontal	± 2248 lbf
Max. dynamic load at operating speed	
Vertical	± 112 lbf
Horizontal	± 112 lbf

All loads are evenly distributed on the four decanter legs



Connections:

	Dimensions/Value:
A. Feed tube Feed connection	Diameter 63.5 (1 1/2") Hose connection
B. Feed tube Internal polymer connection	
C. Feed tube External polymer connection	ISO 228-G 3/4" Connection
D. Feed tube CIP connection	
E. Cover CIP connection	
F. Liquid discharge connection	
G. Solids discharge connection	
H. Paring disc liquid discharge connection	
I. Paring disc drain discharge	
J. Paring disc liquid/vent discharge	

Notes:

Alfa Laval cannot be held responsible for any failures or damages of the decanter, if the decanter isn't installed according to the instructions and guide lines in the Installation Manual

All dimensions in inches (inch)

www.alfalaval.com

ALDEC 75-2 phase-2.5kNm

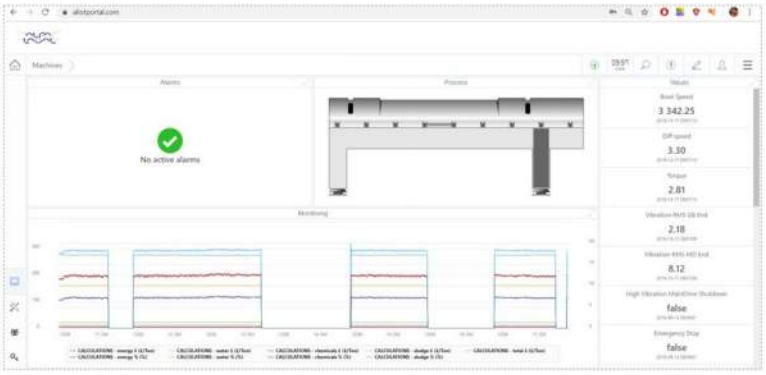
First angle projection

Sales configuration id:
Date: 04-02-2020
Revision: 0 Scale[A0]: 1 : 10

6. CONNECTED SERVICES OVERVIEW

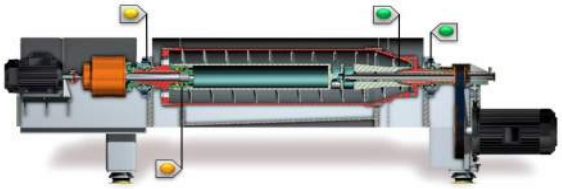
A. Visualization

Our customers can contact Alfa Laval experts for process or maintenance advice, support on troubleshooting activities and better prepare us for our next service activity. In addition to this, Remote Support and Monitoring allows the customer to remotely monitor and analyze their centrifuge operational data. This is achieved through web-based solution. There is add on feature called Cost Calculator. It was created for productivity enhancement and cost optimization.



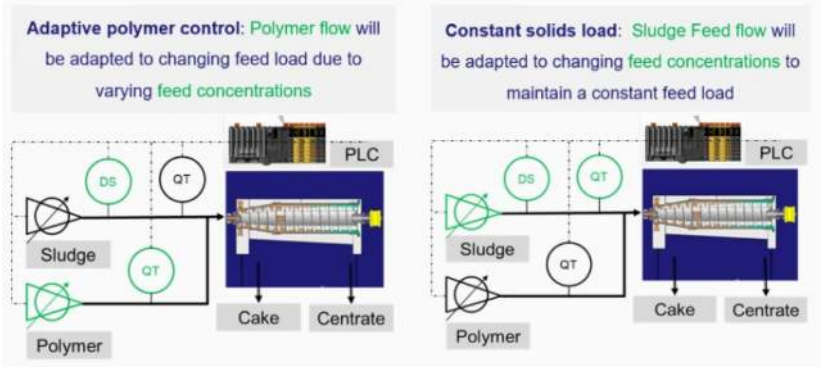
B. Predictive Maintenance

The Predictive Maintenance area of Alfa Laval Connected Services develops services that help our customers improve reliability and avoid risk. The long term objective is to develop a predictive maintenance solution that predicts failures before they ever happen. The first service in this area, launched in September 2019, is ConditionAlertTM for main and conveyor bearings. It is a maintenance decision support system based on advanced vibration analysis.



C. Process Optimization

The Process Optimization area of BUD Connected Services develops services that help our customers optimize their decanter process, thereby reducing cost and increasing savings. For now, this area is focused on the Wastewater Treatment industry. The first 2 services in this area, launched in September 2019, are Constant Solids Load and Adaptive Polymer Control. We are also working to develop a centrate monitor to allow further process optimization.
The long term objective is to develop a self-optimizing decanter.



ALFA LAVAL IN USA

A. Alfa Laval USA

For more than 130 years, we have built a global presence with service centres and partners in nearly 100 countries and key marine harbours. This offers you local expertise, supported by the global breadth and depth of Alfa Laval.

Alfa Laval has been manufacturing decanter centrifuges for Municipal Water and Wastewater for over 50 years. There are more than 50,000 units operating worldwide and more than 5,000 in the US in different markets and applications.

We have pioneered design innovations over the years to improve the operation of decanter centrifuges focusing on reducing power consumption, increasing cake dryness, and increasing capacity in the same footprint.

B. Lab and Pilot Testing Capabilities

In Alfa Laval, we always strive to achievie the sludge thickening and dewatering results using our equipment and to bring value to the customers. We have a full-fledged laboratory at our Houston facilities to determine the best solution and expected performance.

We also have centrifuge and belt technology pilot equipment available for field testing and demonstration.

C. Spare Parts

Since Alfa Laval has such a large installed base of centrifuges in the US and worldwide, Alfa Laval has many service shops and 3 worldwide parts distribution centers. The Americas are served through the American Distribution Center (AMDC) located at the address listed below. Alfa Laval has more capability than any other centrifuge supplier to support this installed base through our parts and service organization. For the recommended spare parts the standard delivery time is 2 weeks for all parts. Most parts can be expedited within 48 hours. All parts for the proposed centrifuge are stocked at the AMDC.

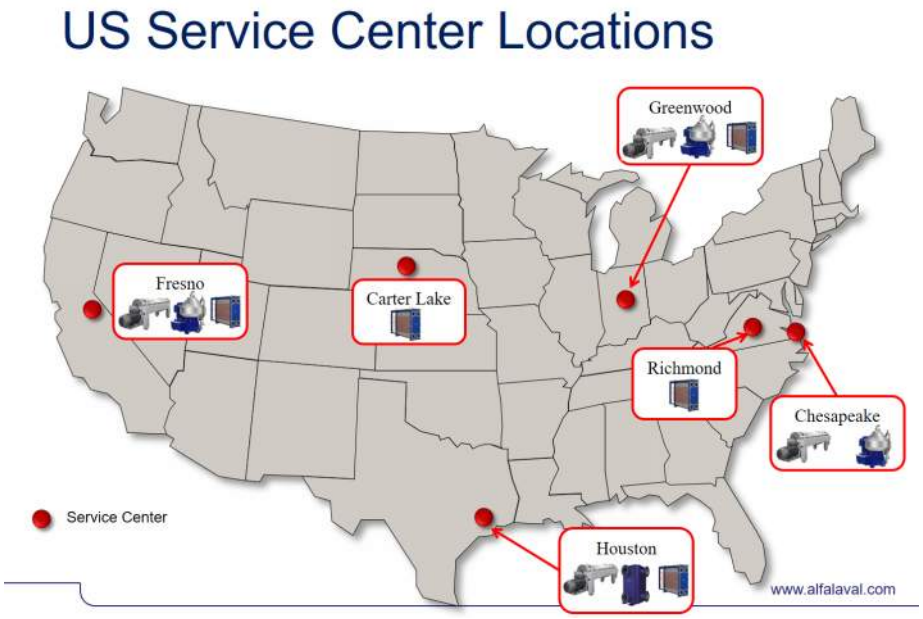
Greenwood AMDC
200 South Park Blvd
Greenwood, IN 46143

The AMDC stocks parts for the entire Americas and holds over 100,000 parts to support Alfa Laval equipment. These parts include all mechanical and controls parts. Inventory levels exceed $30 million USD.

D. Service Network

Service specialists are ready to assist you by phone or on site, depending on your need. Alfa Laval services and parts are in easy reach of your operations, when you need them. Alfa Laval service centres are strategically located around the world. At these modern facilities, everything required to prolong your equipment's life is made available to you.

Alfa Laval can also be reached 24 hours a day 7 days a week for parts and service by calling **1-866-ALFALAVAL (1-866-253-2528)**, CustomerService.usa@alfalaval.com.



E. 360º Service Portfolio

Alfa Laval partners with you for the entire life cycle of your equipment – from start-up, through operation, monitoring and maintenance, all the way to reconditioning and eventual redesign. Our goal is to ensure that our equipment continuously give you optimized process performance.

a) Commissioning

Alfa Laval specialists commission new equipment to ensure that the process is optimized and performing as needed. This can consist of test run, performance checks and performance optimization together with operator training. The commissioning process ends with a handover or acceptance certificate and is often the first day of warranty.

- Enables trouble-free start-up and process fine-tuning
- Advice on optimizing process conditions

- Checks on surrounding components, systems and controls and optimization recommendations
- Help to reduce maintenance costs with a customized proposal to optimize maintenance

b) Preventive Maintenance

Based on extensive experience, Alfa Laval specialists can formulate and implement an optimal maintenance plan for your equipment. Service intervals are determined by various factors, including type of application as well as the usage and condition of the equipment. The service can be performed on board, on site or in one of the Alfa Laval Service Centres located close to you.

- Delivers peace of mind and operational reliability
- Secures maximum throughput
- Increases overall equipment lifetime and provides good cost control
- Maintains safe equipment operation

c) Repair

Alfa Laval specialists repair the equipment according to your needs, replacing unsafe parts and worn parts as required, and then reassemble the equipment.

- Minimizes downtime
- Maximizes production performance
- Extends the lifetime of equipment
- Prevents equipment from consequential damage and accidents

d) Training

Alfa Laval offers a broad range of training courses with an effective mix of hands-on and theoretical training. Tailor-made training can be offered based on your specific training needs on a particular product, industry and/or application.

- Increases productivity
- Extending equipment and system lifetime
- Contributes to equipment safety and safeguards your personnel

e) Equipment Upgrades

There is a wide range of upgrade solutions available to ensure your Alfa Laval equipment features the latest technical developments. As operating conditions change over time, new challenges can call for a review of the current installations. Equipment Upgrades can also include control upgrades that improve equipment automation.

7. NOTES OF CLARIFICATION

In the event that delivery of equipment cannot be made on the scheduled delivery date agreed upon between Alfa Laval and Purchaser and as evidenced by the terms of the contract, due to Purchaser delay, Alfa Laval reserves the right to assess reasonable escalation charges to the project at the rate of 1% per month of the contract value for material price escalation for each month that the project is delayed.

Given the current volatility in steel prices over the past twelve months, Alfa Laval has made this offer based upon shipment of the offered products at the time of this proposal. Should the projected shipment schedule fall outside this period for any reason, pricing shall be subject to review and revision.

We are offering our standard centrifuge configuration in accordance with the attached typical specifications and drawings, for installation within a non-hazardous safe area. Any additional items not explicitly stated in this proposal or our typical specifications are not included in this quotation.

The following are excluded from this quotation:

- Field wiring and electrical flexible connections
- Pipes, valves, and fittings
- Associated equipments, i.e, Sludge macerators, feed pumps, polymer preparation & dosing unit, cake conveyors.
- Flexible connections or chutes connecting to the solids and centrate discharge from the decanter, other than the “outlet funnel for liquid discharge” and the “adaptor for solids discharge” mentioned in optional items in this quotation
- Centrate tanks & pumps
- Measuring instruments between centrifuges and associated equipments
- Noise abatement enclosures
- Odour control equipment
- Inspection and access platforms or ladders
- Mechanical & Electrical Installation
- Polymer, power, water and other consumables required during testing, start-up & commissioning
- Duties, taxes etc.

Please also take **special note** that:

- All Equipments to be supplied by **Alfa Laval** and its sub-suppliers are standard machines as specified in this Quotation. Any modifications / additions other than those specified in the Quotation shall incur extra engineering cost, extra material cost and extra delivery time, all of which to be prior agreed with **Alfa Laval** if so desired.

- The technical submittal documentation of the Equipments shall be the standard documentation as per **Alfa Laval** and the sub-suppliers' standards, in English language. Specific project related engineering is excluded from **Alfa Laval**'s scope of supply. Extra documentation other than standard documentation shall incur extra engineering cost, extra material cost and extra delivery time, all of which to be prior agreed with **Alfa Laval** if so desired.

8. TERMS AND CONDITIONS

These Terms and Conditions of Sale ("Terms and Conditions") apply to all quotations, orders, and contracts for Alfa Laval Inc. products (hereafter "Equipment") and associated services ("Services") As used in these Terms and Conditions, the word "Equipment" includes all hardware, parts, components, software and options.

1. **ACCEPTANCE**: Our sale to you is limited to and expressly made conditional on your assent to these Terms and Conditions and, if applicable, on the attendant quotation, both of which form a part of the contract between us and which supersede and reject all prior agreements, representations, discussions or negotiations, whether written or oral, with respect to this sale and any conflicting terms and conditions of yours, whether or not signed by you. Any terms and conditions contained in your purchase order or request for quotation or other form which are different from, in addition to, or vary from these Terms and Conditions are expressly rejected, shall not be binding upon us, and are void and of no force or effect. These Terms and Conditions may not be changed except by the written agreement of both parties.

2. **PRICES**: Unless otherwise specified in writing, all quoted prices are in U.S. Dollars and are firm for thirty (30) days from the date of offer. Prices quoted are exclusive of taxes, freight and insurance, and you agree to pay any and all sales, revenue, excise or other taxes (exclusive of taxes based on our net income) applicable to the purchase of Equipment. If you claim an exemption from any such taxes you shall provide us with a tax exemption certificate acceptable to the taxing authorities.

3. **DELIVERY; FORCE MAJEURE**: Dates for the furnishing of Services and/or delivery or shipment of Equipment are approximate only and are subject to change. Quoted lead times are figured from the date of receipt of complete technical data and approved drawings as such may be necessary. We shall not be liable, directly or indirectly, for any delay in delivery or failure to deliver caused by carriers or by labor difficulties, shortages, strikes or stoppages of any sort, or difficulties in obtaining materials from ordinary sources and suppliers. In addition, we shall not be liable for any such delays or for any failure to perform our obligations under an order or contract due to any one or more of the following events, whether foreseeable or not: war, hostilities, military operations, terrorism, riots, disorder, accidents, floods, storms, natural disasters, fires, acts of God, epidemics and/or pandemics (and specifically in relation hereto and notwithstanding anything else stated herein, whether or not outbreak of such epidemic or pandemic has occurred prior to acceptance of this order or execution of a contract for the Services), governmental, judicial or administrative decisions, decrees or orders, embargoes or blockades, or any causes beyond our reasonable control. Unless otherwise specifically agreed in writing by us, in no event shall we be liable for any damages or penalties whatsoever, or however designated, resulting from our failure to perform or delay in performing due to any of the causes specified in this paragraph 3.

4. **SHIPMENT, RISK OF LOSS, TITLE**: All sales are made F.O.B. Alfa Laval shipping point, unless otherwise noted. Duty, brokerage fees, insurance, packing and handling as applicable are not included unless otherwise noted. Our liability for delivery ceases upon making delivery of Equipment to the carrier at the shipping point in good condition. The carrier shall be your agent. Risk of loss shall pass to you upon such delivery. Regardless of the delivery term specified, we shall retain title to the Equipment until final payment thereof has been made.

5. **CREDIT AND PAYMENT**: Payment terms are (30) days net, unless agreed otherwise by us in writing. *Pro rata* payments shall become due with partial shipments. Any discount period which may be granted by us begins on the invoice date and all payments are due 30 days after the invoice date. All payments shall be made without deduction, deferment, set-off, lien or counterclaim of any nature. All amounts due not paid within 30 days after the date such amounts are due and payable shall bear interest at the lesser of 1.5 percent per month or the maximum rate of interest allowed by law. We reserve the right at any time to suspend credit or to change credit terms provided herein, when, in our sole opinion, your financial condition so warrants. Failure to pay invoices when such invoices are due and payable, at our election, shall make all subsequent invoices immediately due and payable irrespective of terms, and we may withhold all subsequent deliveries until the full account is settled. We shall not, in such event, be liable for delay of performance or nonperformance of contract in whole or in part subsequent to such event.

6. **SECURITY AGREEMENT:** You hereby grant us a security interest in the Equipment, including a purchase money security interest, and in such materials, proceeds and accessories thereof, to secure payment of the purchase price of the Equipment. You authorize us to file or record a purchase order or copy thereof or any UCC financing statement showing our interest in the Equipment in all jurisdictions where we may determine filing to be appropriate, and you agree to sign all such documents reasonably related thereto promptly following our request. You will not encumber the Equipment with any mortgage, lien, pledge or other attachment prior to payment in full of the price therefor.

7. **CANCELLATIONS AND CHANGES**: Orders which have been accepted by us are not subject to cancellation or changes in specification except upon prior written agreement by us and upon terms that will indemnify us against all losses resulting from or arising out of such cancellation or change in specifications. In the absence of such indemnification, we shall be entitled to recover all damages and costs of whatever nature permitted by the Uniform Commercial Code.

8. **DEFERRED SHIPMENT**: If shipment is deferred at your request, payment of the contract price shall become due when you are notified that the Equipment is ready for shipment. If you fail to make payment or furnish shipping instructions, we may either extend the time for so doing or cancel the contract. In case of deferred shipment at your request, storage and other reasonable expenses attributable to such delay shall be payable by you.

9. **EQUIPMENT WARRANTY AND REMEDY**:

(a) For new Equipment only, we warrant to you that the Equipment that is the subject of this sale is free from defects in design (provided that we have design responsibility), material and workmanship. The duration of this warranty is twelve (12) months from start-up or eighteen (18) months from delivery to you, whichever occurs first (the "Warranty Period"). If you discover within the Warranty Period a defect in design, material or workmanship, you must promptly notify us in writing. Within a reasonable time after such notification, we shall repair, replace, or, at our option, refund you the price of the defective Equipment or part thereof.

(b) For repairs, parts and Services provided by us, we warrant to you that the repairs, parts and Services we provide to you will be free from defects in material and workmanship. The duration of this warranty is ninety (90) days from as applicable (i) the date the Equipment which required the repairs, parts or Services is returned to you by us, (ii) the date of your receipt of the part, or (iii) the date of completion of the repair or other Services, if performed at your facility. If during this ninety-day period you discover a defect in the repairs, parts or Services you must promptly notify us in writing, and we shall correct such defect with either new or used replacement parts or reperform the Services as applicable. If we are unable to correct the defect after a reasonable number of attempts, we will provide a refund of the price paid for the defective repair, parts or Services.

(c) All warranty service is subject to our prior examination and approval and will be performed by us at your facility or at service centers designated by us. All transportation to and from the designated service center will be at our expense. The remedies set forth above are your exclusive remedies for breach of warranty. Unless otherwise agreed in writing by us, our warranty extends only to you and is not assignable to or assumable by any subsequent purchaser, in whole or in part, and any such attempted transfer shall render all warranties provided hereunder null and void and of no further force or effect.

(d) The warranties set forth above are inapplicable to and exclude any product, components or parts not manufactured by us or covered by the warranty of another manufacturer. We shall have no responsibility for defects, loss or damage to the extent caused by (i) normal wear and tear, (ii) your failure to follow all installation and operation instructions or manuals or to provide normal maintenance, (iii) repairs or modifications by you or by others not under our direct supervision, or (iv) a product or component part which we did not design, manufacture, supply or repair.

(e) **DISCLAIMER OF IMPLIED WARRANTIES**. THE WARRANTIES SET FORTH ABOVE AND IN SECTION 12 BELOW ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

10. **LIMITATION OF LIABILITY**: In no event shall we be liable, and you hereby waive any claims against us and release us from liability to you, for any indirect, special, punitive, incidental, or consequential damages whatsoever based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory. In no circumstance, shall we be liable for, however such damages are characterized, loss of profits, loss of savings or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of any substitute Equipment, facilities or services, downtime, or loss of prospective economic advantage. OUR AGGREGATE LIABILITY FOR FAILURE TO PERFORM, BREACH OF WARRANTY OR BREACH OF OTHER CONTRACTUAL OBLIGATIONS SHALL NOT EXCEED THE TOTAL PRICE PAID TO US FOR THE EQUIPMENT AND SERVICES THAT ARE THE SUBJECT OF ANY CLAIM BY YOU.

11. **OWNERSHIP:** All drawings, designs, specifications, data and other proprietary rights supplied by us (including without limitation in connection with the Equipment) have been prepared or assembled by us and are (and shall remain) exclusively our property, and upon our request you agree to execute any additional documents needed to give effect to the foregoing. Such drawings, designs and specifications have been furnished in order to provide full documentation and on the condition that they shall not be disclosed, reproduced or copied in any manner whatsoever, in whole or in part, except for your internal use as necessary, and upon the further condition that, as our sole property, they shall not be used for furnishing information and/or disclosed, in whole or in part, to others or otherwise for any purpose not specifically authorized in a writing signed by one of our corporate officers.

12. **PATENT INFRINGEMENT**

(a) We make no express or implied warranties of non-infringement with respect to the Equipment. We will, however, defend, indemnify and hold you harmless from any third party apparatus claims based upon an issued U.S. patent to the extent such claim relates to the Equipment supplied and sold to you; provided, however, that we undertake no indemnification in respect of third-party rights (i) where the alleged patent infringement is based upon or related to any method, process or design claims in third-party U.S. patents, any combination of the Equipment with other equipment not supplied by us, or any modifications of the Equipment made by you and not approved by us, or (ii) to the extent the alleged infringement is directly attributable to the negligence or intentional misconduct of you or otherwise for which you are obligated to indemnify us for under paragraph 12(c).

(b) We shall assume defense of a claim at our expense in accordance with these Terms and Conditions, provided you shall notify us within 30 days of your receipt of notice of an alleged third-party claim that you believe would entitle you to patent infringement indemnification pursuant to paragraph 12(a). You acknowledge and agree that we shall have the sole right to settle or otherwise compromise such a third-party claim, including but not limited to the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment.

(c) If a third party charges us with patent infringement relating to Equipment sold by us to you, we shall have the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment. If a third party charges us with patent infringement on the bases set forth in paragraph 12(a)(i) or (ii), you shall indemnify and hold us harmless for all expenses as well as any awards of damage assessed against us, and, without limiting any of our other rights and remedies available at law or in equity, we shall also have the right to modify or repurchase the Equipment or to secure rights for continued use by way of assignment or license as set forth in this paragraph.

13. **INSPECTION**: Upon prior written notice, you may make reasonable inspections of Equipment at our facility. We reserve the right to determine the reasonableness of the request and to select an appropriate time and location for such inspection. You agree to execute appropriate confidentiality provisions upon our request prior to visiting our facility. All costs of inspection shall be solely determined by us and shall be payable by you. No inspection or expediting by you at the facilities of our suppliers is authorized.

14. **SOFTWARE PROVISIONS**: If software is provided hereunder (whether such is integrated into the Equipment or otherwise operates alongside the same), you are hereby granted a non-exclusive, non-sublicensable, non-transferable, royalty free license to access and use such software as provided and as intended with our Equipment. Without limiting the foregoing, under the foregoing license you may specifically: (i) use our software in machine readable object code only and only with the Equipment provided; (ii) copy our software into any machine readable object code form solely for back up purposes in support of your use of our software on the Equipment provided in accordance with these Terms and Conditions; and (iii) create one additional copy of the software for archival purposes only. This license may only be assigned, sublicensed or otherwise transferred by you with our prior written consent. You hereby recognize and acknowledge that the software provided to you hereunder comprises valuable trade secret and/or copyright property of Alfa Laval (or its licensors) and you covenant that you will take adequate precautions against access to the software by, or disclosure of the software to, anyone not authorized hereunder to use or have access to the software as contemplated herein. The software is subject to the confidentiality obligations set forth below in paragraph 15.

15. **CONFIDENTIALITY:** Subject to any non-disclosure or confidentiality agreement already in effect between us, any drawings, data, software or other information exchanged between us is proprietary or confidential to us and shall not be used or disclosed by you without our prior written consent. Confidential information shall not be any information that (i) is known previously to you under no obligation of secrecy; (ii) becomes known to the public through no breach of an obligation of secrecy by you; or (iii) is independently developed by you without use or reference to any of the confidential information or materials provided to you by us.

16. **INAPPLICABILITY OF CISG:** The parties specifically agree that the United Nations Convention on Contracts for the International Sale of Goods shall not apply to any sale or order or the contract between us.

17. **GOVERNING LAW & VENUE**: These Terms and Conditions and any dispute or claim arising out of or related to an order or the contract between us shall be finally decided in accordance with the laws of the Commonwealth of Virginia, without giving effect to the provisions thereof relating to conflict of laws. You agree that the venue for any such dispute shall lie in the United States District Court for the Eastern District of Virginia, Richmond Division. In the event that federal jurisdiction cannot be established pursuant to 28 U.S.C. §§ 1331 or 1332, the venue for any such dispute shall lie in the Circuit Court of Henrico County, Virginia. You expressly submit and waive any objection to the sole and exclusive jurisdiction of such courts.

18. **GENERAL:** All previous agreements or understandings between us, either oral or written, with regard to the subject order, with the exception of a pre-existing non-disclosure agreement between us, are void and these Terms and Conditions constitute the entire agreement between us with respect to the matters addressed herein. Neither of us shall assign an order or contract to which these Terms and Conditions apply without the prior written consent of the other party, which consent shall not be unreasonably withheld. If any provision of these Terms and Conditions is held to be invalid or unenforceable, such holding shall not affect the validity or enforceability of any other provision herein. No waiver by either of us of any default or breach by the other party will operate as or be deemed a waiver of any subsequent default or breach.

September 1, 2021

To: Leo A. Kucek
Applied Technologies, Inc.
13400 Bishops Lane, Suite 270
Brookfield, WI 53005

Alfa Laval, Inc.
10470 Deer Trail Drive
Houston, TX 77038
USA
Tel: +1 800-362-9041
Fax: +1 281-449-1324

Subject: Johnson Creek, WI
Budget Proposal: Belt Filter Press
Alfa Laval Project Reference: 0108540

Dear Mr. Kucek,

On behalf of Alfa Laval, Inc., and our representative, Drydon Equipment, Inc., we thank you for the opportunity to offer the following budget proposal based on the following process parameters.

Design Year 2043 with lime
2720 lbs/day, 4 hours a day operation
680 lbs/hr
40 gpm

Current Year with lime
2910 lbs/day, 4 hours a day operation
728 lbs/hr
42 gpm

Design Year 2043 without lime
1780 lbs/day, 3 hours per day operation
593 lbs/hr
52 gpm

Current Year without lime
1910 lbs/day, 3 hours per day operation
637 lbs/hr
55 gpm

One (1) Alfa Laval AS-H Belt Press G3 100 (Klampress®), 1.0 Meter Belt Filter Press (BFP), complete with hydraulic system for belt tensioning and steering. All components will be fabricated of the finest in corrosion resistant material: the frame will be carbon steel, hot dipped galvanized, chicane rods and holders shall be carbon steel galvanized, and all sheet metal components will be Type 316L stainless steel.

One (1) Main Control Panel, will be designed based on Alfa Laval's standard specification. It will be powered from a 480 VAC power source, supplied by others. IEC style motor starters will be supplied for the hydraulic pump and washwater pump, with an Allen Bradley PowerFlex style VFD for the belt drive. All other starters / controllers, and 120 VAC power for the polymer system, will be supplied by others.

The BFP Control Panel will be a NEMA 4X Stainless Steel enclosure. The controls for the BFP and ancillary equipment will be either manually or automatically controlled. START/STOP pushbuttons with RUNNING status lights will be provided for control of the washwater pump/valve, hydraulic pump, belt drive, conveyor, sludge pump, and polymer pump.

Speed control and speed/flow indication will be provided for the belt drive, the sludge pump, and the polymer pump.

Operator interface will be accomplished using Allen Bradley, Type 800H pilot devices. All logic will be performed via an Allen Bradley MicroLogix 1400 programmable logic controller (PLC), with Ethernet network communication capabilities.

One (1) Inline, Non-clog, Variable Orifice Mixer, complete with an injection manifold system and a four port vortex polymer injection ring.

(1) Lot Spare Parts, which shall be provided as follows:
One set of filter belts
Two sets of doctor blades
Two sets of rubber seals for the gravity zone & washbox
One set of bearings of each size used

(1) Lot Field service, one service technician shall be supplied as follows:
One trip and four days for installation inspection and start up
One trip and two days for training
One trip and two days for performance testing

Also included in the pricing:
- Operation and Maintenance Manuals
- Submittals with drawings

Not included in pricing are the following:
- Interconnecting piping and wiring between Alfa Laval ASH equipment and other ancillary equipment
- Equipment installation
- Polymer and Lab services for the performance test and start up (unless noted otherwise)
- Local motor disconnect devices and / or local motor lockouts.
- Freight to jobsite
- Offloading at jobsite
- Storage and Handling charges
- Taxes, fees, port charges, etc.

BUDGET PRICE FOR ONE (1) 1.0 METER ALFA LAVAL AS-H BFP (KP): $275,500.00

WASH WATER REQUIREMENTS:
- 40 GPM at minimum of 85 PSI at the BFP

POWER REQUIREMENTS:
- 1.5 HP BELT DRIVE UNIT, 1 HP HYDRAULIC UNIT

Johnson Creek, WI
Project Reference: 0108540
September 1, 2021

NOTES OF CLARIFICATION:

1. Warranty covers defects in materials and workmanship for twelve (12) months after startup or beneficial use or eighteen (18) months after shipment whichever comes sooner. Alfa Laval reserves the right to review operating and maintenance records to ensure compliance.

2. Any additional service time resulting from non-warranty delays will be charged in accordance with the field service rate schedule in effect at the time of service.

3. The process performance (cake solids, loading, hydraulic throughput, etc.) achieved by the belt filter press can be guaranteed after confirmation of the quality of the feed sludge through the analysis of a representative sample.

4. Installing contractor is responsible for maintaining all relevant electrical codes.

5. Anything not explicitly stated in this proposal is not included.

6. This is a budgetary quotation and it should not be considered binding.

7. Given the current volatility in steel prices over the past twelve months, Alfa Laval has made this offer based upon pricing at the time of this budget quote.

8. In the event that delivery of equipment cannot be made on the scheduled delivery date agreed upon between Alfa Laval and Purchaser and as evidenced by the terms of the contract, due to Purchaser delay, Alfa Laval reserves the right to assess reasonable escalation charges to the project at the rate of 1% per month of the contract value for material price escalation for each month that the project is delayed.

9. Given the current volatility in steel prices over the past twelve months, Alfa Laval has made this offer based upon shipment of the offered products at the time of this proposal. Should the projected shipment schedule fall outside this period for any reason, pricing shall be subject to review and revision.

If you have any questions or require any additional information, please our local representative, Tom Dennis with Drydon Equipment, Inc. at 414-322-1567 or contact me at 317-345-5512.

Sincerely,
Chuck Shaw
Account Manager
Water Separation Sales

Cc: Tom Dennis - Drydon Equipment, Inc.

Johnson Creek, WI
Project Reference: 0108540
September 1, 2021

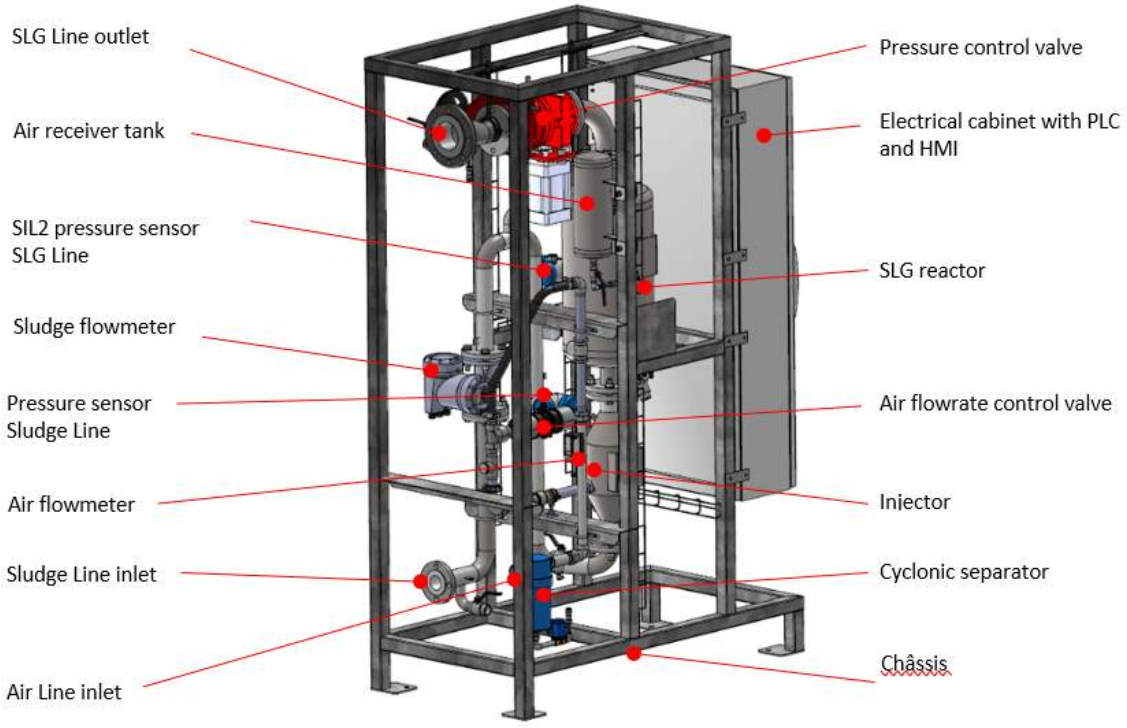
SLG® Technology

Added value for new Alfa Laval Belt Presses and Rebuilds done by Alfa Laval

The SLG® Solution is a proprietary and patented technology designed and built by Orege for the enhancement of existing sludge dewatering operations using new Alfa Laval belt presses and also with rebuilds performed by Alfa Laval on existing belt presses. SLG® Solutions increase cake dryness, improve filtrate quality, and enhance odor/ corrosive gas control. Additional SLG® benefits may also include reduced polymer usage and increased throughput. The SLG® Solution is unique in that it transforms with only compressed air, the physical and microbiological characteristics of the sludge, creating an emulsified air/sludge mixture before it enters the dewatering/ thickening device. This emulsified SLG® sludge often requires a re-evaluation and re-optimization of the existing dewatering/ thickening program to achieve the best results from the transformed emulsion.

SLG® Solution Scope

- SLG® skid
- Air compressor skid
- HMI panel
- Deaerator
- Equipment installation (described below)
- Commissioning start-up, operator training
- One (1) year of Optimization Services
- Operations and Maintenance documentation



General overview of SLG skid

The SLG® Solution scope excludes polymer unit (if required), shipping, or any required process changes to the sludge line identified during the installation.

Orege Turnkey Installation Scope if requested:

The turnkey installation includes placement and connection of the SLG® Solution to existing utilities, connection to new or existing sludge piping and polymer feed system.
The Customer will be responsible for any required regulatory permitting, providing adequate site utilities within 5 feet of the SLG® installation location, structural and/or site improvements, instrumentation and control improvements, and/or programming of control systems.

SLG® Performance

Project completion will be determined by successfully meeting the predetermined performance criteria which is to demonstrate an average increase in cake solids from the belt filter press greater than or equal to 2.0% DS.

SLG® Solution Optimization Services by Orege (after 1st year) – Optional Adder

Orege is vested in the successful operations of our customers' plants. To that end, Orege offers Optimization and Support Services to the Customer with renewal options available annually. This optional service will be performed by qualified Orege personnel and Alfa Laval can help you contact Orege directly if this option is elected.
Please contact us for more information and if you require a proposal.

Johnson Creek, WI
Project Reference: 0108540
September 1, 2021

TERMS AND CONDITIONS OF SALE

These Terms and Conditions of Sale ("Terms and Conditions") apply to all quotations, orders, and contracts for Alfa Laval Inc. products (hereafter "Equipment") and associated services ("Services") As used in these Terms and Conditions, the word "Equipment" includes all hardware, parts, components, software and options.

1. **ACCEPTANCE**: Our sale to you is limited to and expressly made conditional on your assent to these Terms and Conditions and, if applicable, on the attendant quotation, both of which form a part of the contract between us and which supersede and reject all prior agreements, representations, discussions or negotiations, whether written or oral, with respect to this sale and any conflicting terms and conditions of yours, whether or not signed by you. Any terms and conditions contained in your purchase order or request for quotation or other form which are different from, in addition to, or vary from these Terms and Conditions are expressly rejected, shall not be binding upon us, and are void and of no force or effect. These Terms and Conditions may not be changed except by the written agreement of both parties.

2. **PRICES**: Unless otherwise specified in writing, all quoted prices are in U.S. Dollars and are firm for thirty (30) days from the date of offer. Prices quoted are exclusive of taxes, freight and insurance, and you agree to pay any and all sales, revenue, excise or other taxes (exclusive of taxes based on our net income) applicable to the purchase of Equipment. If you claim an exemption from any such taxes you shall provide us with a tax exemption certificate acceptable to the taxing authorities.

3. **DELIVERY; FORCE MAJEURE**: Dates for the furnishing of Services and/or delivery or shipment of Equipment are approximate only and are subject to change. Quoted lead times are figured from the date of receipt of complete technical data and approved drawings as such may be necessary. We shall not be liable, directly or indirectly, for any delay in delivery or failure to deliver caused by carriers or by labor difficulties, shortages, strikes or stoppages of any sort, or difficulties in obtaining materials from ordinary sources and suppliers. In addition, we shall not be liable for any such delays or for any failure to perform our obligations under an order or contract due to any one or more of the following events, whether foreseeable or not: war, hostilities, military operations, terrorism, riots, disorder, accidents, floods, storms, natural disasters, fires, acts of God, epidemics and/or pandemics (and specifically in relation hereto and notwithstanding anything else stated herein, whether or not outbreak of such epidemic or pandemic has occurred prior to acceptance of this order or execution of a contract for the Services), governmental, judicial or administrative decisions, decrees or orders, embargoes or blockades, or any causes beyond our reasonable control. Unless otherwise specifically agreed in writing by us, in no event shall we be liable for any damages or penalties whatsoever, or however designated, resulting from our failure to perform or delay in performing due to any of the causes specified in this paragraph 3.

4. **SHIPMENT, RISK OF LOSS, TITLE**: All sales are made F.O.B. Alfa Laval shipping point, unless otherwise noted. Duty, brokerage fees, insurance, packing and handling as applicable are not included unless otherwise noted. Our liability for delivery ceases upon making delivery of Equipment to the carrier at the shipping point in good condition. The carrier shall be your agent. Risk of loss shall pass to you upon such delivery. Regardless of the delivery term specified, we shall retain title to the Equipment until final payment thereof has been made.

5. **CREDIT AND PAYMENT**: Payment terms are (30) days net, unless agreed otherwise by us in writing. *Pro rata* payments shall become due with partial shipments. Any discount period which may be granted by us begins on the invoice date and all payments are due 30 days after the invoice date. All payments shall be made without deduction, deferment, set-off, lien or counterclaim of any nature. All amounts due not paid within 30 days after the date such amounts are due and payable shall bear interest at the lesser of 1.5 percent per month or the maximum rate of interest allowed by law. We reserve the right at any time to suspend credit or to change credit terms provided herein, when, in our sole opinion, your financial condition so warrants. Failure to pay invoices when such invoices are due and payable, at our election, shall make all subsequent invoices immediately due and payable irrespective of terms, and we may withhold all subsequent deliveries until the full account is settled. We shall not, in such event, be liable for delay of performance or nonperformance of contract in whole or in part subsequent to such event.

6. **SECURITY AGREEMENT:** You hereby grant us a security interest in the Equipment, including a purchase money security interest, and in such materials, proceeds and accessories thereof, to secure payment of the purchase price of the Equipment. You authorize us to file or record a purchase order or copy thereof or any UCC financing statement showing our interest in the Equipment in all jurisdictions where we may determine filing to be appropriate, and you agree to sign all such documents reasonably related thereto promptly following our request. You will not encumber the Equipment with any mortgage, lien, pledge or other attachment prior to payment in full of the price therefor.

7. **CANCELLATIONS AND CHANGES**: Orders which have been accepted by us are not subject to cancellation or changes in specification except upon prior written agreement by us and upon terms that will indemnify us against all losses resulting from or arising out of such cancellation or change in specifications. In the absence of such indemnification, we shall be entitled to recover all damages and costs of whatever nature permitted by the Uniform Commercial Code.

8. **DEFERRED SHIPMENT**: If shipment is deferred at your request, payment of the contract price shall become due when you are notified that the Equipment is ready for shipment. If you fail to make payment or furnish shipping instructions, we may either extend the time for so doing or cancel the contract. In case of deferred shipment at your request, storage and other reasonable expenses attributable to such delay shall be payable by you.

9. **EQUIPMENT WARRANTY AND REMEDY**:

(a) For new Equipment only, we warrant to you that the Equipment that is the subject of this sale is free from defects in design (provided that we have design responsibility), material and workmanship. The duration of this warranty is twelve (12) months from start-up or eighteen (18) months from delivery to you, whichever occurs first (the "Warranty Period"). If you discover within the Warranty Period a defect in design, material or workmanship, you must promptly notify us in writing. Within a reasonable time after such notification, we shall repair, replace, or, at our option, refund you the price of the defective Equipment or part thereof.

(b) For repairs, parts and Services provided by us, we warrant to you that the repairs, parts and Services we provide to you will be free from defects in material and workmanship. The duration of this warranty is ninety (90) days from as applicable (i) the date the Equipment which required the repairs, parts or Services is returned to you by us, (ii) the date of your receipt of the part, or (iii) the date of completion of the repair or other Services, if performed at your facility. If during this ninety-day period you discover a defect in the repairs, parts or Services you must promptly notify us in writing, and we shall correct such defect with either new or used replacement parts or reperform the Services as applicable. If we are unable to correct the defect after a reasonable number of attempts, we will provide a refund of the price paid for the defective repair, parts or Services.

(c) All warranty service is subject to our prior examination and approval and will be performed by us at your facility or at service centers designated by us. All transportation to and from the designated service center will be at our expense. The remedies set forth above are your exclusive remedies for breach of warranty. Unless otherwise agreed in writing by us, our warranty extends only to you and is not assignable to or assumable by any subsequent purchaser, in whole or in part, and any such attempted transfer shall render all warranties provided hereunder null and void and of no further force or effect.

(d) The warranties set forth above are inapplicable to and exclude any product, components or parts not manufactured by us or covered by the warranty of another manufacturer. We shall have no responsibility for defects, loss or damage to the extent caused by (i) normal wear and tear, (ii) your failure to follow all installation and operation instructions or manuals or to provide normal maintenance, (iii) repairs or modifications by you or by others not under our direct supervision, or (iv) a product or component part which we did not design, manufacture, supply or repair.

(e) **DISCLAIMER OF IMPLIED WARRANTIES**. THE WARRANTIES SET FORTH ABOVE AND IN SECTION 12 BELOW ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

10. **LIMITATION OF LIABILITY**: In no event shall we be liable, and you hereby waive any claims against us and release us from liability to you, for any indirect, special, punitive, incidental, or consequential damages whatsoever based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory. In no circumstance, shall we be liable for, however such damages are characterized, loss of profits, loss of savings or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of any substitute Equipment, facilities or services, downtime, or loss of prospective economic advantage. OUR AGGREGATE LIABILITY FOR FAILURE TO PERFORM, BREACH OF WARRANTY OR BREACH OF OTHER CONTRACTUAL OBLIGATIONS SHALL NOT EXCEED THE TOTAL PRICE PAID TO US FOR THE EQUIPMENT AND SERVICES THAT ARE THE SUBJECT OF ANY CLAIM BY YOU.

11. **OWNERSHIP:** All drawings, designs, specifications, data and other proprietary rights supplied by us (including without limitation in connection with the Equipment) have been prepared or assembled by us and are (and shall remain) exclusively our property, and upon our request you agree to execute any additional documents needed to give effect to the foregoing. Such drawings, designs and specifications have been furnished in order to provide full documentation and on the condition that they shall not be disclosed, reproduced or copied in any manner whatsoever, in whole or in part, except for your internal use as necessary, and upon the further condition that, as our sole property, they shall not be used for furnishing information and/or disclosed, in whole or in part, to others or otherwise for any purpose not specifically authorized in a writing signed by one of our corporate officers.

12. **PATENT INFRINGEMENT**

(a) We make no express or implied warranties of non-infringement with respect to the Equipment. We will, however, defend, indemnify and hold you harmless from any third party apparatus claims based upon an issued U.S. patent to the extent such claim relates to the Equipment supplied and sold to you; provided, however, that we undertake no indemnification in respect of third-party rights (i) where the alleged patent infringement is based upon or related to any method, process or design claims in third-party U.S. patents, any combination of the Equipment with other equipment not supplied by us, or any modifications of the Equipment made by you and not approved by us, or (ii) to the extent the alleged infringement is directly attributable to the negligence or intentional misconduct of you or otherwise for which you are obligated to indemnify us for under paragraph 12(c).

(b) We shall assume defense of a claim at our expense in accordance with these Terms and Conditions, provided you shall notify us within 30 days of your receipt of notice of an alleged third-party claim that you believe would entitle you to patent infringement indemnification pursuant to paragraph 12(a). You acknowledge and agree that we shall have the sole right to settle or otherwise compromise such a third-party claim, including but not limited to the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment.

(c) If a third party charges us with patent infringement relating to Equipment sold by us to you, we shall have the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment. If a third party charges us with patent infringement on the bases set forth in paragraph 12(a)(i) or (ii), you shall indemnify and hold us harmless for all expenses as well as any awards of damage assessed against us, and, without limiting any of our other rights and remedies available at law or in equity, we shall also have the right to modify or repurchase the Equipment or to secure rights for continued use by way of assignment or license as set forth in this paragraph.

13. **INSPECTION**: Upon prior written notice, you may make reasonable inspections of Equipment at our facility. We reserve the right to determine the reasonableness of the request and to select an appropriate time and location for such inspection. You agree to execute appropriate confidentiality provisions upon our request prior to visiting our facility. All costs of inspection shall be solely determined by us and shall be payable by you. No inspection or expediting by you at the facilities of our suppliers is authorized.

14. **SOFTWARE PROVISIONS**: If software is provided hereunder (whether such is integrated into the Equipment or otherwise operates alongside the same), you are hereby granted a non-exclusive, non-sublicensable, non-transferable, royalty free license to access and use such software as provided and as intended with our Equipment. Without limiting the foregoing, under the foregoing license you may specifically: (i) use our software in machine readable object code only and only with the Equipment provided; (ii) copy our software into any machine readable object code form solely for back up purposes in support of your use of our software on the Equipment provided in accordance with these Terms and Conditions; and (iii) create one additional copy of the software for archival purposes only. This license may only be assigned, sublicensed or otherwise transferred by you with our prior written consent. You hereby recognize and acknowledge that the software provided to you hereunder comprises valuable trade secret and/or copyright property of Alfa Laval (or its licensors) and you covenant that you will take adequate precautions against access to the software by, or disclosure of the software to, anyone not authorized hereunder to use or have access to the software as contemplated herein. The software is subject to the confidentiality obligations set forth below in paragraph 15.

15. **CONFIDENTIALITY:** Subject to any non-disclosure or confidentiality agreement already in effect between us, any drawings, data, software or other information exchanged between us is proprietary or confidential to us and shall not be used or disclosed by you without our prior written consent. Confidential information shall not be any information that (i) is known previously to you under no obligation of secrecy; (ii) becomes known to the public through no breach of an obligation of secrecy by you; or (iii) is independently developed by you without use or reference to any of the confidential information or materials provided to you by us.

16. **INAPPLICABILITY OF CISG:** The parties specifically agree that the United Nations Convention on Contracts for the International Sale of Goods shall not apply to any sale or order or the contract between us.

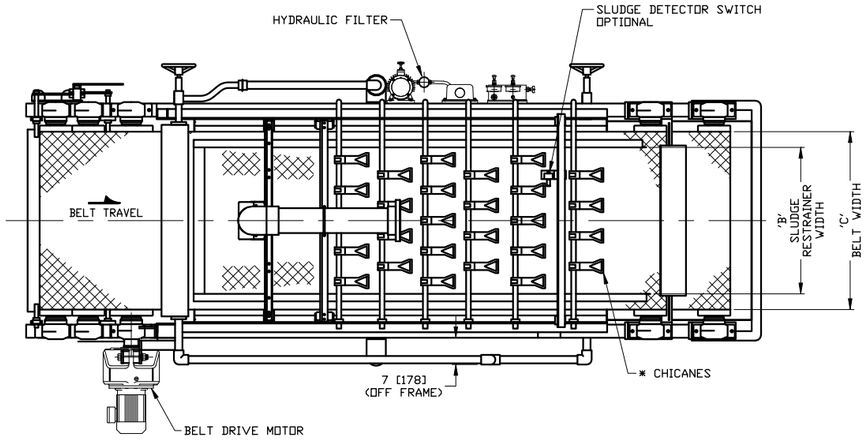
17. **GOVERNING LAW & VENUE**: These Terms and Conditions and any dispute or claim arising out of or related to an order or the contract between us shall be finally decided in accordance with the laws of the Commonwealth of Virginia, without giving effect to the provisions thereof relating to conflict of laws. You agree that the venue for any such dispute shall lie in the United States District Court for the Eastern District of Virginia, Richmond Division. In the event that federal jurisdiction cannot be established pursuant to 28 U.S.C. §§ 1331 or 1332, the venue for any such dispute shall lie in the Circuit Court of Henrico County, Virginia. You expressly submit and waive any objection to the sole and exclusive jurisdiction of such courts.

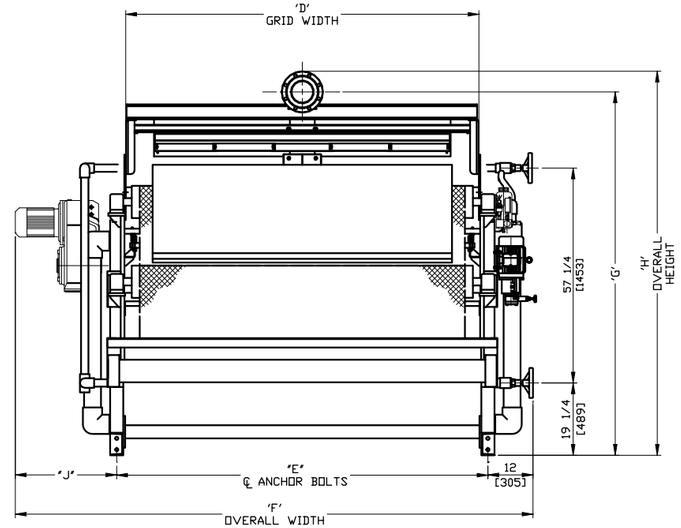
18. **GENERAL:** All previous agreements or understandings between us, either oral or written, with regard to the subject order, with the exception of a pre-existing non-disclosure agreement between us, are void and these Terms and Conditions constitute the entire agreement between us with respect to the matters addressed herein. Neither of us shall assign an order or contract to which these Terms and Conditions apply without the prior written consent of the other party, which consent shall not be unreasonably withheld. If any provision of these Terms and Conditions is held to be invalid or unenforceable, such holding shall not affect the validity or enforceability of any other provision herein. No waiver by either of us of any default or breach by the other party will operate as or be deemed a waiver of any subsequent default or breach.

REV. 7

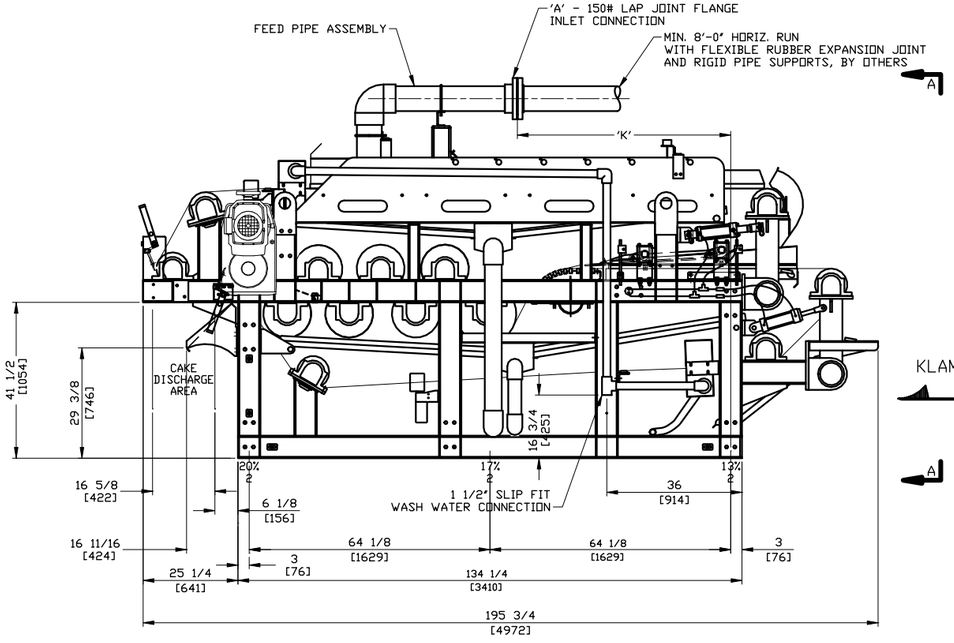
B4MATR7.DWG

KLAMPRESS	'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'J'	'K'	No. OF CHICANES STD/OPT	STATIC WEIGHT	DYNAMIC WEIGHT
1 METER	4'	39" (1000 mm)	47 1/4" (1200 mm)	53 7/8" (1370 mm)	58 7/8" (1495 mm)	93 13/16" (2383 mm)	94 15/16" (2410 mm)	99 7/16" (2525 mm)	22 15/16" (583 mm)	57 7/8" (1470 mm)	15/27	12,300 LBS (5590 kg)	14,028 LBS (6375 kg)
1.5 METER	4'	59" (1500 mm)	67 1/2" (1700 mm)	73 7/8" (1875 mm)	78 7/8" (2003 mm)	115 13/16" (2942 mm)	94 15/16" (2410 mm)	99 7/16" (2525 mm)	24 15/16" (633 mm)	57 7/8" (1470 mm)	21/39	15,500 LBS (7045 kg)	18,092 LBS (8225 kg)
2 METER	6'	79" (2000 mm)	86 5/8" (2200 mm)	93 7/8" (2385 mm)	98 7/8" (2511 mm)	138 15/16" (3529 mm)	96 7/8" (2460 mm)	102 3/8" (2600 mm)	28 1/16" (713 mm)	55 7/8" (1419 mm)	33/51	18,400 LBS (8365 kg)	21,856 LBS (9935 kg)
2.5 METER	6'	98" (2500 mm)	106 1/4" (2700 mm)	115 7/8" (2942 mm)	120 7/8" (3070 mm)	158 5/8" (4030 mm)	96 7/8" (2460 mm)	102 3/8" (2600 mm)	24 15/16" (633 mm)	55 7/8" (1419 mm)	45/63	21,500 LBS (9752 kg)	25,820 LBS (11711 kg)

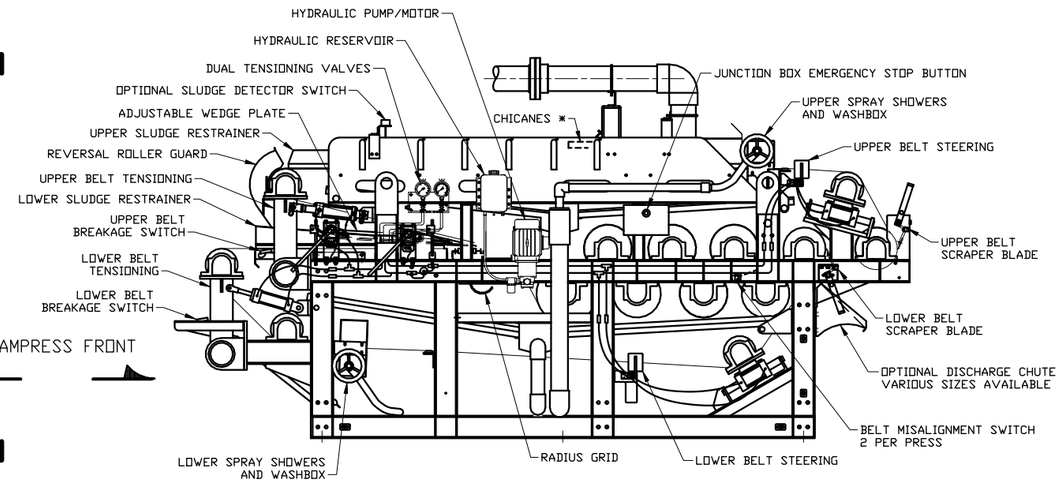




VIEW 'A-A'



KLAMPRESS FRONT



NOTES:
1.) CONTROLS ARE PRE-WIRED AND TERMINATED AT THE JUNCTION BOX
2.) HOLE LOCATION FOR 3/4" DIA. ANCHOR BOLTS AND PERCENT OF WEIGHT DISTRIBUTION

CERTIFIED FOR CONSTRUCTION USE.
DATE: 2 AUG 2002
By J.E.Thompson

TOLERANCE UNLESS NOTED		
	INCHES	MILLIMETERS
FRACTION	+/- 1/32	N/A
X.	+/-0.100	+/-3.0
X.X	+/-0.030	+/-1.0
X.XX	+/-0.015	+/-0.5
X.XXX	+/-0.005	+/-0.1

REVISIONS

REV.	DATE	DESCRIPTION	BY	APP'D
11	8/98	ADDED WEDGE PLATE TO DWG.	JDW	JET
12	10/98	UPDATED TITLE BLOCK TO NEW STYLE.	SAC	JET
13	2/98	REVISED "F" DIM. "K" WAS 25 3/8	JDW	JET
14	1/99	ADDED OPTIONAL DISCHARGE CAKE CHUTE.	JET	JET
15	6/00	CORRECTED CHICANE QUANITIES	DY	JET
16	10/00	COMBINED DWGS WITH IMPERIAL AND METRIC UNITS.	DG	JET
17	2/02	REVISED WITH NEW SCRAPER CONFIGURATION.	ARC	JET
18	6/02	ADD MANUFACTURING NOTE. UPDATE DIM BLOCK.	MM	JET
19	8/02	REVISED MANUFACTURING NOTE. UPDATE DIM BLOCK.	MM	JET
20	2/07	REVISED FEED ASSEMBLY.	MM	JET
21	3/09	ADDED 2.5m DIMENSIONS	MCA	MCA
22				

DRAWN	WOLF	DATE 11/17/94
CHECKED	WOLF	DATE 11/17/94
APPROVED	DY	DATE 11/17/94
NEXT ASS'Y	N/A	WEIGHT SEE TABLE

NOTE:
1)DEBURR ALL SHARP EDGES.
2)MARK WITH PART NUMBER PER WORK OR PURCHASE ORDER

ALFA LAVAL
ASHBROOK SIMON-HARTLEY

ALFA LAVAL ASHBROOK SIMON-HARTLEY INC
11600 East Hardy Road
Houston, Texas 77093
Phone: 281-449-0322
FAX: 281-449-1324

TITLE
GENERAL ARRANGEMENT
KLAMPRESS
8 ROLLER CONFIGURATION

SCALE	DWG. NO.	REV
1/40	SK001154	21

CUSTOMER ASHBROOK

Appendix D – Dewatering and Thermal Treatment Equipment Vendor Proposals

PROPOSAL

TO: **Johnson Creek WWTP**

PROJECT / REF: **Johnson Creek WWTP – Volute Press**

PROPOSAL TYPE: Budget Price and Scope

SPEC. SECTIONS: N/A

DATE: 08 November 2023

PWT #: VDP–WI-21163

REV: 2

SIZING INFORMATION: Sized to dewater 10,600 GPD of 1.5% sludge

MANUFACTURERS REP:
Paul Nygaard
The ICS Group
(920) 676 – 4835
pauln@theicsgrp.com

NOTES:

REVISION NOTES:
1- August Sizing
2- November Sizing

PREPARED BY: Chris Hubbard | Joseph Collar

PROPOSAL CONTENT

- Scope of supply summary
- Scope Details
- Exceptions and Exclusions
- Governing Conditions and Warranty Notes
- Price
- Data Sheets
- GA Drawings
- PWTech Terms and Conditions and Warranty

*Volute is registered with the U.S. Patent and Trademark Office as a registered trademark of AMCON

SCOPE OF SUPPLY

Line	Qty.	Item	Manufacturer / Model / Description
1	1	Volute* Dewatering Press	PWTech - ES-202
2	1	Polymer Preparation System	VeloDyne - VeloBlend VM-1P-120-X0D
3	1	Influent Sludge flowmeter	Rosemount™ Model 8750W with 1” ANSI Flanges
4	1	Control System for Item 1-3	PWTech
5		Documentation	Submittals, O&M manuals, Startup Report
6		Field services	Installation inspection, Commissioning, Testing and operator training
7		Delivery to site	

*Volute is registered with the U.S. Patent and Trademark Office as a registered trademark of AMCON, Inc., Yokohama, Japan

SCOPE DETAILS

1. Volute Dewatering Press - PWTech Model ES-202

Design

- The unit to be supplied will be an ES-202 with a MAXIMUM capacity of 28 GPM of thin sludge (<1%) or 160 dry pounds per hour for heavier sludge (>3%)

Components

- The Dewatering Press consists of:
  - Flash mixing tank including mixer with gear motor.
  - Flocculation tank including mixer with gear motor.
  - Two (2) x 200 Series Dewatering Drum with a drive motor.
  - Filtrate collection pan and support frame.
  - Integrated, pre-wired control panel for the unit and appurtenances mounted on the flocculation tank. (may be provided mounted separately if requested).
- Connections are:
  - Inlet: DN 2” FNPT
  - Filtrate outlet: DN 4" ANSI B16.5 Class 150 Flanged
  - Drain: DN 2” ANSI B16.5 Class 150
  - Washwater Water inlet: ¾” FNPT

Materials and Construction

- The unit is all stainless steel. No carbon steel is used in the manufacture of the press.
- Unit is manufactured and assembled in the USA. All components are sourced from the USA or Japan.
- Electrical components are manufactured and tested prior to shipment to site in the United States.
- Gear Drives are Nissei GTR gear motors utilizing heloid gear reduction. They are one piece construction and are sealed for life.

Supplied spare parts

- No spare parts are included in this scope.

Additional Press information is appended to this scope.

2. Polymer Preparation unit – Velodyne Model VM-1P-120-X0D

Design

- Polymer Flow Range: 0.05 to 1 GPH
- Dilution Water Flow: 12 to 120 GPH

Components

- Polymer Mixing Chamber:
  - VeloBlend VM - Staged Hydro-Mechanical
  - ½ HP, 230/460 VAC, 1750 RPM, Inverter ready Mixer motor
  - Mechanical Mixer Shaft Seal with seal flushing assembly
  - VeloCheck™ Neat Polymer Check Valve with Quick Release Pin
  - Pressure Rating of 100 psi with Pressure Relief Valve

- Neat Polymer Delivery Assembly
  - A 2.5 GPH stainless steel & Viton progressive cavity metering pump shall be provided
  - ½ HP, 1750 RPM, 230/460 VAC, Inverter ready with gear reducer
  - Thermal type loss of polymer flow sensor
  - Metering pump calibration assembly with isolation valves: (500 ml)
- Dilution Water Inlet and Solution Outlet Assembly
  - Primary 12-120 GPH rotameter controlled dilution water flow
  - Low differential pressure alarm switch
  - 0-160 psi inlet water pressure gauge (stainless steel, liquid filled)
  - Swing type PVC and Viton check valve
- Electrical Junction Box
  - All electrical components are pre-wired to an FRP junction box
  - A marked terminal strip is provided for landing all wiring for connection to the Volute Press Panel

Materials and Construction

- Mixing Chamber is Stainless Steel body and impeller with clear polycarbonate cover.
- Plumbing is Schedule 80 PVC
- Frame and fasteners are 304 stainless steel. Frame is open design for access to all components and is designed for bolt-down installation.

3. Magnetic flowmeter, 1” Rosemount™ Model 8750W

Design

- 1” Flowmeter is designed for accurate measurement of flows between 3 - 50 GPM
- Suitable for direct burial and constant flooding (IP 68).
- Includes Compact mounting of transmitter on the flowmeter body
- Flowmeter out-puts analogue signal (4-20 mA) to Volute Press Control panel

Components

- 1 inch ANSI 150# flange connections.
- Includes grounding rings

Materials and Construction

- Coated Carbon Steel construction with a polyurethane, ceramic, neoprene, or Teflon liner as required by the application.
- All metallic wetted parts are stainless steel type 316

4. Electrical and Control

The Volute* unit is supplied with a pre-mounted, pre-wired control panel designed to control all aspects of the thickening/dewatering operation unless otherwise specified and noted.

- Control panel is:
  - Fed by a single 208, 240, or 480VAC, 3-phase, 60 Hz, power supply (client specified)
  - NEMA 4X rated manufactured in Stainless Steel type 304
  - Manufactured in a UL accredited facility and is UL listed
- Panel includes HMI and PLC control modules.
  - PLC/HMI is a single Unitronics Unistream 10.4 unit.
- All manual switching operations are undertaken via switches on the HMI

- Unit includes complete control system for unit and ancillary equipment including operation of the polymer preparation system.
- Control system may utilize a system flow meter and PID loop to allow operator to set the system flow.
- Control panel includes system running and system fault outputs to plant PLC and the ability to connect via Ethernet to external controls.
- A junction box on the polymer preparation skid is pre-wired to the polymer preparation components and designed for easy on-site connection to the main Volute* system control panel.
- Junction box is NEMA 4X FRP and includes numbered terminal block & wires with terminal block legend.

5. Documentation:

Scope includes:

- Submittals (hard copy and electronic) and
- O&M Manuals (hard copy and electronic).
- Startup Report
- PLC/HMI Program (electronic copy) – does not include programming software

6. Field Services:

Scope includes the following start-up services -

- On-site start-up and training services for:
  - One (1) trip consisting of four (4) consecutive days (8 hours per day, Monday-Friday) by a PWT field service engineer and/or qualified manufacturer's representative
- Services include:
  - Installation inspection
  - Commissioning of Volute* unit and Controls
  - Start-up of Ancillary equipment included in this Scope
  - Functional testing and calibration of equipment
  - Training on all equipment
- Phone consultation regarding installation will also be provided.
- Should additional services be deemed necessary by the PURCHASER, the additional services can be procured from PWT on a per diem basis. The current rate is $1000 per day plus travel.

7. Delivery and Freight

- Submittals issued approximately six (6) weeks from receipt of written Purchase Order
- Delivery is approx. twenty (20) weeks from receipt of written acceptance of Submittal documents [x]
- Deliver to site for all components **is INCLUDED in the price**.

[x] **PLEASE NOTE:** While seller believes this estimated delivery time to be a valid and realistic estimate, due to the unpredictable nature of current parts shortages, this does not constitute any form of guarantee regarding the delivery schedule.

EXCLUSIONS AND EXCEPTIONS:

The Following items are specifically excluded from this scope unless specifically noted otherwise:

- Taxes, permits, and bonding
- Any civil works including, but not limited to, any building works, construction of suitable foundations, and access structures.
- Installation including, but not limited to, mechanical, plumbing, and electrical hook-ups
- Unloading of delivered equipment on site and storage
- PLC/HMI Programming software unless specified elsewhere.

GOVERNING TERMS AND CONDITIONS AND WARRANTY

This scope is subject to Process Wastewater Technologies, LLC. Standard Terms and Conditions and Standard Warranty as attached. The following items are specific to this project:

Payment Terms:

Payment terms for this scope are as per the table below:

Trigger	Amount		Terms			Condition
Submittals	**20**	%	due NET	30	days	On Approval of Submittals
Delivery	**70**	%	due NET	30	days	On shipping, or the offer to ship
O&M	**5**	%	due NET	30	days	On Delivery of final O&M Manuals
Startup	**5**	%	due NET	30	days	On Completion of startup and any other services provided under this scope.

Validity

Validity of this proposal is strictly 30 days. Written authorization from seller is required to extend this.

Warranty

PWTech warrants that the Products shall be free from defects in material and workmanship for the shorter period of: (i) twelve (12) months from the date of start-up; (ii) the warranty period for the third party good or service embodied in the Product; or (iii) eighteen (18) months from the delivery of the specified Product.

PRICE

Total price for the ES-202 and appurtenances as per this scope: **$288,000.00**

Volute Dewatering Press Specification Sheet - ES-202

Please note - All information here is generic and for preliminary reference only. Detailed dimensions, and other data is very project specific and this sheet has not been altered to reflect that. Project specific data would be available from PWTech at the appropriate time.

General Data	**Model Information**	Over All Dimensions:		106"(L) x 41"(W) x 74"(H)
		Optimal Space requirement of installation:		169" x 100" (L x W)
		Minimum Opening dimensions for installation:		40" x 60"
		Weight	Empty:	1496 lbs
			Operating:	2491 lbs
		MAX Solids throughput (Solids >3%):		160 Dry pounds per hour
		MAX Hydraulic throughput (Solids <1%):		28 GPM
		Power use:		2.3 HP
		Washwater use:		16 GPM intermittent, 24 GPH total

Dewatering Drum	**General**	Dimension2:		8" diameter x 45" long
		Quantity:		2
		Material:	Thickening Zone Rings:	Poly Carbonate Resin
			Dewatering Zone Rings:	Type 304 Stainless Steel
			Screw:	304 Stainless Steel with CoCr coating
	Drive info	Gear Motor Supplier:		Nissei Corporation
		Model:		FSW-45-600-T020 WEX
		Motor Power:		0.2 kW (0.27HP) 4-Pole
		Insulation:		TEFC / IP65
		Gear Reduction:		600 : 1

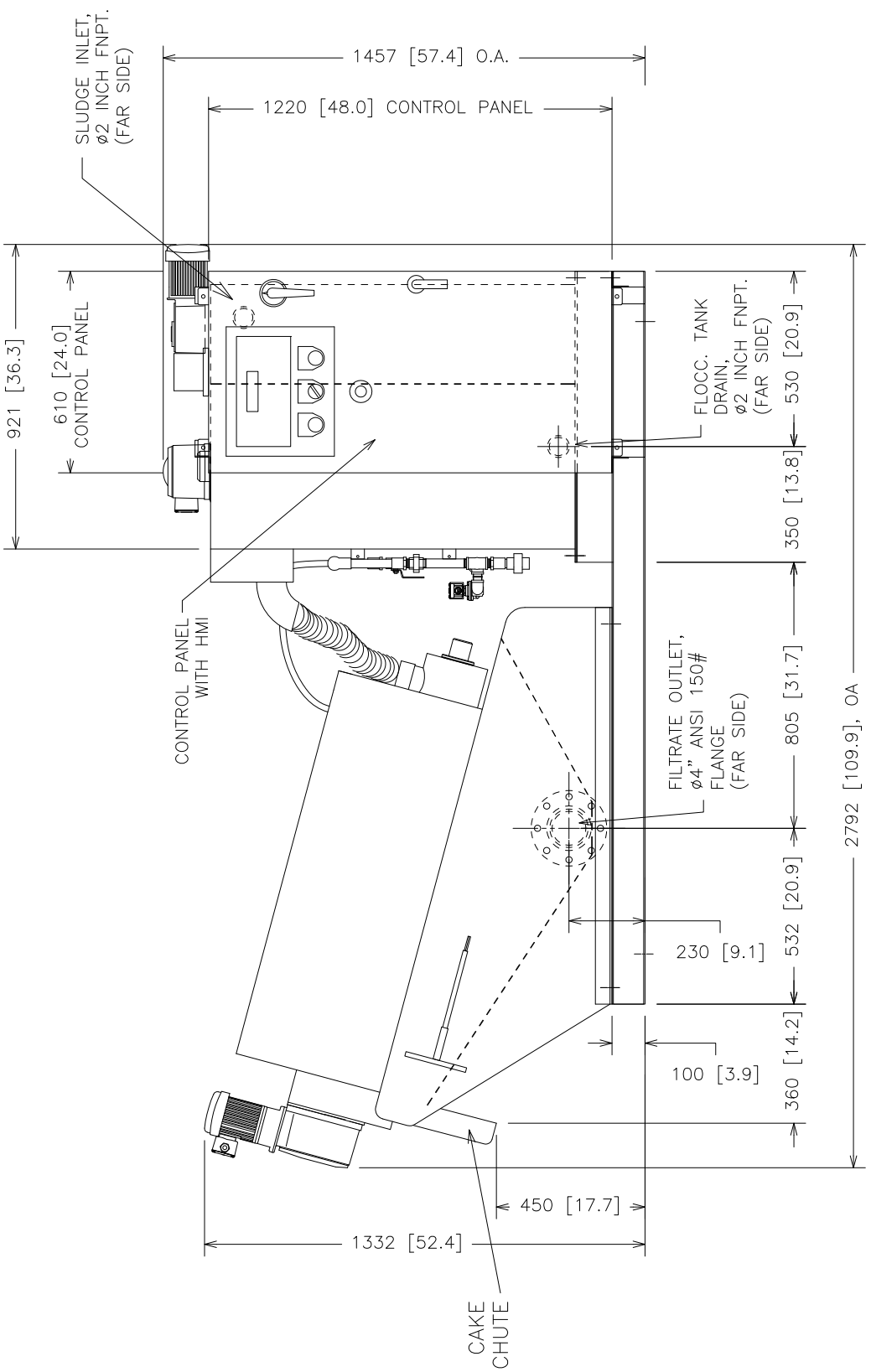
Flash mixing tanks	**General**	Dimensions:		12" x 20" x 39" (L x W x H)
		Volume		39.6 Gallons
		Working Volume:		34.1 Gallons
		Material		Type 304 Stainless Steel
	Drive Info	Gear Motor Supplier:		Nissei Corporation
		Model:		FSW-30-10-T020 WEX
		Motor Power:		0.2 kW 4-Pole
		Motor Insulation:		TEFC / IP65
		Gear Reduction:		10 : 1

Flocculation tank	**General**	Dimensions:	20" x 20" x 39" (L x W x H)
		Volume	66.1 Gallons
		Working Volume:	56.8 Gallons
		Material	Type 304 Stainless Steel
	Drive Info	Gear Motor Supplier:	Nissei Corporation
		Model:	FSW-35-60-T040 WE
		Motor Power:	0.4 kW (0.54HP) 4-Pole
		Motor Insulation:	TEFC / IP65
		Gear Reduction:	60 : 1

Electrical	**General**	Supply Voltage:	208/240/460/480 VAC
		Service:	3-Phase, 3-Wire (No Neutral)
		Control Voltage:	Dual - 24VDC & 115VAC
		Minimum Required Breaker Size:*	15 Amps * 480 VAC
	Panel	Panel Size:	24"(w) x 48"(h) x 8"(d)
		Panel Material:	Type 304 Stainless Steel
		Panel Rating:	Nema 4X
		Control Module:	Unitronics Vision 700 PLC

Polymer System	Supplier:	Velocity Dynamics, Inc.
	Model:	VM-1P-120-X0D
	Mixing Type:	Variable - Mechanical & Hydraulic
	Feed Pump Type:	Progressive Cavity
	Polymer Feed Capacity:	0.05 - 1 Gallons per hour
	Water Use:	12 - 120 Gallons per hour
	Dimensions:	24" x 34" x 42" (L x W x H)
	Weight:	~200 lbs

Connections	Feed Sludge:	2" FNPT Coupling
	Filtrate:	4" ANSI 150# Flange
	Drain:	2" FNPT Coupling
	Water:	3/4" FNPT Coupling
	Polymer Water Inlet:	1" FNPT
	Polymer Solutions Outlet.	1" FNPT
	Raw Polymer Feed Inlet:	1" FNPT



**ALL METAL COMPONENTS ARE STAINLESS STEEL

SIDE ELEVATION VIEW

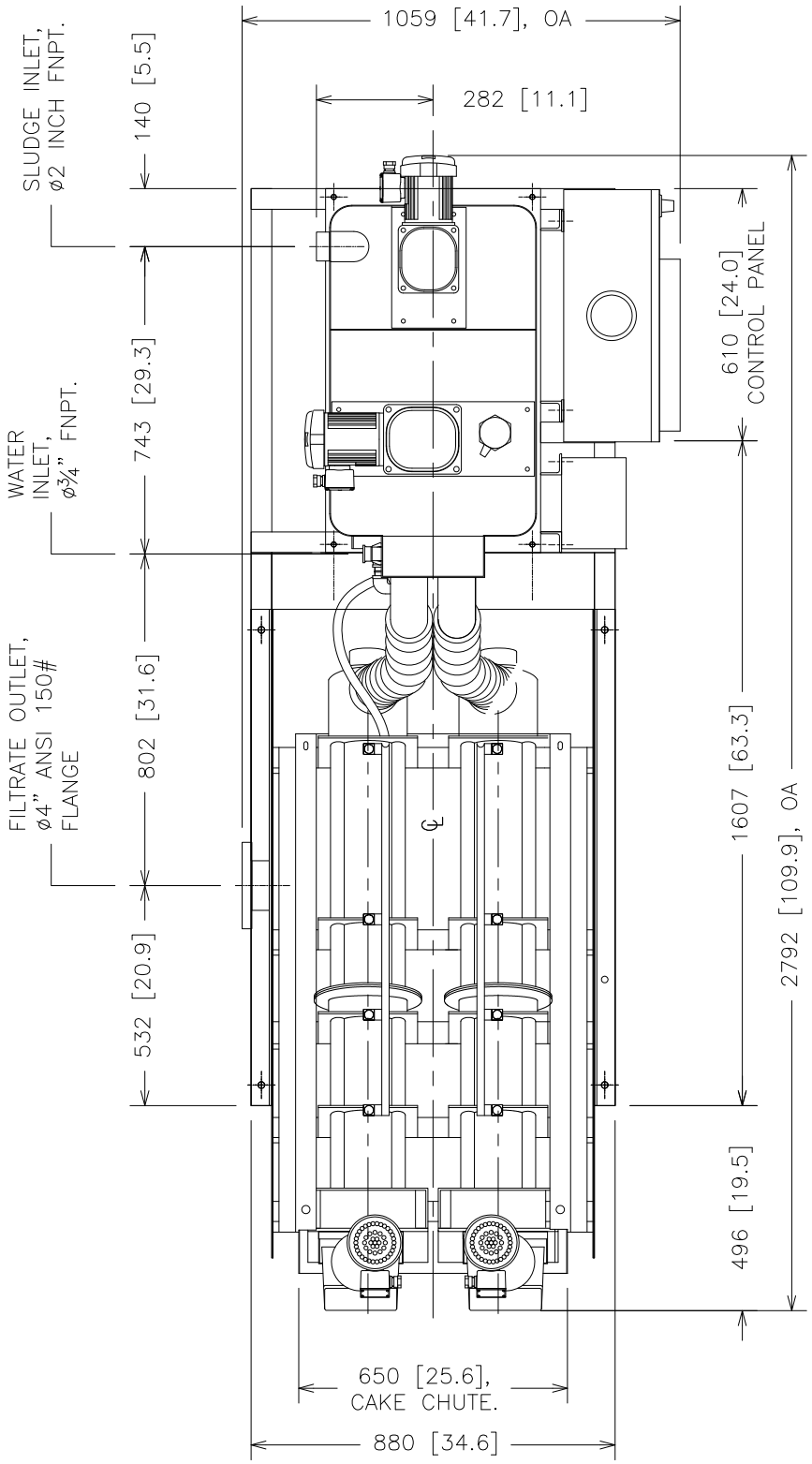
DIMENSIONS: MM [INCHES]

PWTech
PROCESS WASTEWATER TECHNOLOGIES

VOLUTE DEWATERING PRESS ES202 GA ELEVATION

JOB# PWT VDP ES202 GA	SCALE NTS
DATE JUNE, 2017	
DRAWN PWTech Inc.	SHEET 1 OF 4
APPROV. ALEX DAVEY	

9004 YELLOW BRICK ROAD, SUITE D, ROSEDALE, MD 21237 PHONE: 410 238 7977 WEB: www.PWTech.us



PLAN VIEW

**ALL METAL COMPONENTS ARE STAINLESS STEEL

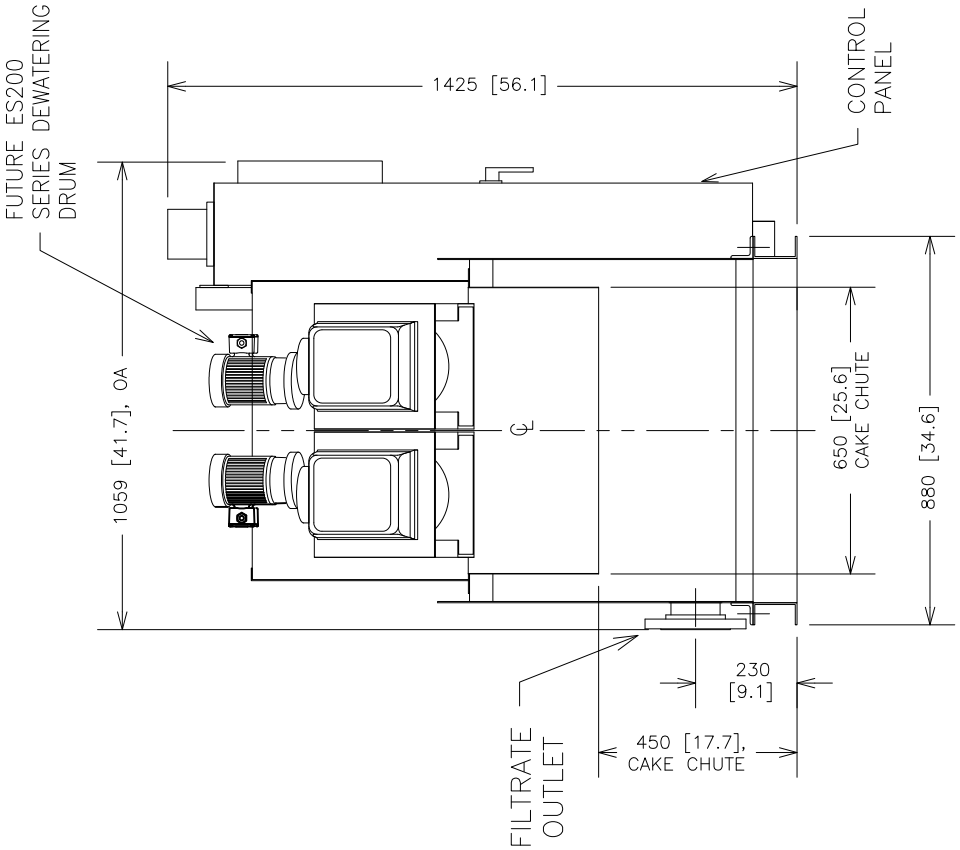
DIMENSIONS: MM [INCHES]

PWTech
PROCESS WASTEWATER TECHNOLOGIES

VOLUTE DEWATERING PRESS ES202 GA PLAN

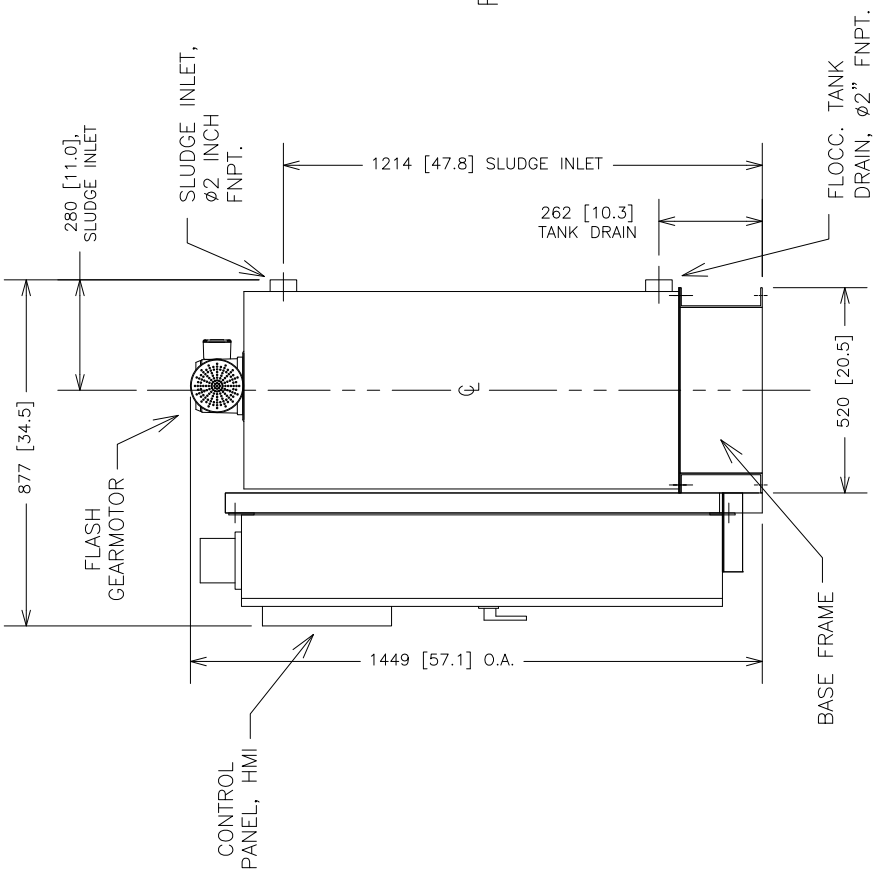
JOB# PWT VDP ES202 GA	SCALE NTS
DATE JUNE, 2017	
DRAWN PWTech Inc.	SHEET 2 OF 4
APPROV. ALEX DAVEY	

9004 YELLOW BRICK ROAD, SUITE D, ROSEDALE, MD 21237 PHONE: 410 238 7977 WEB: www.PWTech.us



PRESS END ELEVATION

**ALL METAL COMPONENTS ARE STAINLESS STEEL



TANK END ELEVATION

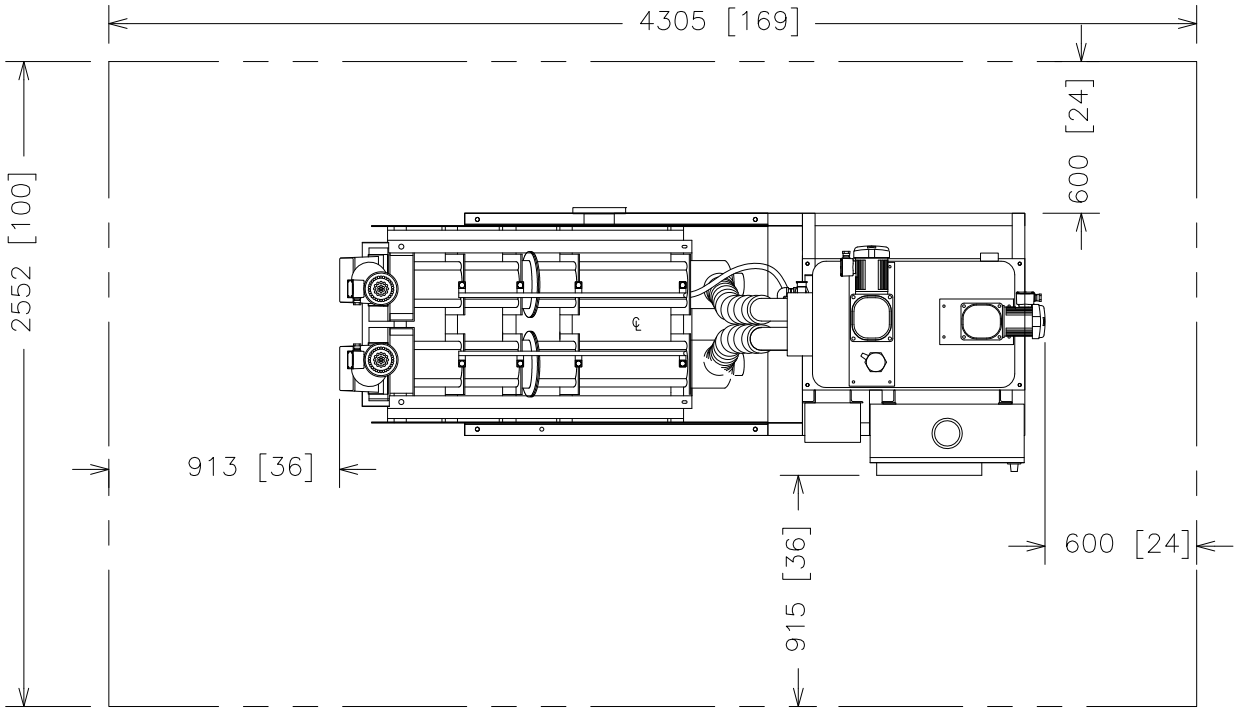
DIMENSIONS: MM [INCHES]

PWTech
PROCESS WASTEWATER TECHNOLOGIES

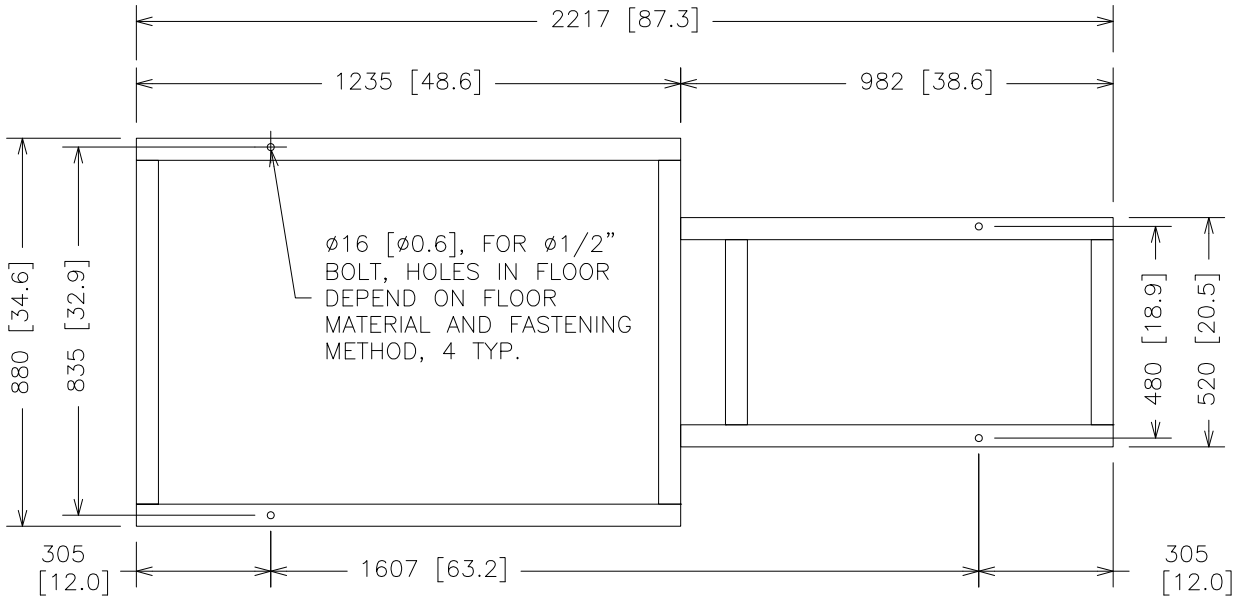
VOLUTE DEWATERING PRESS ES202 GA END & REQ. MAINT. SPACE

JOB# PWT VDP ES202 GA	SCALE NTS
DATE JUNE, 2017	
DRAWN PWTech Inc.	SHEET 3 OF 4
APPROV. ALEX DAVEY	

9004 YELLOW BRICK ROAD, SUITE D, ROSEDALE, MD 21237 PHONE: 410 238 7977 WEB: www.PWTech.us



RECOMMENDED SPACE



FOOTPRINT AND ANCHOR POINTS

DIMENSIONS: MM [INCHES]

PWTech
PROCESS WASTEWATER TECHNOLOGIES

VOLUTE DEWATERING PRESS ES202 GA END & REC. MAINT. SPACE

JOB# PWT VDP ES202 GA	SCALE NTS
DATE JUNE, 2017	
DRAWN PWTech Inc.	SHEET 4 OF 4
APPROV. ALEX DAVEY	

9004 YELLOW BRICK ROAD, SUITE D, ROSEDALE, MD 21237 PHONE: 410 238 7977 WEB: www.PWTech.us

Process Wastewater Technologies, LLC. Standard Terms and Conditions

These terms and conditions ("Terms") shall exclusively govern the sale of all goods ("Products") and related services ("Services") by Process Wastewater Technologies, LLC. ("PWT") to the party ("Buyer") that issued a Purchase Order in accordance with, and/or signed and accepted the PWT Proposal ("Proposal"), and upon execution, the "Order" along with the Terms and the PWT Standard Limited Warranty attached hereto, the "Agreement").

Item 1. ACCEPTANCE

Buyer may accept this Agreement by executing the Proposal and returning it to PWT or by issuing a written purchase order that is accepted in writing by PWT or by executing an acceptance of offer in lieu of purchase order. No oral acceptance shall be effective. This Agreement is intended by the parties as a final expression of their agreement and is intended as a complete and exclusive statement of the terms of their Agreement. Acceptance or acquiescence in a course of performance rendered under this Agreement shall not be relevant to determine the meaning of this Agreement even though the accepting or acquiescing party has knowledge of the nature of the performance and opportunity for objection. No agent, employee or representative of PWT has any authority to bind PWT to any affirmation, representation or warranty concerning the equipment, components or related services sold under this Agreement, unless an affirmation, representation or warranty made by an agent, employee or representative is specifically included within this Agreement, otherwise it has not formed a part of the basis of this Agreement and shall not in any way be enforceable.

Item 2. CANCELLATION

Once the Buyer has executed the Proposal and submitted it to PWT, Buyer shall have no right to cancel this Agreement or any part thereof, except under the conditions specified in this provision or otherwise agreed to in writing by both parties. Any cancellation by Buyer of this Agreement must be in writing and shall be deemed effective upon receipt by PWT. In the event of cancellation by Buyer prior to the commencement of production of the Products specified under the applicable Order, Buyer shall pay PWT a cancellation charge equal to all of the costs incurred by PWT under the applicable Order up to the time of cancellation, plus fifteen percent (15%) of the full Order amount. In the event that production of the Products under the Order has commenced prior to cancellation, Buyer shall pay a cancellation charge equal to all of the costs incurred by PWT under the applicable Order up to the time of cancellation, plus an amount equal to the greater of: the value of the Products already completed under the applicable Order; or fifteen percent (15%) of the full order amount under the applicable Order.

Item 3. PRICES

Unless otherwise stated in the Proposal, prices are in United States Dollars (US$) and are F.O.B. Point of Origin. Charges for Services not stated in the Proposal (including, but not limited to, on-site technical assistance performed by a factory technical representative) are not included and must be purchased pursuant to a separately executed agreement between the parties.

Item 4. VALIDITY

Unless otherwise specified and subject to PWT's acceptance as described herein, the Proposal is valid for (30) thirty days and is subject to review thereafter. Prices may be extended beyond thirty (30) days only if confirmed in writing by PWT.

Item 5. PAYMENT TERMS

Buyer's payments shall be made in accordance with the terms and conditions of the Proposal. If no payment terms are set forth in the Proposal, then the payment terms are (a) thirty percent (30%) of the purchase price under the applicable Order shall be invoiced net five (5) days upon execution of the Proposal by Buyer; (b) sixty percent (60%) of the purchase price under the applicable Order shall be invoiced net thirty (30) days upon shipping, or upon PWT's offer to ship; (c) five percent (5%) of the purchase price to be invoiced net thirty (30) days upon delivery of Operation and Maintenance manuals and (d) the remaining five percent (5%) will be invoiced net thirty (30) days upon completion and/or performance of all related Services under the applicable Order. Interest will be charged on the unpaid invoiced balance at the rate of one and a half percent (1½%) per month for any amount received after thirty (30) days from the date of invoice. Any collection costs and/or attorney fees incurred by PWT in order to collect payment due will be invoiced to the Buyer, and Buyer agrees to pay said costs. In addition to the foregoing rights, PWT may suspend the shipping of any Products if the Buyer has failed to PWT in a timely manner.

Item 6. FEES AND TAXES

Buyer shall pay directly or reimburse PWT for payment of any and all applicable customs, sales, use, excise or other fees and taxes associated with the production and delivery of Products and PWT's performance under this Agreement. Buyer is responsible for and bears the risk of establishing, if applicable, a valid exemption from any tax, and shall indemnify, defend and hold PWT harmless for any loss, cost, or expense relating to any such exemption.

Item 7. DELAYED SHIPPING

Unless otherwise specified in the Proposal, if Buyer specifies a shipping date more than eight (8) months from the date of Buyer's acceptance of the Proposal, the price stated in the Proposal for the same goods shall be increased by a figure equal to the greater of (a) one percent (1%) per month (or part thereof), or (b) the average percentage increase of the stainless-steel and electronics commodity prices measured among the Consumer Price Index and the Producer Price Index or their successor indices as of the date of such acceptance and the shipping date. If PWT incurs a delay in

production of the Products due to force majeure events or supply chain issues of more than three (3) months or its suppliers have materially increased its costs as reasonably demonstrated to Buyer by PWT, then the Products costs shall be adjusted by the percentage increase of the stainless steel commodity price as measured by Producer Price Index or its successor index as of the date of such acceptance and the manufacturing date of the Products.

Item 8. FINANCIAL RESPONSIBILITY OF BUYER

If at any time before shipment, Buyer's financial ability to pay becomes impaired or unsatisfactory, PWT shall have the right to require Buyer to make payment or provide other assurances in full before shipment. In addition, if at any time before shipment, any proceeding is brought by or against Buyer under the bankruptcy or insolvency laws, PWT shall have the right to cancel an Order and/or terminate this Agreement and Buyer shall pay PWT a cancellation charge equal to all of the costs incurred by PWT up to the time of termination, plus fifteen percent (15%) of the purchase amount under the applicable Order(s).

Item 9. SHIPPING

Unless otherwise specified, all equipment and components will be shipped in one lot by the lowest cost method at the discretion of PWT. Any additional shipping requests by Buyer may be subject to additional shipping and handling charges. All shipments shall be F.O.B. – point of origin - the PWT manufacturing facility. Delivery to the carrier shall constitute delivery to Buyer for purpose of transfer of title, risk of loss or damage in transit. Buyer is responsible for obtaining any desired cargo insurance and shall pursue any loss or damage claims solely with the carrier.

Item 10. DELIVERY SCHEDULE

Unless otherwise specified, delivery dates under this Agreement and each Order are approximate, and failure to meet an exact delivery date shall not constitute a breach of this Agreement.

Item 11. INSPECTION

Upon reasonable advance written notice, Buyer or Buyer's representative may inspect the Products prior to shipment at the PWT point of origin at a time mutually agreeable to both parties. Inspection will be allowed only inasmuch as such inspection does not unreasonably interfere with PWT's production work flow. Complete details of any requested inspection must be submitted to PWT in writing, at least two weeks in advance of the requested inspection date. Any inspection under this provision must be completed prior to shipment of any goods under the applicable Order.

Item 12. OFFER BASIS

This Agreement is exclusively based upon drawings and specifications in the possession of PWT at the time of this Agreement and the applicable Order. PWT expressly reserves the right to modify the price and other terms of this Agreement as reasonably determined by PWT, should additional drawings, documents, amendments, clarifications or other addenda be required to produce or deliver the Products under an applicable Order.

Item 13. LIMITED WARRANTY

PWT's warranty liability under this Agreement is limited to the terms listed in the PWT Standard Limited Warranty that accompanies these Terms and is incorporated herein by reference. No other warranty, express of implied, is made with respect to the Products and/or services provided under this Agreement.

Item 14. MEET AND CONFER

The parties shall amicably work together to negotiate and resolve any controversy or dispute arising out of, or in connection with this Agreement or its interpretation, performance or non-performance or breach thereof. In particular, in the event of a disagreement, the parties shall meet and confer and attempt in good faith to resolve their differences. At the written request of the aggrieved party, a face-to-face meeting between decision-makers of the parties shall be arranged at the offices of the non-aggrieved party. Such a meeting shall occur within thirty (30) days of the delivery of the written request of the aggrieved party, unless otherwise agreed by the parties.

Item 15. FORCE MAJEURE

Neither party will be deemed in default of this Agreement to the extent that performance of its obligations (other than payment of money) or attempts to cure any breach are delayed or prevented by reason of any event beyond the reasonable control of such party, including any act of God (*i.e.*, fire, earthquake, natural disaster), act of government (*i.e.*, war, terrorism, embargo), or any other act or circumstance that is beyond the reasonable control of such party, provided that such party gives the other party prompt written notice thereof. Any delays caused by Buyer which impact costs associated with the Products may result in additional fees.

Item 16. GOVERNING LAW

Subject to Section 14, all disputes and matters arising under, in connection with, or incidental to this Agreement shall be litigated, if at all, in and before the Circuit Court of Baltimore County, Maryland, USA to the exclusion of other courts of other states, the United States or other countries and to the exclusion of other venues. The parties expressly consent to the exclusive jurisdiction of this court and agree that this venue is convenient and not to seek a change of venue or to dismiss this action on the grounds of forum non conveniens, and not to remove any litigation from that court to a federal court. This Agreement shall be construed in accordance with and governed by the substantive laws of the State of Maryland, to the extent state law applies. An action for breach of this Agreement must be commenced within one (1) year after the cause of action has accrued.

Item 17. WAIVER AND MODIFICATION

No waiver by either party of any breach, default or violation of any term, warranty, representation, agreement, covenant, condition or provision of this Agreement shall constitute a waiver of any subsequent breach, default, or violation of the same or other term, warranty, representation, agreement, covenant, condition or provision. No modification, amendment, extension, renewal, rescission, termination or waiver of any of the provisions contained in this Agreement, or any future representation, promise or condition in connection with the subject matter of this Agreement, shall be binding upon either party unless in writing and signed by both parties.

Item 18. SEVERABILITY

Any provision of this Agreement which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective solely to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

Item 19. ASSIGNMENT AND DELEGATION

Buyer shall not have the right to assign or delegate this Agreement or its interest in or obligations under this Agreement without the prior written consent of PWT, which shall not be unreasonably withheld. The merger, acquisition, reorganization, or other restructuring of Buyer shall not constitute an assignment under the terms of this Agreement provided the surviving entity has assumed all of the obligations of PWT under this Agreement pursuant to a written confirmation. Subject to the foregoing, the rights and obligations of the parties to this Agreement shall be binding upon, and enforceable by their respective heirs, successors and permitted assigns.

Item 20. CONFIDENTIALITY

The parties recognize that, in the course of their dealings, each may come into possession of information relating to the business of the other which is not generally known in the industry, which reasonably or logically may be considered to be confidential or proprietary and which might reasonably be expected to do harm to the other if divulged ("Confidential Information"). Each party agrees to keep the Confidential Information confidential and not to disclose it, in whole or in part, to any third persons whatsoever, nor even to any of its own employees except those having a "need to know," and otherwise to protect the confidentiality of such Confidential Information in accordance with reasonable industry practices. Confidential Information of a party shall no longer be subject to the foregoing restrictions (a) if it is or becomes available to the public through no fault of the other party, (b) if it is otherwise known to the other party as shown by written records of the other party at the time of disclosure of the Confidential Information, (c) if, subsequent to disclosure hereunder, it is obtained by the other party on a non-confidential basis from a third party who has the right to disclose such information or (d) if it is required to be disclosed pursuant to a court order, so long as the non-disclosing party is given adequate notice and the ability to challenge the required disclosure. Confidential Information will include the terms and conditions of this Agreement. Each receiving party shall immediately notify the disclosing party in writing if the receiving party reasonably determines that there has been an unauthorized access, use or receipt of the disclosing party's Confidential Information.

Item 21. NOTICES.

Any notice given under this Agreement shall be given when delivered in person or by registered or certified mail, postage prepaid, return receipt requested or by other delivery service providing evidence of receipt to the party to whom such notice is to be given at the address set forth above or at such other address as either party shall hereafter give notice of to the other in writing.

Item 22. INDEPENDENT CONTRACTOR.

Buyer has no authority to bind PWT in any contractual manner or to represent to others that the relationship between the other is other than stated herein.

Item 23. INTELLECTUAL PROPERTY

Except as expressly set forth in this Agreement, this Agreement does not grant either party any rights, implied or otherwise, to the other party's intellectual property (including, but not limited to, firmware, technology, data, or software) or any third party's intellectual property. Buyer acknowledges that, as between the parties, PWT retains all right, title, and interest in and to all components of the PWT Products and related intellectual property rights (collectively, the "PWT IP"). PWT hereby grants the Buyer a non-exclusive, irrevocable, worldwide, perpetual, royalty-free right and license to the PWT intellectual property solely as it is embodied in the Products and solely for the purposes of operating and using the Products.

Item 24. INDEMNIFICATION

Buyer hereby agrees to defend, indemnify and hold harmless the PWT, its directors, officers, employees, agents, and any assignee from and against any and all losses, damages, injuries, claims, suits, demands, judgments, decrees, losses, costs, expenses and liabilities, including, but not limited to attorneys' fees and courts costs asserted against, imposed upon or incurred by PWT arising from: any claim that manufacture or use of the Products (or their specifications) infringes upon a third party intellectual or proprietary right, including, but not limited to, patent, copyright, trademark, trade secret or any other intellectual or proprietary right where Buyer provided the specifications therefore.

Process Wastewater Technologies, LLC Standard Limited Warranty

Item 1. LIMITATION OF LIABILITY

EXCEPT AS OTHERWISE SET FORTH HEREIN, THE PRODUCTS ARE PROVIDED "AS IS" AND PWT DOES NOT MAKE ANY OTHER STATUTORY, EXPRESS WARRANTIES OR ANY IMPLIED WARRANTIES WITH RESPECT TO THESE PRODUCTS AND SERVICES PROVIDED HEREIN, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, INFRINGEMENT, TITLE, OR OF FITNESS FOR A PARTICULAR PURPOSE OR USE.

PWT does not assume and expressly disclaims any liability for (i) SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES which anyone may suffer as a result of the sale, delivery, service, use, or loss of use, of any Products and/or services provided by PWT, or (ii) any charges or expenses of any nature which are incurred without the prior written consent of PWT. Without limiting the foregoing, PWT does not warrant that any Products provided are free from any claim of any third person by way of infringement or the like, and PWT expressly disclaims any liability for any claim of infringement or the like that may result from the sale, delivery, service, use, or loss of use of any Products and/or services provided by PWT.

PWT's total liability under this Agreement or in connection with any claim involving any Products or services is expressly limited to the purchase price of the goods set forth in the applicable Order and/or services in respect of which damages are claimed.

Item 2. DEFECTS WARRANTY

Unless otherwise set forth in the Proposal, PWT warrants that the Products shall be free from defects in material and workmanship for the shorter period of: (i) twelve (12) months from the date of start-up; (ii) the warranty period for the third party good or service embodied in the Product; or (iii) eighteen (18) months from the delivery of the specified Product.

PWT's sole obligation and Buyer's exclusive remedy under this Agreement is expressly limited to the repair or replacement of any Product or parts of the Product or at the option of PWT, a refund of the purchase price, of any Product or parts which are return to PWT freight prepaid; provided that PWT determines in its sole discretion that the Product is defective, failed prematurely or has faulty workmanship or materials.

Item 3. PRODUCTS OF OTHER MANUFACTURERS

Unless otherwise set forth in the Proposal, PWT makes no warranty with regard to any products not manufactured by PWT, including but not limited to, electrical components, firmware, equipment and motors.

Item 4. TYPES OF DAMAGES AND CLAIMS FOR WHICH PWT LLC IS NOT RESPONSIBLE

The following non-exclusive list of items are specifically not covered by the PWT Standard Limited Warranty and, in the event of their occurrence, will render the PWT Defects Warranty null and void:

- defects which are caused by improper installation, improper or abnormal use or operation, or improper storage or handling;
- defects caused by the failure of the Buyer to perform and log normal preventative maintenance;
- defects caused by the use of replacement parts not approved in writing by PWT;
- defects caused by repairs by persons not authorized in writing by PWT;
- defects caused by modifications or alterations made by the Buyer; and/or
- any damage to our any Product occurring while it is in the possession of the Buyer.

Item 5. EQUIPMENT SAFETY PARAMETERS

With respect to operation of the Products, it is the responsibility of the Buyer to define and provide any safety device(s) or associated safety device(s) (other than that which is ordinarily furnished by PWT) which may be necessary and/or required, and to establish safety procedures and operational instructions to safeguard the operator(s) during maintenance, cleaning, or any use of the Products whatsoever, and to subsequently ensure that the Products are operated in conformance with all applicable safety procedures, laws, regulations and instructions.

It is also the responsibility of the Buyer to enforce all safety regulations and operational instructions and to maintain the Product in a safe condition (e.g., guards in place; warning, caution and/or important labels affixed; electrical boxes secure; interlocks operational; etc.). In particular, all warning, caution and/or important labels must be maintained in a readable condition, and if necessary, replaced with new labels.

Additionally, as the nature of the Product does not always make it possible to fully prevent operator access from rotating components, maintenance or cleaning of any nature must not be performed on the Products without first disconnecting all power.

Item 6. OPERATOR SAFETY COMPLIANCE

Buyer warrants and agrees that because it has sole control over the Product, it shall be solely responsible for safety compliance. Operator access and use of Products, and full compliance with all provisions of the Operator Safety section of PWT Instruction Manuals are essential and the user's responsibility; the provisions of that section being expressly incorporated herein.

SHINCCI-USA

4743 E 30th Place, Yuma, AZ 85365
Tel: (520) 834-2433
Email: AJ@Shincci-USA.com
http://www.Shincci-USA.com

Dehumidifying Wet Sludge Cake from 18% to 90% Total Solids Exceptional Quality (EQ) Biosolids at Village of Johnson Creek, WI

December 12, 2023

Table of Contents

4743 E 30th Place, Yuma, AZ 85365
Tel: (520) 834-2433
Email: AJ@Shincci-USA.com
http://www.Shincci-USA.com

I. Design Parameters

This proposal is based on dehumidifying the equivalent of 9,270 lbs. of bone-dry sludge per week after dewatering from 1.5% total solids to a minimum of 18% total solids.

The 9,270 dry lbs. result in the generation of 74,100 gallons of liquid sludge per week at 1.5% total solids. Dewatering 6 days per week results in the requirement to dewater 12,350 gallons per day. That results in the generation of 4.29 tons of wet sludge cake per day at 18% total solids when operating 6 days per week.

Drying the 4.29 tons of wet sludge cake from 18% to 90% totals solids using the Shincci-USA Dehumidification System generates 0.86 ton of final dried product that is exceptional quality (EQ) biosolids as per U.S. EPA Rule 503 and WDNR regulations.

The design is based on operating the Shincci-USA dehumidification system with uptime of 22 hours per day 6 days per week.

II. Selection of Shincci-USA Dehumidification System

To dry 4.29 tons of wet sludge cake per day operating 22 hours from 18% to 90% total solids, one (1) SHS6000FL Shincci-USA dehumidification system is selected.

The final dried materials are Class A biosolids as per Alternative 1 of U.S. EPA 40 CFR 503.32(a)(3)(ii)(B) being cited on May 22, 2022: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503#p-503.32(a)(3)(ii)(B)

When 40 CFR 503.32(a)(3)(ii)(B) equation 2 listed below is used, table TvsT can be generated for the different treatment temperatures.

$$D = \frac{131{,}700{,}000}{10^{0.1400t}} \qquad \text{Eq. (2)}$$

Where,

D = time in days.

t = temperature in degrees Celsius.

The final product meets vector attraction reduction per 40 CFR 503.33(b)(7) cited May 22, 2022: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503#p-503.33(b)(7) or 40 CFR 503.33(b)(8) cited May 22, 2022: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-O/part-503#p-503.33(b)(8)

Table TvsT: Required Treatment Time as a Function of Sludge Cake Temperature During Treatment

Sludge Temperature (°C)	Required Treatment Time			Comments
	In Days	In Hours	In Minutes	
50	13.170	316.080	**18,964.8**	
55	2.628	63.066	**3,784.0**	
60	0.524	12.583	**755.0**	
65	0.105	2.511	**150.0**	
70	0.021	0.501	**30.0**	Equivalent to Pasteurization
71	0.015	0.363	**21.8**	
72	0.011	0.263	**15.8**	
73	0.008	0.190	**11.4**	
74	0.006	0.138	**8.3**	
75	0.004	0.100	**6.0**	
76	0.003	0.072	**4.3**	
77	0.002	0.052	**3.1**	
78	0.002	0.038	**2.3**	
79	0.001	0.028	**1.7**	
80	0.001	0.020	**1.2**	Heat Treatment

Table 1 shows design parameters of the selected dehumidification system.

Table 1: Design Parameters and Selected Dehumidification System

Required / Design Parameters	*From	*To	Notes
Inlet Wet Cake @ 18.0% Total Solids (TS) - REQUIRED CAPACITY	***4.3***		Tons/22 Hours of Operation
Inlet Wet Cake @ 18.0% TS - SYSTEM DESIGN CAPACITY	***4.5***	***6.0***	Tons/22 Hours of Operation
Outlet Dried Final Product @ 90.0% TS	0.9	1.2	Tons/22 Hours of Operation
Required Evaporative Capacity	***823***		Gallons of water/22 Hours of Operation
Required Electric Energy for Drying	1,474		kWh/22 Hours of Operation
Shincci Low Temperature Dehumidification Model	**SHS6000FL**		Shincci Manufactured Patented Electric Heat Pump
Number of Dehumidification Systems	**1**		SHS6000FL
Number of Modules	2		Per Dehumidification System
Number of Refrigeration Systems	8		Per Dehumidification System
Total Available Water Evaporative Capacity (1 System)	***872***	***1,162***	Gallons of water/22 Hours of Operation
Total Energy Required to Evaporate 1 Gallon of Water	1.69	1.27	kWh/Gallon of Water
Total Energy Required to Evaporate 1 Pound of Water	692	519	BTUs/(lb. of Water)
Total Energy Required to Dry 1 Ton of Wet Sludge Cake	325	244	kWh/Ton from 18.0% To 90.0% Total Solids
Total Energy Required to Evaporate a Ton of Water from Sludge Cake	405	304	kWh/Ton of Water (2,000lbs. of Water)

*Range depends on wet sludge type, composition, consistency, homogeneity, age, dewatering method, and polymer/coagulant type and amount

Table 2 shows the list of items required for the proposed treatment system. Table 2 also shows basic specifications for each item, capacities and required powers. Freight will be paid by buyer before shipping the system.

Table 2: Quote and Specifications for Proposed System

No.	Item	Quantity	Unit Price (US$)	Price (US$)
1	Shincci-USA Low Temperature Belt-Type Sludge Dehumidification System Model **SHS6000FL**: 480VAC, 3 Phase, 60 Hz. Total Power Required = 67 kW for each system. Required footprint per system: 22.31 feet long by 7.1 ft. wide and 7.4 ft. in height excluding slitter box. Each system requires additional 6.5 ft. maintenance and operational space around and above the dehumidification system. The **SHS6000FL** system has 2 modules and 8 Refrigerant Systems. The modules utilize the Shincci Patented and Shincci Manufactured Heat Pumps. Condenser, evaporator, refrigerant pipelines are made of SUS316 Stainless Steel. The heat pumps are also made of SUS316L Stainless Steel which provides the highest corrosion resistance heat pump on the market today. Each dehumidification system weighs 6.5 tons. Dual Nord or SEW brand motors are used for slitters. Electric cabinets are UL Listed and are NEMA4/4X. PLC/VFD/HMI and components are Siemens brands or compatibles that comply with NEC requiements. Price includes: factory start up services, one year manufacturer limited warranty, and cooling fans for the system. Price does not include freight. Expected freight cost is $45,000	1	$838,850	$838,850
2	***Estimated Grand Total**			**$838,850**

*Prices do not include taxes. Prices are valid for 90 days from proposal date

III. Component Parts and Specifications for Selected System

SHS6000FL Dehumidification Component Parts Specification					
No.	**Item**	**Standard Specificaitons**	**Brand**	**Qty**	**Unit**
I	**dehumidification heat pump**				
1	Scroll compressor	ZB48，6kW（480v/60Hz）	Copland	8	set
2	Main Fan	7.5kW（480v/60Hz）	Detong	2	set
3	Axial Fan	4#,1.1kW,（480v/60Hz）	Shincci	4	set
4	External rotor axial fan	0.7kW,480v/60Hz	MAER	2	set
5	Evaporator	SUS316L Aluminum composite	Shincci	4	set
6	Primary condenser	SUS316L+Aluminum composite fin	Shincci	2	set
7	Secondary condenser	SUS316L+Aluminum composite fin	Shincci	4	set
8	Air Condenser	SUS316L+Aluminum composite fin	Shincci	2	set
9	Auxiliary condensing heater	SUS316L+Aluminum composite fin	Shincci	2	set

SHS6000FL Dehumidification Component Parts Specification					
No.	**Item**	**Standard Specificaitons**	**Brand**	**Qty**	**Unit**
I	**dehumidification heat pump**				
10	Regenerator	DDC05-04, SUS304+Aluminum composite Plate fin	Shincci	2	set
11	Electronic expansion valve	4	Sanhua	8	set
12	refrigerant accumulator	307	Shincci	8	set
13	Dry filter	165S	DANFOSS	8	set
14	Pressure Sensor	0-50Bar	Sanhua	16	set
15	Refrigerant	R134a	Chemours	48	kg
16	Primary effect Bag filter	790×334×350mm	Shincci	6	set
17	Medium efficiency bag filter	790×334×350mm	Shincci	6	set
18	Bracket	SUS304	General	1	set
19	Partition board (Insulation Panel)	SUS304，0.5-1.0mm	General	1	set
20	Service Access door	38mm Polyurethane foam board, Inner&outer SUS304/0.5mm	Shincci	1	set

SHS6000FL Dehumidification Component Parts Specification					
No.	**Item**	**Standard Specificaitons**	**Brand**	**Qty**	**Unit**
II	**Mesh Belts**				set
1	Helical gear reducer	0.25kW（480v/60Hz）	Nord	2	set
2	Mesh Belt Bracket	Rectangular tube 100×50×2.0mm,50×50×1.5mm,SUS304	General	1	set
3	Mesh belt guide	Angle joint bar 40×40×4mm,30×30×3mm,SUS304	General	1	set
4	Wear strip (plastic part of the belt moving rail)	PE 35×5mm，25×5mm	General	1	set
5	Chain	P=38.1mm, Roller Φ28.58mm	General	1	set
6	Stainless steel mesh	Rod P=114.3mm，W=950,SUS304	General	1	set
7	Polyester weave belt	Hole 2×2mm	General	1	set
8	Polyester weave belt	Hole 0.9×0.9mm	General	1	set
9	Support Shaft	Φ12mm,SUS304	General	1	set
10	Main drive shaft	ZZ950-00 SUS304	Shincci	2	pc
11	Slave drive shaft	CZ950-00 SUS304	Shincci	2	pc
12	chain wheel/Sprocket	P=38.1mm,SUS304	General	8	pc
13	Mounted Spherical Bearing	UCP208/Φ40,SUS304	Boren	4	pc
14	Mounted Spherical Bearing	UCT208/Φ40,SUS304	Boren	4	pc

SHS6000FL Dehumidification Component Parts Specification					
No.	**Item**	**Standard Specificaitons**	**Brand**	**Qty**	**Unit**
III	**Insulation library body**				
1	Insulation board	50mm Polyurethane foam board, Inner&outer SUS304/0.5mm	Shincci	1	set
IV	**Slitter and feeding hopper**				
1	Round knife	950, SUS304	Shincci	1	set
2	Master-slave scraper	950, brass	Shincci	2	pc
3	Hopper	SUS304	Shincci	1	set
4	Hopper Bracket	SUS304	Shincci	1	set
5	Helical gear reducer	2.2kW (480v/60Hz)	SEW/Nord	1	set
6	chain wheel/Sprocket	SP100B	General	2	pc
7	Chain	Pitch31.75mm，RollerΦ19.05mm	General	1	mtrs
8	Gear	31 Teeth	General	2	pc
9	Gear	40 Teeth	General	2	pc
10	Coupling	KC8020	General	1	set
11	roller bearing	UCFU210	Luoyang	1	set

SHS6000FL Dehumidification Component Parts Specification					
No.	Item	Standard Specificaitons	Brand	Qty	Unit
V	Electrical and automatic control				
1	PLC	Simatic S7-1500	Siemens	1	set
3	touch screen	Siemens TP1200	MCGS	1	pc
4	Temperature Sensor	NTC；KLN-B3590	KUNLUN	28	set
5	Circuit breaker	IC65N 3P	Schneider	1	set
6	Leakage module	Vigi iC65 (100mA)	Schneider	1	set
7	AC contactor	LC1	Schneider	1	set
8	thermal relay	LRD	Schneider	1	set
9	Resistance switch (level sensor)	ZB-10	Lanxin/Sipai	2	set
10	DC24V Switching power supply	LP1050D-24S	Reign	1	set

IV. Proposed 2-Year Spare Parts for the SHS6000FL Shincci-USA Dehumidification System

SHS6000FL Shincci-USA Dehumidification System: 2-Year Spare Parts					
No.	Item	Specifications	Brand	Qty	Unit
1	Noddle comb	950, brass	SHINCCI	2	Set
2	Bearing	UCFU210	SKF/FAG	4	pc
3	Oil seal	φ100*75*12; Nitrile rubber	General Brand	4	pc
4	Oil seal	Φ70*90*12；Nitrile rubber	General Brand	4	pc
5	Plate type primary filter	790×334×350mm	SHINCCI	24	set
6	Bag filter	790×334×350mm	SHINCCI	24	set
7	Dry filter	1136-305S；SUS316L	Xingfeng	2	pc
8	Electric expansion valve	DPF(S03)6.5C-02；PQ- M03012-000017	Sanhua	2	pc
9	The electromagnetic valve	EVR10；1/2（12.7）	Danfoss	2	set
10	Pressure Sensor	35CP02-06158050XS00F5H- ENV_D	Sanhua	2	set
11	bearing	UCP208	General Brand	2	pc
14	Blow fuse	RT18-32/3A	Zhengrong	10	pc
15	Blow fuse	RT18-32/5A	Zhengrong	10	pc
16	Temperature Sensor	（NTC）；KLN-B3590，9 mtrs	Kunlun	4	pc
17	Temperature Sensor	PT100，13 mtrs	Kunlun	4	pc
18	Frequency converter	ATV 320U04N4C 0.37KW	Schneider	1	set
19	Frequency converter	ATV 320U22N4C 2.2KW	Schneider	1	set
20	Frequency converter	ATV 320U22N4C 1.5KW	Schneider	1	set
21	Main Fan	TBF450；7.5KW；	SHINCCI	1	set
22	Axial Fan	4#,1.1kw	Huda	1	set
23	Compressor	ZB48KQE-TFD-558; 480V/60Hz	Copeland	1	set
24	Evaporator	SUS316L+Aluminum composite fin	SHINCCI	1	set
25	Primary condenser	SUS316L+Aluminum composite fin	SHINCCI	1	set
26	Secondary condenser	SUS316L+Aluminum composite fin	SHINCCI	1	set
27	Heat regenerator cube	DDC05-04, SUS316L+Aluminum composite Plate fin	SHINCCI	1	set
28	External axial cooling fan	600,480V/60Hz	Maer	1	set

V. Operational Cost and Maintenance

Operational cost involves only the cost of electric power as shown in Table 1. Energy requirements shown in Table 1 are maximum values.

About 2-man hours are required at the beginning of each week per system for cleaning filters and examining system components.

Every 6 months, each system will be down for no more than 6 hours for regular maintenance as specified in the operational manual.

Two years' worth of essential spare parts are recommended and optional and are not included in the price. Spare parts can be replenished when used.

The treatment systems have a one-year maintenance warranty through Shincci-USA. After the first year, the estimated maintenance cost is no more than 2% of system cost per year. Shincci-USA can provide a yearly maintenance contract for parts and/or labor after year one.

Shipping and delivery of all components to the project site are not included in the price and will be invoiced at the time of shipping. Startup services and optimization of each component of the proposed system and training of staff to operate and perform regular maintenance on the system are included in the price.

VI. Additional Requested Information

A. Anticipated lead times for each equipment

We required 90 working days for fabrication after signing a contract or receiving a purchase order; shipping is 6 to 8 weeks; and installation, commissioning and optimization take 3 to 6 weeks.

B. Installation list with references/contact info for dehumidification system

There are 1,600 dehumidification systems installed worldwide. The list shown below is limited to the ones installed in the USA. A comprehensive list of all systems installed globally can be provided upon request.

No.	Project Name	Entity	Location	Contact Person	Phone Number	Wet Sludge Cake Live Bottom Buffer Bin	Wet Sludge Cake Inlet Conveyor	Dry Material outlet conveyor	Dry material storage bin	Stock input rate	Year
1	WI: Marinette Wastewater Treatment Plant - Undigested Sludge Dewatering and Drying	Municipal / Governmental	Marinette, WI	Warren Howard	715-938-0811	Yes	Yes	Yes	Yes	10 tons of wet cake at 18 to 21% TS per day	2020
2	IN: Memphis Wastewater Treatment Plant - Undigested Sludge Dewatering & Drying	Municipal / Governmental	Memphis, IN	Brad Hutchinson	812-987-6881	Yes	Yes	Yes	Yes	6 tons of wet cake at 18% to 21% TS per day	2020
3	IA: Tyson Wastewater Treatment Plant - WAS & Alum Sludge Dewatering & Drying	Industrial WWTP	Storm Lake, IA	Bob Behlers	712-490-8339	Yes	No	No	No	45 tons of wet cake at 18% TS per day	2022
4	Kite Technologies	Industrial WWTP	Kissimmee, FL	Manuel Gutierrez	407-557-0512	No	No	No	No	20 tons of wet cake at 29% TS per day	2023
5	Quechan WWTP	Domestic WWTP	CA	Rick Miller	928-920-9059	No	Yes	Yes	Yes	4,000 Gallons of liquid sludge from 0.7% to 90%	2020
6	Apollo Drain 1	Septage, Milk, Fat, Oil, grease and other wastes	Yuma, Az	Jeremy Griffin	928-246-2646	No	Yes	yes	Yes	20,000 gallons of liquid sludge from 1% to 90%	2019
7	Apollo Drain 2	Septage, Milk, Fat, Oil, grease and other wastes	Yuma, Az	Jeremy Griffin	928-246-2646	No	Yes	yes	Yes	20,000 gallons of liquid sludge from 1% to 90%	2020
8	VT: Bellow Falls Wastewater Treatment Plant - Digested Sludge Drying	Municipal / Governmental	Bellows Falls, VT	Rob Rock	802-376-6585	No	No	No	No	8 tons of wet cake at 28% TS per day	2019

C. Example(s) of this equipment operating at facilities with similar sludge types (aerobically digested WAS). We understand that Marinette co-thickens with primary sludge which does not compare closely to Johnson Creek.

We dried at least 45 different types of wet sludge cake using the Shincci-USA dehumidification system and found out that if the wet sludge cake can be formed into noodles in the slitter box, the dehumidification system will dry it effectively.

D. Annual O&M costs for each equipment

1. Electrical cost

As shown in Table 1, the dehumidification system requires a maximum of 1,474 kWh per day of operation. Most of the time the required electrical energy requirements is about 20% less than we are quoting here.

2. Polymer

None for the dehumidification system require polymer.

3. Labor

As shown earlier, about 2-man hours are required at the beginning of each week per system for cleaning filters and examining system components.

Every 6 months, each system will be down for no more than 6 hours for regular maintenance as specified in the operational manual.

4. Maintenance costs

As indicated earlier, maintenance costs will not be more than 2% of system cost after year 1.

5. Note that the Village desires to achieve Class A biosolids. Please specify which pathogen requirements are proposed to be achieved by the equipment to meet Class A requirements (refer to Wisc. Admin Rules NR 204.07 and 40 CFR 503.32 (a)).

The U.S. EPA 503 Alternative 1: Thermally Treated Sewage Sludge-Time/Temperature with Regime A is selected for the Shincci-USA low temperature belt type dehumidification system to meet Class A treatment level. As described by U.S. EPA 40 CFR 503.32(a)(3)(ii)(B), treatment time, D, in days at treatment temperature, t, in °C the following equation is given to determine minimum treatment time:

$$D = \frac{131{,}700{,}000}{10^{0.1400\,t}}$$

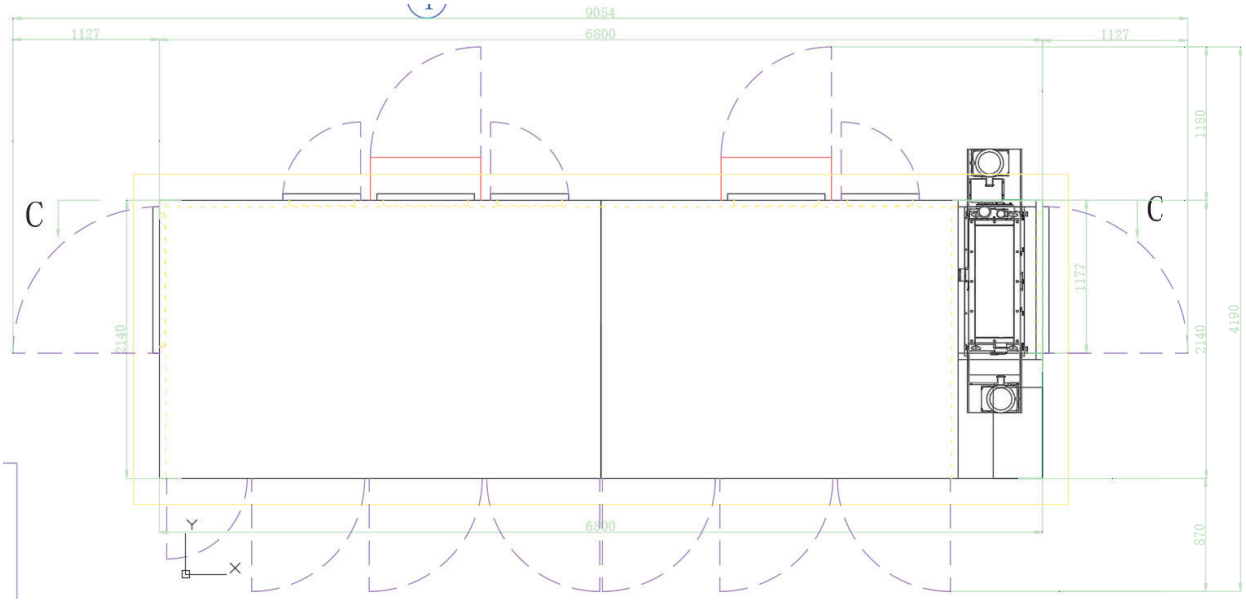
For minimum temperature of 70°C, *D* can be calculated as 0.020873 days which is equivalent to 30 minutes. Therefore, treatment time for treatment of sewage sludge using Shincci-USA dehumidification system is required to be 30 minutes or higher.

As will be described later in this document, the dehumidification system has two mesh belts: the upper mesh belt and the lower mesh belt. The upper mesh belt is exposed to temperatures between 48°C and 60°C to partially dry wastewater sewage sludge at low temperatures to avoid sealing of the voids in the sewage sludge matrix. The lower mesh belt however is exposed to air temperatures between 70°C and 75°C, and most of the time to temperatures around 75°C. This allows for the sewage sludge temperatures to be at a minimum of 70°C. Drying and pathogen destruction happens at the lower mesh belt. Therefore, treatment time is calculated for the duration sewage sludge is present on the lower mesh belt. Sewage sludge temperatures are measured and logged during the presence of wastewater sewage sludge on the lower mesh belt for the duration of the treatment time.

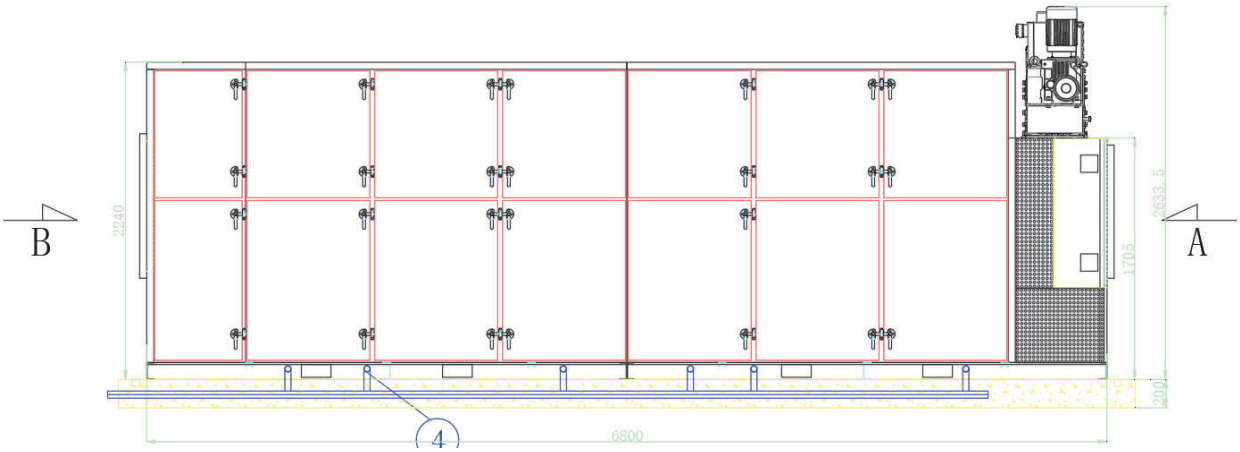
VII. System Layout

All dimensions shown are in mm. An AutoCAD file is provided with this proposal.

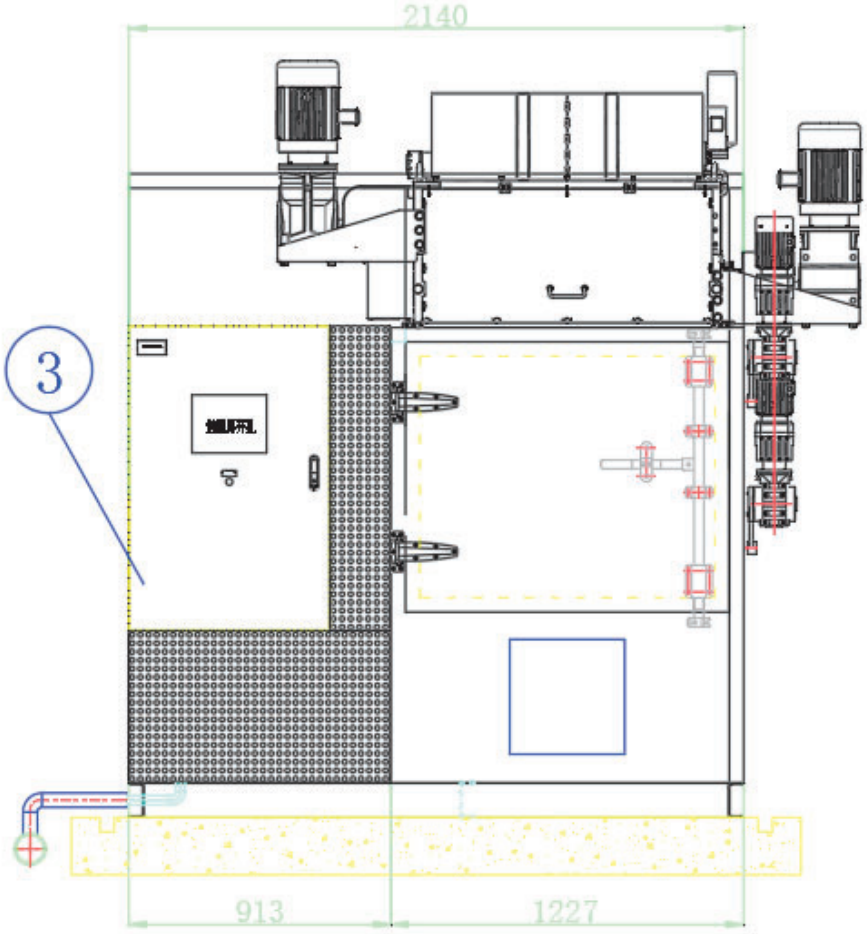
A. Top View



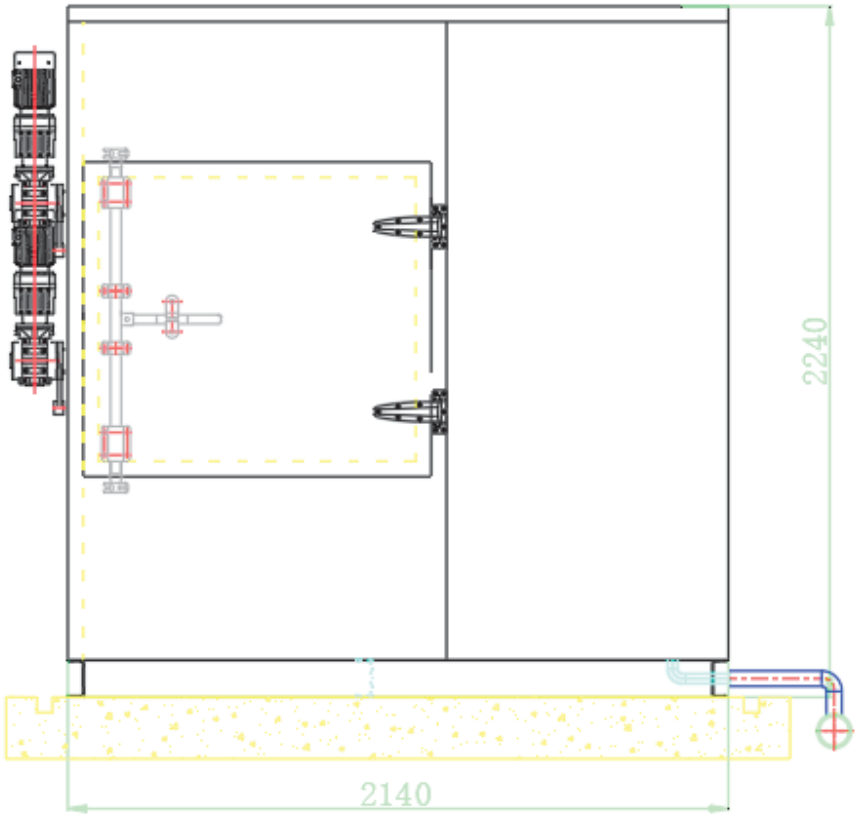
B. Side View



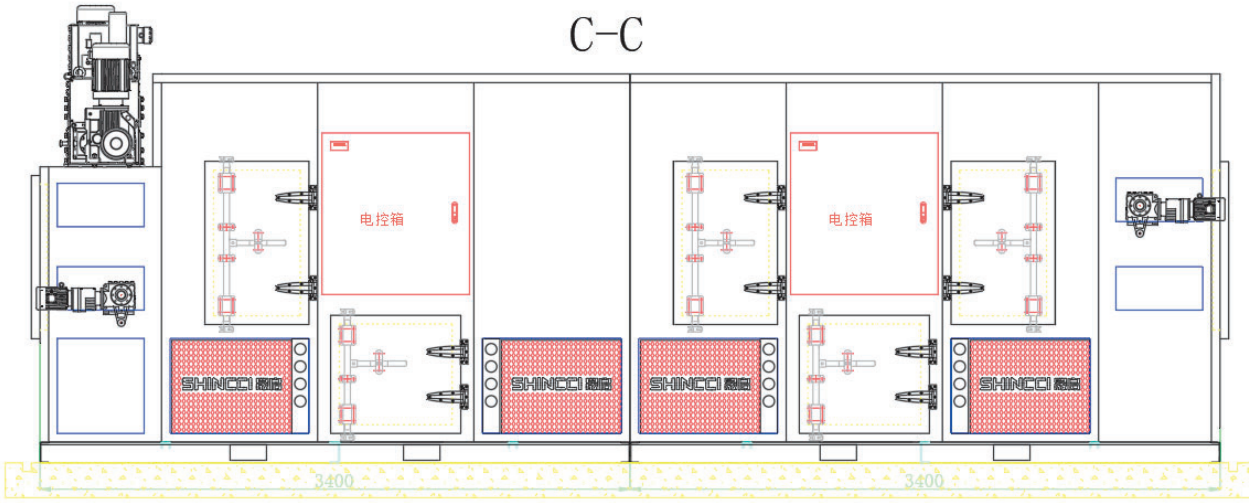
C. Front, A, View



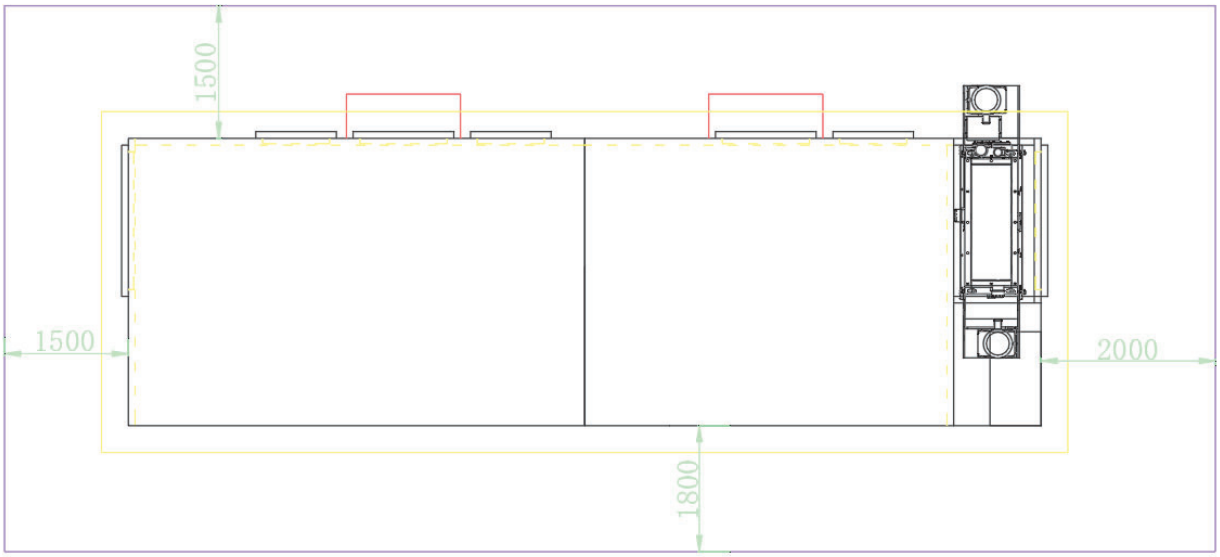
D. End, B, View



E. C-C Section



F. Service and Operation Space



VIII. Standard Terms and Conditions

These below terms and conditions shall exclusively govern the sale of all goods and related services by Shincci-USA to Buyer.

Acceptance

Buyer may accept the preceding offer by noting acceptance in the space provided on the preceding offer sheet, if such space is provided, or by written purchase order. No oral acceptance shall be effective. This writing is intended by the parties as a final expression of their agreement and, in conjunction with the accompanying signed offer or purchase order and Shincci-USA Standard Limited Warranty, is intended as a complete and exclusive statement of the terms of their agreement. Acceptance or acquiescence in a course of performance rendered under this agreement shall not be relevant to determine the meaning of this agreement even though the accepting or acquiescing party has knowledge of the nature of the performance and opportunity for objection. No agent, employee or representative of Shincci-USA has any authority to bind the Seller to any affirmation, representation or warranty concerning the equipment, components or related services sold under this agreement, and unless an affirmation, representation or warranty made by an agent, employee or representative is specifically included within this written agreement, it has not formed a part of the basis of this agreement and shall not in any way be enforceable.

Cancellation

Upon acceptance of the preceding offer, Buyer shall have no right to cancel this agreement or any part thereof, except under the conditions specified in this provision or otherwise agreed to in writing by both parties. Any cancellation by Buyer of this agreement must be in writing and shall be deemed effective upon receipt by Shincci-USA. In the event of cancellation by Buyer prior to the commencement of production of the goods specified under this agreement, Buyer shall pay Shincci-USA a cancellation charge equal to all of the costs incurred by Shincci-USA under this agreement up to the time of cancellation, plus fifteen percent (15%) of the full order amount. In the event that production of the goods under this agreement has commenced prior to cancellation, Buyer shall pay a cancellation charge equal to all of the costs incurred by Shincci-USA under this agreement up to the time of cancellation, plus an amount equal to the greater of: the value of the goods already completed under the agreement; or fifteen percent (15%) of the full order amount.

Prices

Unless otherwise stated in this offering, prices are F.O.B.

Validity

Unless otherwise specified, the preceding offer is valid for acceptance for (30) thirty days and is subject to review thereafter. Prices may be extended beyond thirty (30) days only if confirmed in writing by Shincci-USA.

Payment Terms

We would like to receive 33% of total project cost at the time the purchase order is issued, 27% before shipping the systems, 30% when systems are delivered to project site, and 10% after the systems are optimized. Other terms can be negotiated. Price under this agreement shall be invoiced net thirty (30) days upon shipping, or upon Shincci-USA's offer to ship. Interest will be charged on the unpaid invoiced balance at the rate of one and a half percent (1½%) per month for any amount received after thirty (30) days from the date of invoice. Any collection costs and/or attorney fees incurred by Shincci-USA in order to collect payment due will be invoiced to the Buyer, and Buyer agrees to pay said costs.

Fees and Taxes

Buyer shall pay directly or reimburse Shincci-USA for payment of any and all applicable customs, sales, use, excise or other fees and taxes associated with the production and delivery of goods under this agreement. Buyer is responsible for and bears the risk of establishing, if applicable, a valid exemption from any tax, and shall indemnify, defend, and hold Shincci-USA harmless for any loss, cost or expense relating to any such exemption.

Delayed Shipping

If Buyer specifies a shipping date more than one (1) year from the date of acceptance of the preceding offer, the price stated in the preceding offer for the same goods shall be increased accounting for inflation, increased prices of raw materials, increase in logistical costs, and devaluation of the value of the U.S. dollar against major Asian currencies.

Financial Responsibility of Buyer

If at any time before shipment, Buyer's financial ability to pay becomes impaired or unsatisfactory, Shincci-USA shall have the right to require Buyer to make payment in full before shipment. In addition, if at any time before shipment, any proceeding is brought by or against Buyer under the bankruptcy or insolvency laws, Shincci-USA shall have the right to cancel this contract and Buyer shall pay Shincci-USA cancellation charges equal to all of the costs incurred by Shincci-USA up to the time of termination, plus fifteen percent (15%) of the purchase order amount.

Shipping

Unless otherwise specified, all equipment and components will be shipped in one lot by the lowest cost method at the discretion of Shincci-USA. Any additional shipping requests by Buyer may be subject to additional shipping and handling charges. All shipments shall be F.O.B. from equipment manufacturing facility. Delivery to the carrier shall constitute delivery to Buyer for purpose of transfer of risk of loss or damage in transit, and any delivery deadlines specified in this agreement. Buyer is responsible for obtaining any desired cargo insurance and shall pursue any loss or damage claims solely with the carrier.

Delivery Schedule

Unless otherwise specified, delivery dates under this agreement are approximate, and failure to meet an exact delivery date shall not constitute a breach of this agreement unless delivery is not affected within a reasonable time after the specified delivery date.

Inspection

Inspection by Buyer or Buyer's representative of the goods specified under this agreement will be permitted prior to shipment at manufacturing facility, at a time mutually agreeable to both parties. Inspection will be allowed only inasmuch as such inspection does not unreasonably interfere with Shincci-USA's production workflow. Complete details of any requested inspection must be submitted to Shincci-USA in writing, at least two weeks in advance of the requested inspection date. Any inspection under this provision must be completed prior to shipment of any goods under this agreement.

Offer Basis

This agreement is exclusively based upon drawings and specifications in the possession of Shincci-USA at the time of this agreement. Shincci-USA expressly reserves the right to modify the price and other terms of this agreement as reasonable, should additional drawings, documents, or other addenda be required to produce or deliver the goods and/or services provided underthis agreement.

Limited Warranty

Shincci-USA's warranty liability under this agreement is limited to the terms listed in the Shincci-USA Standard Limited Warranty that accompanies these Terms and Conditions and is incorporated herein by reference. No other warranty, expressed or implied, is made with respect to the goods and/or services provided underthis agreement.

Meet and Confer

The parties shall amicably work together to negotiate and resolve any controversy or dispute arising out of, or in connection with this agreement or its interpretation, performance or non-performance or breach thereof. In particular, in the event of a disagreement, the parties shallmeet and confer and attempt in good faith to resolve their differences. At the request of the aggrieved party, a face-to- face meeting between decision-makers of the parties shall be arranged at the offices of the non-aggrieved party. Such a meeting shall occur with fourteen days of the delivery of the written request of the aggrieved party, unless otherwise agreedby the parties.

Arbitration

If, after meeting and conferring as provided under this agreement, the parties are unable to resolve their differences, any disputes shall be settled by binding arbitration in accordance with the following procedures:

a) The Arbitration shall be conducted in accordance with the Commercial Arbitration Rules of the American Arbitration Association (AAA) in effect at the time of the arbitration, except as may be modified herein or by mutual agreement of the parties. The location of the arbitration shall be Yuma, Arizona or Tucson, Arizona.

b) The arbitration shall be conducted by one arbitrator jointly selected by the parties. If the parties are unable to agree upon an arbitrator after thirty (30) days, the arbitrator shall be

selected under AAA rules.

c) The award shall be in writing and shall state the reasons for the award and shall be final and binding on the parties. The award may also include an award of costs, including reasonable attorneys' fees and disbursements. Judgment upon the award may be entered by any court having competent jurisdiction over the parties or their assets.

Governing Law

All disputes and matters arising under, in connection with, or incidental to this contract shall be litigated, if at all, in and before the Circuit Court of Pima County, Tucson, AZ, USA to the exclusion of other courts of other states, the United States or other countries and to the exclusion of other venues. The parties expressly consent to the exclusive jurisdiction of this court and agree that this venue is convenient and not to seek change of venue or to dismiss this action on the grounds of *forum non conveniens*, and not to remove any litigation from that court to a federal court. This Agreement shall be construed in accordance with and governed by the substantive laws of the State of Arizona, to the extent state law applies. An action for breach of this agreement must be commenced within two (2) years after the cause of action has accrued.

Waiver and Modification

No waiver by either party of any breach, default or violation of any term, warranty, representation, agreement, covenant, condition or provision of this agreement shall constitute a waiver of any subsequent breach, default, or violation of the same or other term, warranty, representation, agreement, covenant, condition or provision. No modification, amendment, extension, renewal, rescission, termination or waiver of any of the provisions contained in this agreement, or any future representation, promise or condition in connection with thesubject matter of this agreement, shall be binding upon either party unless in writing and signed by both parties.

Severability

Any provision of this agreement which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective solely to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

Assignment and Delegation

Neither party to this agreement shall have the right to assign ordelegate its interest in or obligations under this Agreement without the prior written consent of the other party, which shall not be unreasonably withheld. The merger, acquisition, reorganization or other restructuring of Shincci-USA shall not constitute an assignment under the terms of this agreement provided the surviving entity has assumed all of the obligations of Shincci-USA under this agreement. The transfer of any rights under this agreement from Shincci-USA to any entity controlled by or affiliated with Shincci-USA shall not constitute an assignment under the terms of this agreement provided Shincci-USA retains all of its obligations under this agreement. The rights and obligations ofthe parties to this Agreement shall be binding upon, and enforceable by their respective heirs, successors and permitted assigns.

IX. Standard Limited Warranty

Limitation of Liability

The only warranty which Shincci-USA makes is that warranty which is set forth in the preceding agreement and which is further detailed below:

THE GOODS SPECIFIED UNDER AGREEMENT WITH Shincci-USA ARE PROVIDED "AS IS" AND Shincci-USA DOES NOT MAKE ANY OTHER EXPRESS WARRANTIES OR ANY IMPLIED WARRANTIES WITH RESPECT TO THESE GOODS AND/OR RELATED SERVICES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR USE.

In addition, Shincci-USA does not assume and expressly disclaims any liability for (i) any SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES which anyone may suffer as a result of the sale, delivery, service, use, or loss of use,of any goods and/or services provided by Shincci-USA, or (ii) any charges or expenses of any nature which are incurred without the express written consent of Shincci-USA. In particular, Shincci-USA does not warrant that any goods provided are free from any claim of any third person by way of infringement or the like, and Shincci-USA expressly disclaims any liability for any claimof infringement or the like that may result from the sale, delivery, service, use, or loss of use of any goods and/or services provided by Shincci-USA.

Shincci-USA's obligation under this warranty is expressly limited to the repair or replacement of any part or parts that are proved to the satisfaction of Shincci-USA to have failed prematurely or because of a fault in workmanship or materials.

Shincci-USA's total liability under this warranty or in connection with any claim involving any goods or services is expressly limited to the purchase price of the goods and/or services in respect of which damages are claimed.

Defects Warranty

Shincci-USA warrants that the goods manufactured or sold by Shincci-USA shall be free from defects in material and workmanship for the shorterperiod of: (i) eighteen (18) months from the date of delivery; or (ii) twelve (12) months from the start up of the specified goods.

Shincci-USA's liability under this warranty or in connection with any other claim relating to goods manufactured or sold, and delivered by Shincci-USA is limited to the repair, or at our option, the replacement or refund of the purchase price, of any products or parts or components which are returned to Shincci-USA freight prepaid, and which Shincci-USA determines, in its discretion, are defective in material and workmanship. Products or parts or componentsthereof which are repaired or replaced by Shincci-USA will be returned to the buyer freight collect.

Products of other Manufacturers

Shincci-USA makes no warranty with regard to any products not manufactured by Shincci-USA or Shincci-Asia, including but not limited to electrical components or equipment and other prime movers.

Types of Damages and Claims for Which Shincci-USA is not Responsible

The following non-exclusive list of items are specifically not covered by the Shincci-USA Standard Limited Warranty and, in the event of their occurrence, will render the Shincci-USA Defects Warranty null and void:

- defects which are caused by improper installation, improper or abnormal use or operation, or improper storage or handling;
- defects caused by the failure of the buyer or user to perform and log normal preventative maintenance;
- defects caused by the use of replacement parts not approved in writing by Shincci-USA;
- defects caused by repairs by persons not authorizedin writing by Shincci-USA;
- defects caused by modifications or alterations madeby the buyer or user;
- any damage to any product occurring while it is in the possession of the buyer or user.

Equipment Safety Parameters

With respect to operation of the equipment, it is the responsibility of the buyer to define and provide any safety device(s) or associated safety device(s) (other than that which is ordinarily furnished by Shincci-USA) which may be necessary and/or required, and to establish safety procedures and operational instructions to safeguard the operator(s) during maintenance, cleaning, or any use of the equipment whatsoever, and to subsequently ensure that the equipment is operated in conformance with all applicable safety procedures, laws, regulations and instructions.

It is also the responsibility of the buyer to enforce all

safety regulations and operational instructions and to maintain the equipment in a safe condition (*e.g.*, guards in place; warning, caution and/or important labels affixed; electrical boxes secure; interlocks operational; etc.). In particular, all warning, caution and/or important labels must be maintained in a readable condition, and if necessary, replaced with new labels.

Additionally, as the nature of the equipment does not always make it possible to fully prevent operator access from rotating components, maintenance or cleaning of any nature must not be performed on the equipment without first disconnecting all power.

Operator Safety Compliance

Buyer warrants and agrees that because it has sole control over the equipment, it shall be solely responsible for safety compliance. Operator access and use of equipment, and full compliance with all provisions of the Operator Safety section of Shincci-USA Instruction Manuals are essential and the user's responsibility; the provisions of that section being expressly incorporated herein.

Appendix E – Combustible Dust Documentation

SHINCCI-USA

Johnson Greek WWTP Project, Johnson Greek, WI

Engineer's Comments and Questions Regarding the Shincci-USA Dehumidification System

- Is pilot or bench testing available for the dehumidification system? The proposal mentions that the system works well as long as cake can be formed into noodles in the slitter box – if no full pilot is available, would it be somehow possible to test the slitter box during the volute press pilot using the dewatered sludge?

If the wet sludge cake being fed into the dehumidification system is at 18% totals solids or higher, the wet sludge cake will form in the slitter box and forms the noodle.

Pilot testing can be available if needed and requested by the engineer. There is a cost involved with the pilot test. Pilot testing has to be completed after the winter months. The limitations are due to the mobile unit and its availability and not the dehumidification system. The dehumidification system can operate during winter and summer months.

We can perform the testing in Yuma using the mobile unit if at least 5 gallons of wet sludge cake can be shipped to Yuma on ice to be tested.

- General layout of cake solids conveyors – attached layout is to start the conversation. Please provide any feedback/comments. Once we nail down general layout we'll need budgetary pricing/cut sheets/info from you.
    - Do you recommend using a shaftless screw conveyor to transfer cake solids between volute and dehumidifier? Would you propose the same shaftless screw conveyor types for sludge going into and out of the dehumidifier?
    - Marinette used progressive cavity pump and piping for feeding the dehumidifier but was having challenges with flowability.
    - What is max incline? What are required clearances below volute press chute and above dehumidifier? Will help us determined required spacing between equipment.
    - What maintenance access spacing is recommended around (all sides of) the shaftless screw conveyor? We'd like to keep the conveyor close to the inside wall if possible to provide space between the conveyor and dehumidifier.
    - Any drain connections needed for conveyors?

Based on our vast experience with the proposed technologies (dewatering presses, dehumidification systems, live bottom bins, all types of conveyors, different types of silos and dried materials receiving bins, automation and PLC designs), we at Shincci-USA can propose a layout of the volute press, a small wet sludge cake live bottom bin (LBB), a conveyor for delivering wet sludge cake into the dehumidification system, a conveyor for the dried materials to the storage room. We can also provide a complete design and specifications for the components listed above with prices for each item, and we can fabricate, deliver and supervise installation of the entire system if requested.

It will be more convenient and easier for designing and commissioning the different system components if one vendor provides all systems for this project. We can work with PWTech to have the Volute press be part of the design.

If desired, we can discuss this further through a zoom meeting in the coming days.

- Polymer skid location – we'd like to keep close to the overhead doors for polymer tote deliveries, but:
  - Is there a max recommended distance for diluted polymer dosing line?
  - Where is recommended injection location into the sludge feed line? Any pipe distance or residence time considerations?
  - Any special injection quills or static mixers recommended or supplied? Or just tee polymer feed into sludge line?

Answers should be provided by PWTech.

- Top access needed for dehumidifier?

This depends on the conveyance system used.

- Fixed ladder recommended? Suggested location(s)?

The ladder provided with the system is similar to what is provided at Marinette. Its location should be decided upon based on the layout. If the press is selected to be elevated to reduce the angle and save space a catwalk and ladder would be appropriate; that can provide access to the top of the dehumidification system.

- Electrical area classification
  - Does the dehumidifier generate combustible dust or particles?

The Shincci-USA dehumidification system does not generate combustible dust or combustible particles.

High Temperature Sludge Dryers vs. The Shincci-USA Low Temperature Mesh Belt Type Dehumidification System

When drying wastewater sludge at high and medium temperatures, a quantity of dust and final dried products are produced, both of which can be combustible. The dried materials can form the **fuel** which is one of the three necessary components required for a fire or explosion to occur in any system. In order for the fuel to burn a sufficient quantity of **oxygen** is required and there must be an ignition source present of high temperature to ignite the dust-fuel-oxygen mixture.

The concept of drying sludge initially came from European companies, especially German companies, in the last decade of the twentieth century as a result of legislation banning the dumping of sewage sludge at sea. All sludge dryers including brand names such as Sevar, Kline and Komline; and paddle type, rotary drum type, fluidized bed type and belt types all use high temperatures that range between 250°F and 450°F (120°C and 282°C).

Utilizing high temperature sludge dryers involves mechanical rotation and mixing of the sludge within the dryers to raise sludge particles into the air, within the dyer, to reduce the energy required to evaporate water from sludge which results in sludge dust generation. In some systems, most of the sludge dust is bound together using adhesive bonding materials and pressure to form pellets.

Sludge disintegrating into particles at high temperatures generate dust that has the potential of combustion. Combustible dust generated during high temperature drying and pelletizing is well known and well documented in the literature to cause explosions. Many high temperature sludge drying operations including pelletizing were abandoned due to explosions and fire hazards.

Factors that Determine the Combustibility of Sludge/Biosolids and the Combustibility of Sludge Dust

1. Dust Layer Ignition: is defined as the minimum temperature of a hot surface, which will result in the decomposition and/or ignition of a sludge dust layer placed on it. Surfaces in wastewater treatment facilities using sludge drying may become hot enough to ignite layers of dust include the surface of the dryer, motor surfaces, electrical and light fittings. Results of tests reported in the literature fall within the range 302°F – 536°F (150°C - 280°C) for a 5 mm layer.
2. Minimum Ignition Temperature (MIT) of a Dust Cloud: The minimum ignition temperature of a dust suspension is the lowest temperature at which it will ignite spontaneously and propagate flame, the value being particularly relevant to large, heated areas of treatment plant such as surfaces of dryers. For sewage sludge samples tested dust cloud ignition temperatures were found to fall within the range of 662°F and 1,022°F (350°C - 550°C) depending on the type of sludge.
3. Minimum Explosible Concentration (MEC) of sludge dust is the lowest concentration of dust dispersed as a cloud in air that will, on contact with an ignition source, allow the propagation of flame through the cloud. The minimum explosible concentration of wastewater sludge was found to vary between 60 and 200 g/m^3.
4. Minimum Ignition Energy (MIE): when sludge and sludge dust handling operations involve the transportation via conveying or pouring and agitation via grinding, mixing or sieving then build-up of electrostatic charges occurs. If rapidly discharged a spark of sufficient energy to ignite a dust cloud may result. The minimum ignition energy of a dust cloud gives an indication of the sensitivity of the sample to ignition by electric and electrostatic sparks. The majority of wastewater sludge samples reported in the literature showed a low sensitivity to ignition from low energy static discharges of 500mJ. However, as a minimum requirement all wastewater treatment facilities items should be earth bonded, grounded.
5. Limiting Oxygen Concentration (LOC) of a Dust Cloud: the minimum concentration of oxygen that is necessary for a dust suspension to ignite and propagate flame. Values of the LOC reported in the literature for wastewater sludge dust varied from 9.0% - 12.0% using nitrogen and carbon dioxide as inert gases. When water vapor is used as inert gas, the LOC increases to above 12%.

Table 1 reflects differences between medium/high temperature dryers and the Shincci-USA low temperature belt type dehumidification systems.

Table 1: Medium/High Temperature dryers vs. Shincci-USA Low Temperature Belt Type Dehumidification Systems

Item	Factor	High Temperature Dryers	The Shincci-USA Low Temperature Belt Type Dehumidification Systems	Notes
1	Dust Layer Ignition (@ 5 mm)	302°F – 536°F (150°C - 280°C)	302°F – 536°F (150°C - 280°C)	Surface Temperatures for Shincci-USA Systems are below 167°F (75°C)
2	Minimum Ignition Temperature	662°F and 1,022°F (350°C - 550°C)	662°F and 1,022°F (350°C - 550°C)	Maximum Temperatures for Shincci-USA Systems are below 167°F (75°C)
3	Minimum Explosible Concentration	60 g/m^3 to 200 g/m^3	Less Than 60 g/m^3	Shincci-USA technology uses water vapor as inert gas; and the system can be opened during operation with no dust cloud forming
4	Minimum Ignition Energy	500 mJ and is never reached	500 mJ and is never reached	This ignition energy is never reached
5	Limiting Oxygen Concentration	9.0% - 12.0%	Greater than 12%	Shincci-USA technology uses water vapor as an inert gas which makes it very hard for ignition to occur

The Shincci-USA technology does not generate sludge dust due to the fact that the sludge is not mixed or agitated during drying. It is formed in thin noodle shape that produces pellets shaped like final product without using any bonding or pelletizing technologies. The doors to the dehumidification system cabinet can be opened during operation without causing any dust due to the water vapor used as inert materials instead of using nitrogen and carbon monoxide gases.

From Table 1 and from the information presented earlier, one can conclude that combustible materials, combustible particles, and combustible dust do not form when the Shincci-USA low temperature belt type dehumidification technologies are implemented to treat sludge cake and hence do not cause explosion hazards.

- Do you have any experience with electrical area classification requirements (Class 1 Div1/2) as it relates to the Shincci dryers? Table from NFPA 820 is copied below.

Yes. Attached as a separate PDF file a fire engineer report attesting that the Shincci-USA dehumidification systems Meet the NFPA820. The Shincci-USA dehumidification systems use Electric cabinets that are NEMA4/4X.

Appendix F – Detailed Cost Estimates

OPINION OF PROBABLE COST					
VILLAGE OF JOHNSON CREEK					
WASTEWATER TREATMENT FACILITY - SLUDGE DEWATERING IMPROVEMENTS					
SLUDGE DEWATERING AND THERMAL TREATMENT ALTERNATIVE					
173420148					
MARCH 2024					
STRUCTURE ID	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL PRICE
GENERAL					
	MOBILIZATION, BONDS, INSURANCE (10%)	LS	1	$ 289,000	$ 289,000
SITEWORK					
	INSTALL CLEANOUTS ON SLUDGE FEED LINE	LS	1	$ 25,000	$ 25,000
	TURF ESTABLISHMENT	LS	1	$ 2,000	$ 2,000
600	**CONTROL BUILDING**				
	NEW VFDS FOR DIGESTED SLUDGE PUMPS	EA	2	$ 20,000	$ 40,000
650	**SLUDGE DEWATERING BUILDING**				
	REMOVE CONCRETE REACTION TANK AND APPURTENANCES	LS	1	$ 40,000	$ 40,000
	REMOVE SLUDGE FEED PUMP, PIPING AND APPURTENANCES	LS	1	$ 10,000	$ 10,000
	REMOVE PLATE & FRAME PRESS, SUPPORTS, CONVEYORS, PLATFORM/STAIRS	LS	1	$ 40,000	$ 40,000
	FLOOR DRAIN MODIFICATIONS	LS	1	$ 10,000	$ 10,000
	CONCRETE FLOOR MODIFICATIONS, RESLOPING	LS	1	$ 15,000	$ 15,000
	NEW CONCRETE FLOOR TO REPLACE REACTION TANK	LS	1	$ 15,000	$ 15,000
	EXTEND THICKENED SLAB BELOW DEHUMIDIFIER	LS	1	$ 20,000	$ 20,000
	CONCRETE EQUIPMENT PADS	LS	1	$ 15,000	$ 15,000
	VOLUTE PRESS AND POLYMER SYSTEM	LS	1	$ 310,000	$ 310,000
	SLUDGE DEHUMIDIFIER	LS	1	$ 950,000	$ 950,000
	SHAFTLESS SCREW CONVEYORS	LS	1	$ 200,000	$ 200,000
	PROCESS EQUIPMENT INSTALLATION (25%)	LS	1	$ 365,000	$ 365,000
	INTERIOR PROCESS PIPING AND VALVES	LS	1	$ 40,000	$ 40,000
	BUILDING MECHANICAL IMPROVEMENTS	LS	1	$ 100,000	$ 100,000
	REPLACE OVERHEAD DOOR MOTORIZED OPENER	LS	1	$ 5,000	$ 5,000
	REPLACE EXTERIOR HOLLOW METAL DOORS	EA	3	$ 3,000	$ 9,000
ELECTRICAL, INSTRUMENTATION AND CONTROLS					
	OVERALL ELECTRICAL, INSTRUMENTATION AND CONTROLS WORK	LS	1	$ 450,000	$ 450,000
	REPLACE STANDBY GENERATOR	LS	1	$ 225,000	$ 225,000
CONSTRUCTION SUBTOTAL					**$ 3,180,000**
CONTINGENCY		**10% OF CONSTRUCTION**			**$ 320,000**
PRELIMINARY ENGINEERING (TO DATE)					**$ 80,000**
REMAINING ENGINEERING*					***$ 400,000***
BONDING, INSURANCE, PERMITTING		**2% OF CONSTRUCTION**			**$ 70,000**
TOTAL PROJECT COST					**$ 4,050,000**
** FINAL ENGINEERING SCOPE AND FEE TO BE DETERMINED BASED UPON VILLAGE STAFF REVIEW OF PRELIMINARY DESIGN.*					

Annual Costs - Liquid Hauling			
Digested Sludge Pump Electrical	**Value**	**Units**	**Notes**
Existing Pump Motor	7.5	HP	
Current Hours of Operation	5	hours/week	
Future Hours of Operation	10	hours/week	
Electrical Utility Rate	$ 0.12	/kWh	From US EIA, Wisconsin electricity profile for 2022, avg retail price
Current Power Consumption	1,463	kWh/yr	
2045 Power Consumption	2,925	kWh/yr	
Estimated Electrical Costs @ Current Production	*$ 180*	*/yr*	
Estimated Electrical Costs @ 2045 Design Production	*$ 360*	*/yr*	
Liquid Hauling	**Value**	**Units**	**Notes**
Johnson Creek Estimated Cost Rate	$ 0.10	/gal	In 2022, Village payed approximately $173,000 for liquid sludge hauling
Estimated Hauling Costs @ Current Production	*$ 173,000*	*/yr*	
Estimated Hauling Costs @ 2045 Design Production	*$ 304,000*	*/yr*	
Total Estimated Annual Costs @ Current Production	**$ 174,000**		
Total Estimated Annual Costs @ 2045 Design Production	**$ 305,000**		

Annual Costs - Dewatering and Drying			
Dewatering and Drying Electrical Costs	**Value**	**Units**	**Notes**
Digested Sludge Pump	7.5	HP	Current motor is 7.5 HP, VFD to be added
Polymer Feed System	1	HP	Two 0.5 HP motors (mixer motor and neat polymer pump)
Volute Press	2.5	HP	2.3 HP listed on proposal, includes total of flash mixer, floc tank mixer, and dewatering drum drive
Sludge Dehumidifier	90	HP	67 kW for total system listed on proposal
Screw Conveyors	6	HP	Three at 1.5 HP each and one at 1 HP
Future Hours of Operation	76	hours/week	Based on 2021-2023 sludge production
Future Hours of Operation	121	hours/week	At 2045 design production
Electrical Utility Rate	$ 0.12	/kWh	From US EIA, Wisconsin electricity profile for 2022, avg retail price
Current Power Consumption	317,148	kWh/yr	
2045 Power Consumption	504,933	kWh/yr	
Estimated Electrical Costs @ Current Production	*$ 39,000*	*/yr*	
Estimated Electrical Costs @ 2045 Design Production	*$ 61,000*	*/yr*	
Dewatering Polymer Costs	**Value**	**Units**	**Notes**
Monticello Cost Rate	$ 0.0066	/gal sludge	2019 dollars
% solids ratio	0.75		Assume 1.5% solids for Johnson Creek / 2% solids for Monticello
Inflation rate	20.4%		Per CPI inflation calculator, Bureau of Labor Statistics, for June 2019 to Jan 2024
Johnson Creek Estimated Cost Rate	$ 0.0060	/gal sludge	
Estimated Polymer Costs @ Current Production	*$ 11,000*	*/yr*	
Estimated Polymer Costs @ 2045 Design Production	*$ 19,000*	*/yr*	

Annual Costs - Dewatering and Drying			
Equipment Labor and Maintenance Costs	**Value**	**Units**	**Notes**
Volute Press Labor	$ -	/yr	Assume no changes to current staffing at WWTF
Volute Press Maintenance	$ 5,760.00	/yr	From vendor: System rebuild every 12,000-15,000 hours. No cost of rebuild was given. Will assume average annual maintenance is 2% of system cost ($288,000)
Dehumidifier Labor	$ -	/yr	Assume no changes to current staffing at WWTF
Dehumidifier Maintenance	$ 16,800.00	/yr	From vendor proposal: Annual maintenance 2% of system cost ($838,850)
Estimated Labor/Maint Costs @ Current Production	*$ 23,000*	*/yr*	
Estimated Labor/Maint Costs @ 2045 Design Production	*$ 23,000*	*/yr*	
Cake Land Application	**Value**	**Units**	**Notes**
Estimated Annual Cost	$ 2,000		Based on discussions with facility staff, there has historically been strong interest from local dairy farmers for taking sludge. Nominal costs for Village to assist farmers with pickup costs.
Estimated Cost Rate	$ 18.92	/dry ton	
Estimated Application Costs @ Current Production	*$ 2,000*	*/yr*	
Estimated Application Costs @ 2045 Design Production	*$ 4,000*	*/yr*	
Total Estimated Annual Costs @ Current Production	**$ 75,000**		
Total Estimated Annual Costs @ 2045 Design Production	**$ 107,000**		

Appendix G – Bench and Pilot Testing Information

Johnson Creek WWTF Sludge Jar Testing Report

Date: December 6th, 2023

AUTHOR: David Grimm
CUSTOMER: Johnson Creek, WI
SUBJECT: Jar Testing Report

SUMMARY

On 12/05/2023, samples of the sludge from Johnson Creek Wastewater Treatment Facility (WWTF) in Wisconsin were sent to PWTech for the purposes of determining the feasibility of mechanical dewatering via the Volute Dewatering Press (VDP). The sample received contained sludge with a solid's concentration of 0.8%.

The test work indicated the following.

• The sludge was found to form well defined, clearly separated floc that would be ideal for mechanical dewatering in the Volute Dewatering Press (VDP).

• The optimum product tested for the application is Solenis K275FLX. The recommended polymer dosage determined for this product is around 6—10 lbs. of raw polymer/ton of dry solids(lbs/T).

• Mechanical dewatering performed for jar testing with an ES-051 Volute Dewatering Press (VDP) drum serves as a rough simulation of full scale capabilities, and cake solids of 14.8% were produced. Further pilot testing can provide a more accurate and thorough indication of the VDP's capabilities.

1.0 INTRODUCTION

The Johnson Creek WWTF is interested in the use of a VDP for the mechanical dewatering of their sludge. Jar testing was performed to determine the effectiveness of different polymers and the viability of mechanically dewatering their sludge with a Volute Dewatering Press.

2.0 EXPERIMENTAL AND RESULTS

2.1 Characterization of Sample

Four 2.5 gallon samples of aerobically digested waste-activated sludge were collected by the Johnson Creek WWTF staff and shipped overnight to the PWTech office. The physical appearance and characteristics of the sludge sample prior to polymer addition are described in Figure 1 below.

CHARACTERISTIC	RESULT
Sample Type	**WWTP Sludge**
Physical Characteristics	Dark brown in color with a homogeneous appearance and minimal grit, debris or other irregularities.
pH	6.39
Dry Solids	0.81%

Figure 1: Physical appearance and characteristics of the sludge received.

a. Product Screening

Sample aliquots of 500ml were taken. The raw emulsion polymers were prepared at a 0.5% concentration (by volume), which was then applied to the sludge under high shear and conditioned in a specialty mixer for roughly 15 seconds at 100 rpm and 30 seconds at 50 rpm to simulate dual stage mixing in the VDP. The polymer dosage was varied until the optimum floc formation was observed. Products were judged based on floc size, dosage, relative strength, and resistance to sheer.

After the optimum products were determined, the samples were drained, and the filtrate was tested for Total Suspended Solids (TSS). Five gallons of the sample were mixed with the optimal dose of polymer and dewatered using a ES-051 dewatering drum at low speed and maximum pressure. Cake produced by the ES-051 was testing for Total Solids percentage (TS%) using an Ohaus moisture analyzer. The results of the testing can be found in tables 1-3 below.

Table 1:

Run #	Volume of Sludge (mL)	Sludge Solids (%)	Volume of Polymer (mL)	Active Polymer (%)	Polymer Dilution (%)	Active Polymer (lbs/ton)	Polymer	Comments
1	500	0.8	0	46	0.25	0	K275	
2	500	0.8	3	46	0.25	1.725	K275	small floc, good separation
3	500	0.8	4	46	0.25	2.3	K275	bigger
4	500	0.8	5	46	0.25	2.875	K275	
5	500	0.8	6	46	0.25	3.45	K275	ground beef texture
6	500	0.8	7	46	0.25	4.025	K275	
7	500	0.8	8	46	0.25	4.6	K275	
8	500	0.8	9	46	0.25	5.175	K275	
9	500	0.8	11	46	0.25	6.325	K275	large floc
10	**500**	**0.8**	**13**	**46**	**0.25**	**7.475**	**K275**	**clear water, strong floc, best**
11	500	0.8	15	46	0.25	8.625	K275	
12	500	0.8	17	46	0.25	9.775	K275	no small floc
13	500	0.8	19	46	0.25	10.925	K275	starting to get cloudy
14	500	0.8	21	46	0.25	12.075	K275	
15	500	0.8	23	46	0.25	13.225	K275	some small floc
16	500	0.8	26	46	0.25	14.95	K275	
17	500	0.8	29	46	0.25	16.675	K275	
18	500	0.8	32	46	0.25	18.4	K275	smaller floc, much cloudier
19	500	0.8	35	46	0.25	20.125	K275	.

Table 1: Jar testing observations for the sample while using Solenis K275 FLX

Table 2:

Run #	Volume of Sludge (mL)	Sludge Solids (%)	Volume of Polymer (mL)	Active Polymer (%)	Polymer Dilution (%)	Active Polymer (lbs/ton)	Polymer	Comments
1	500	0.8	0	46	0.25	0	K279	
2	500	0.8	3	46	0.25	1.725	K279	small floc, bigger than 275
3	500	0.8	4	46	0.25	2.3	K279	bigger
4	500	0.8	5	46	0.25	2.875	K279	
5	500	0.8	6	46	0.25	3.45	K279	ground beef texture
6	500	0.8	7	46	0.25	4.025	K279	
7	500	0.8	8	46	0.25	4.6	K279	
8	500	0.8	9	46	0.25	5.175	K279	
9	500	0.8	11	46	0.25	6.325	K279	large floc
10	**500**	**0.8**	**13**	**46**	**0.25**	**7.475**	**K279**	**strong floc good separation**
11	500	0.8	15	46	0.25	8.625	K279	
12	500	0.8	17	46	0.25	9.775	K279	no small floc
13	500	0.8	19	46	0.25	10.925	K279	starting to get cloudy
14	500	0.8	21	46	0.25	12.075	K279	
15	500	0.8	23	46	0.25	13.225	K279	floc getting smaller
16	500	0.8	26	46	0.25	14.95	K279	
17	500	0.8	29	46	0.25	16.675	K279	
18	500	0.8	32	46	0.25	18.4	K279	all smaller floc, much cloudier
19	500	0.8	35	46	0.25	20.125	K279	
20	500	0.8	38	46	0.25	21.85	K279	

Table 2: Jar testing observations for the sample while using the Solenis k279 FLX

Table 3:

Sample	Cake Solids (% Total Solids)	Filtrate Solids (mg/L)	Solids Recovery (%)
K275	14.75%	64	99.2

Table 3: Simulated mechanical dewatering and filtrate results.

3.0 DISCUSSION

Based upon these results, both polymers Solenis Praestol K275 FLX and K279 FLX can produce strong enough floc for effective dewatering and should be trialed in a pilot. Polymer K279 is expected to perform slightly better based on observations in jar testing.

The flocculation appeared to reach an optimum formation at a polymer dose of roughly 7.5 lbs/ton with the K279 and K275, but polymer K275 produced a slightly larger floc with clearer filtrate. Both polymers produced strong floc, so the differences were minimal. The optimal floc obtained while using each polymer is shown in Figure 2 below.

Figure 2: Optimal floc observed at a polymer dose of 7.5 lbs/ton of K279 (left) and K275 (right)

Mechanical dewatering was performed in an ES-051 dewatering press, just using the 5 cm diameter drum and auger. A batch of five gallons of sludge was manually mixed with 250 ml of 0.5% K275 polymer and gradually added to the dewatering drum. Running the drum at a minimum speed and the maximum pressure resulted in cake solids of 14.8%. The cake solids results observed in testing provide only an approximation of the cake solids expected during dewatering with a Volute Dewatering Press and it is recommended that pilot testing of the equipment be performed to gain more accurate predictions of cake solids. The pressure applied during the jar testing procedure is similar to that of a full-scale press but lacks the

two stage mixing tank for proper floc formation and consistent cake production. Cake solids produced by the VDP would be expected to show increases from the solids % obtained during the jar testing.

At optimal dosing, both samples yielded a clear filtrate containing minimal residual solids. The filtrate obtained from the sample tested with the K275FLX contained 64 mg/L. This represents a solids recovery of approximately 99%. The solids recovery results observed in testing provide only a rough approximation of the solids recovery expected during dewatering with a Volute Dewatering Press and it is recommended that pilot testing of the equipment be performed to gain more accurate predictions of dewatering results.

4.0 CONCLUSIONS

- Solenis K275FLX appears to be the optimum polymer for dewatering, however, the scope of polymers tested was limited. The recommended jar test dosage is 8 lbs/ton.

- Mechanical dewatering of the sludge with the Volute Dewatering Press is not only feasible but should result in a significant volume reduction with potential cake solids reaching 14.8% during the jar testing. It is likely that the mechanical advantages in the VDP will lead to greater cake solids than those achieved during the jar testing.

PWTech Volute Dewatering Press Pilot Report
Johnson Creek WWTP – Johnson Creek, WI

February 5th to February 9th, 2024

PROCESS WASTEWATER TECHNOLOGIES LLC

Process Wastewater Technologies, LLC.
9004 Yellow Brick Road, Suite D, Rosedale, MD21237
Phone: 410-238-7977, Fax: 410-238-7559

Pilot Operator / Report Prepared by: William Pei
Manufacturer's Representative: Paul Nygaard, ICS Group

Summary

- The Volute Dewatering Press, model ES-132, was piloted at Johnson Creek WWTP on aerobically digested sludge.

- Cake solids as high as 19.3% were produced with maximum solids capture rates recorded at 99.5%.

- Cake solids averaged 17.6% and solids capture rates averaged 97%.

- The unit's reliability, ease of operation, low wash water requirements, and minimal maintenance requirements were all demonstrated to plant staff.

Contents

1. Introduction

PWTech performed pilot testing of the Volute Dewatering Press (VDP), model ES-132, at Johnson Creek WWTP in Johnson Creek, WI. The pilot unit dewatered the plant's aerobically digested sludge.

Johnson Creek WWTP treats local municipal wastewater, receiving approximately 370 thousand gallons of wastewater per day. The influent first goes through screening and grit removal before being sent to an oxidation ditch where phosphorous removal occurs. It then flows into clarifiers with the supernatant going through UV treatment and leaving the plant through a local stream. Settled solids from the clarifier flow to an aerobic digester which sends RAS back to the oxidation ditch. WAS from the digester is pumped out to a storage tank where it is then sent to haulers for disposal. This treatment process is outlined in **Figure 1** below.

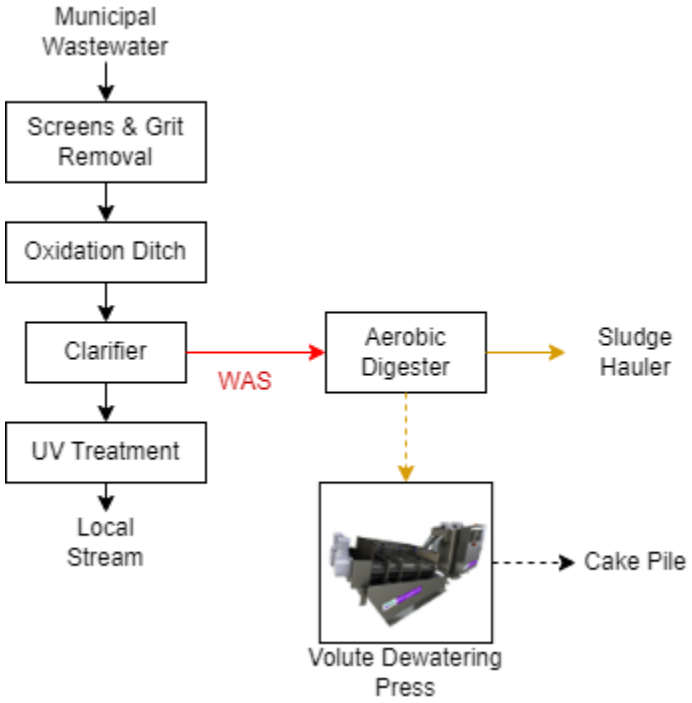


Figure 1: Process flow diagram of Johnson Creek WWTP including the position of the VDP during piloting.

Johnson Creek WWTP used to operate a plate and frame press for their dewatering operation but it has been rendered nonoperational. The plant is seeking to upgrade their dewatering system with the end goal of producing class A solids with a sludge dryer. To this end the plant is looking for a dewatering system that can meet the feed requirements of the sludge dryer. The low maintenance and ease of use of the VDP makes it an ideal option for their purposes.

2. Objective

The objective of the pilot was to demonstrate PWTech's volute dewatering press's ease of use, low maintenance, and dewatering performance.

3. Pilot Set-Up

The ES-132 trailer unit was parked next to the plant's dewatering building pulling sludge from a tank inside the building with a 0.5 HP submersible pump connected via a 2" hose. Water was supplied from a water spigot inside the building. 480V 3Ø power was supplied from a generator provided by the plant. 120V 1Ø was supplied via a power outlet inside the dewatering building. Cake was disposed off into trash bins and dumped in the plant's cake pile. Effluent was sent to a nearby opened manhole.

The ES-132 has two 13cm diameter drums with a maximum hydraulic rated capacity of 15 GPM for sludge less than 1% solids and maximum solids rated capacity of 100 dry lbs/hour.

4. Testing and Sample Analysis

After unit setup tests were run to determine the settings for optimal performance. For these tests the following parameters were changed.

- Influent Sludge Flow
- Endplate Gap (distance between the end of the screw and the plate at the end of the drum)
- Drum Speed (rotational speed of the dewatering screw)
- Type of polymer used and dosage of polymer

Samples were taken every hour to give time for polymer adjustment to set in, the following samples were taken to determine conditions and unit performance.

- Influent Sludge Solids (Total residual solids (TS) by %)
- Cake Solids (Total residual solids (TS) by %)
- Effluent Solids (Total suspended solids (TSS) by %)

Influent sludge samples were taken from the sludge feed into the unit while cake samples were collected from the end of the drum. Influent sludge was tested for TSS, TDS, and VSS by a third party laboratory.

Total residual solids for both the influent sludge and the cake were determined on site using two Ohaus Moisture Analyzers, rated to a 0.01% accuracy. The analyzers work by measuring initial mass of the sample then heating the sample at 105° C until no meaningful change (considered as a change of more than 1 mg/minute) occurs and then records and compares this final mass to the initial mass. This yields a TS percentage according to the equation below.

$$Total\ Solid(\%) = 100 * \frac{initial\ mass}{final\ mass}$$

Effluent samples were taken from the effluent discharge and were analyzed by a third-party laboratory for TSS testing.

The following polymers were tested during this pilot.

- Solenis Praestol K275 FLX
- Solenis Praestol K279 FLX

Power readings of major components of the unit were taken at the same hourly intervals of the samplings.

5. Results and Discussion

16 runs were conducted throughout the week of the pilot with the plant's digested sludge. 10 runs were done for dosage testing the three polymers while the last 6 runs were dedicated to testing throughput in the system.

5.1. Influent Sludge

Influent solids for each run are shown in **Figure 2** below.

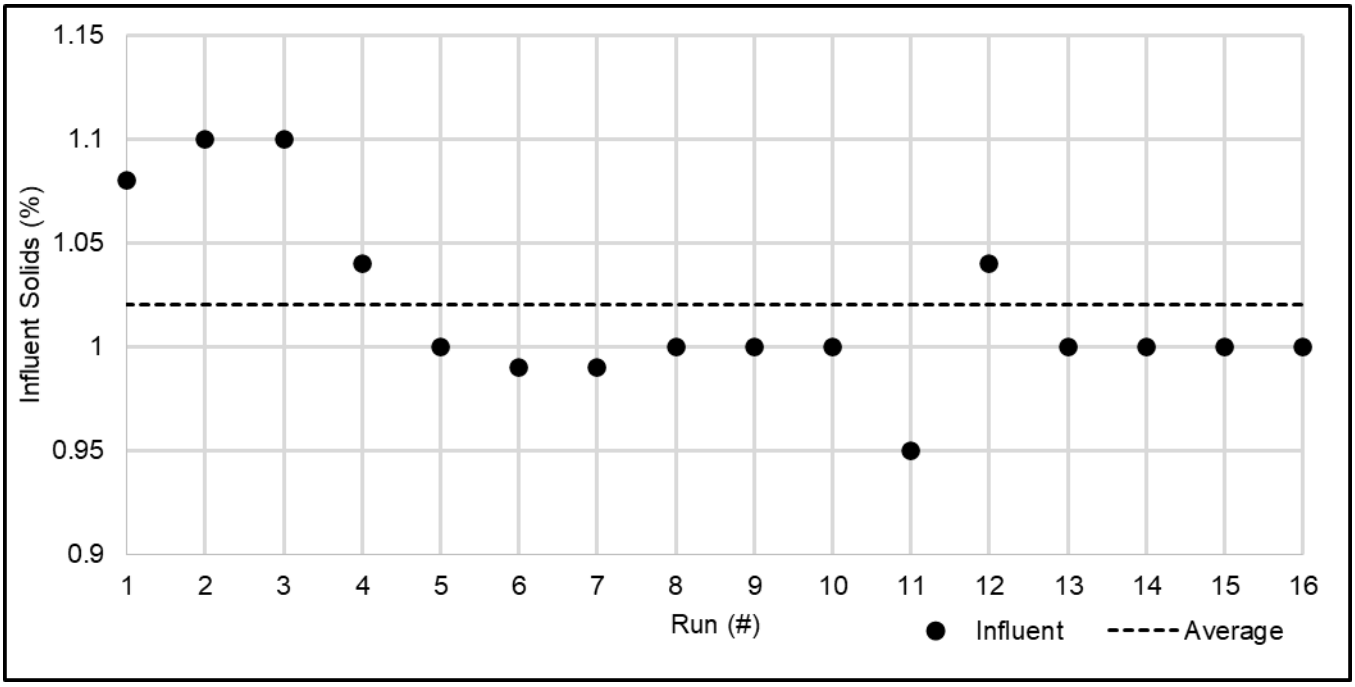


Figure 2: Total solids of feed sludge for each run

Influent sludge solids varied from 0.95% to 1.1% with an average of 1.02% across all runs. Additional measurements were taken for pH, settleability, and temperature while lab testing was done to determine TSS, VDS, and TDS. These sludge characteristics are shown below in **Table 1**.

Table 1. Influent Sludge Characteristics

Date	Sample	Settled Sludge	SVI	TSS	VSS		TDS	pH	Temp
	#	(mL/L)	(mL/g)	(mg/L)	%	(mg/L)	(mg/L)		(°F)
2/6/2024	S1	900	97	9300	77.4	7200	1300	7.4	30
2/8/2024	S2	900	99	9100	79.1	7200	1300	7.4	48

Table 1: Influent sludge characteristics for each day

5.2. Cake Solids Overview

Cake solids averaged 17.1% for all testing runs at below 47% unit capacity with maximum cake solids recorded at 19.3%. The cake solids result from each run with the primary sludge can be seen below in **Figure 3**.

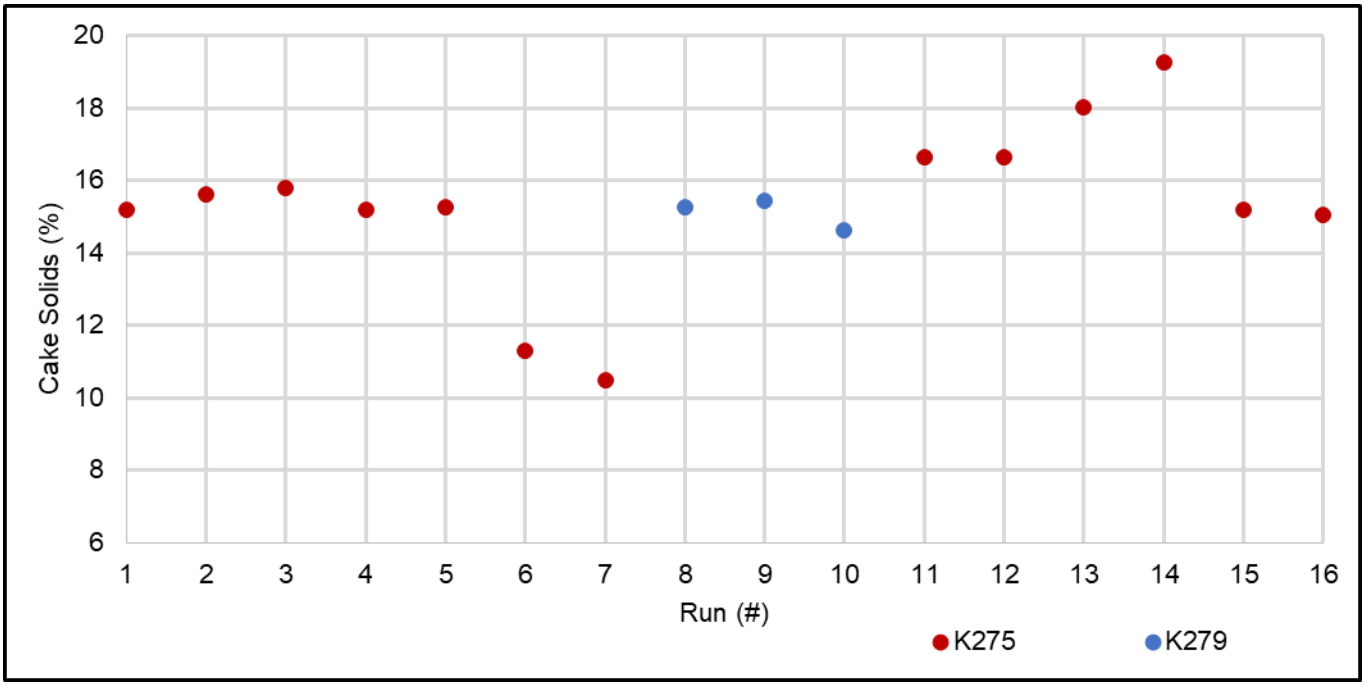


Figure 3: Cake solids results for each run

5.3. Solids Capture Performance

Solids capture rates averaged 97.4% for all runs with a polymer dosage higher than 20 active lbs/ton with maximum solids capture rate was recorded at 99.5%. All solids capture data for each run is shown below in **Figure 4**.

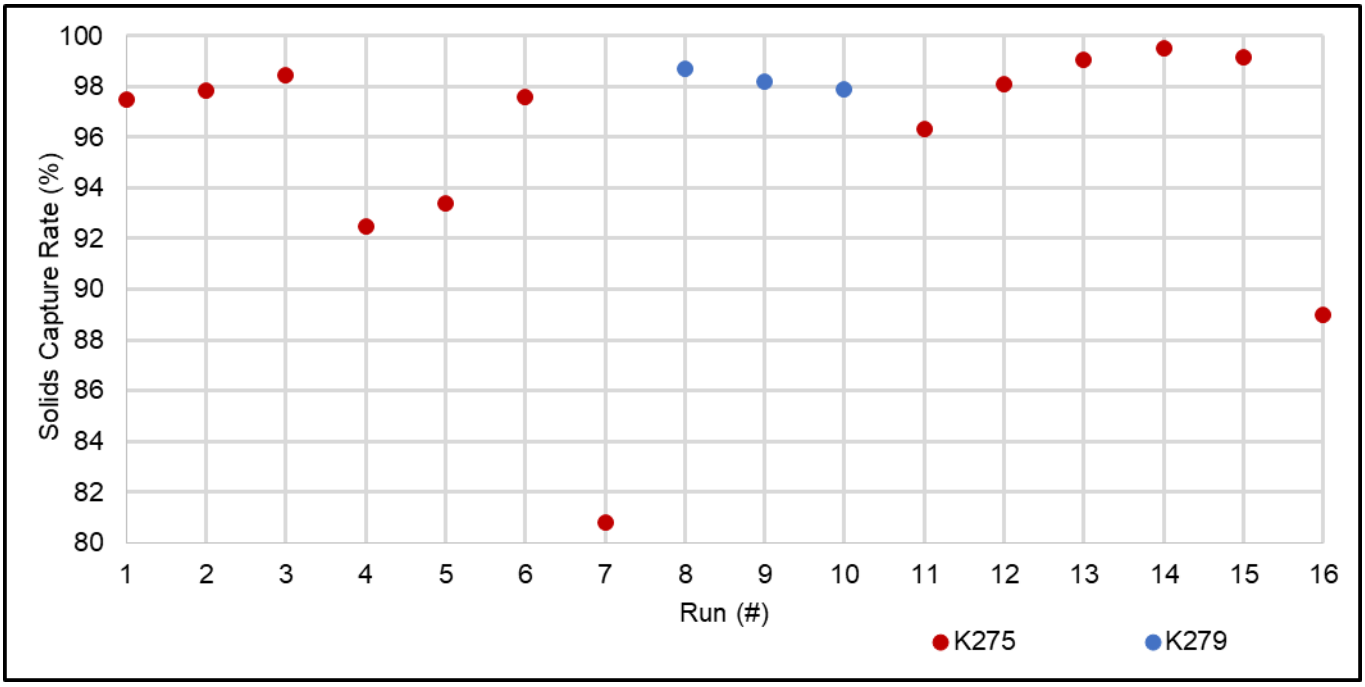


Figure 4: Solids capture rates for each run

The sudden drop in solids capture performance on run #7 was due to intentional polymer underdosing to see the limits of the unit's performance and are not indictive of typical performance.

5.4. Polymer Dosing

Cationic polymers Solenis Praestol K275 and Solenis Praestol K279 were tested during the pilot with dosages ranging from 7 to 44.2 active lbs/ton. The effects of polymer dosage on cake dryness are shown below in **Figure 5**.

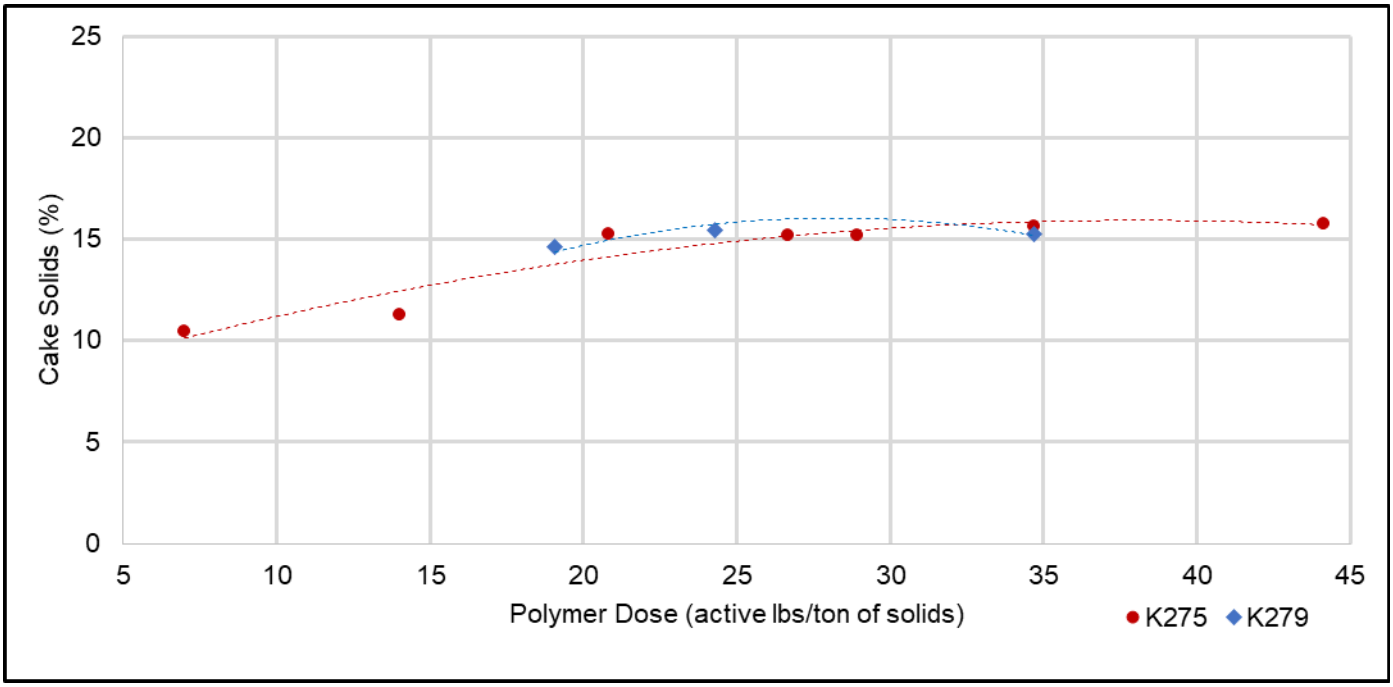


Figure 5: Cake solids vs. polymer dose

Polymer dosage also affects solids capture performance with a similar trend with cake solids, decreasing solid capture performance at underdosed and overdosed states. This is due to the floc losing structure resulting in solids escaping out of the drum with the filtrate effluent during the dewatering process. The effect of polymer dosage on solids capture is shown below in **Figure 6.**

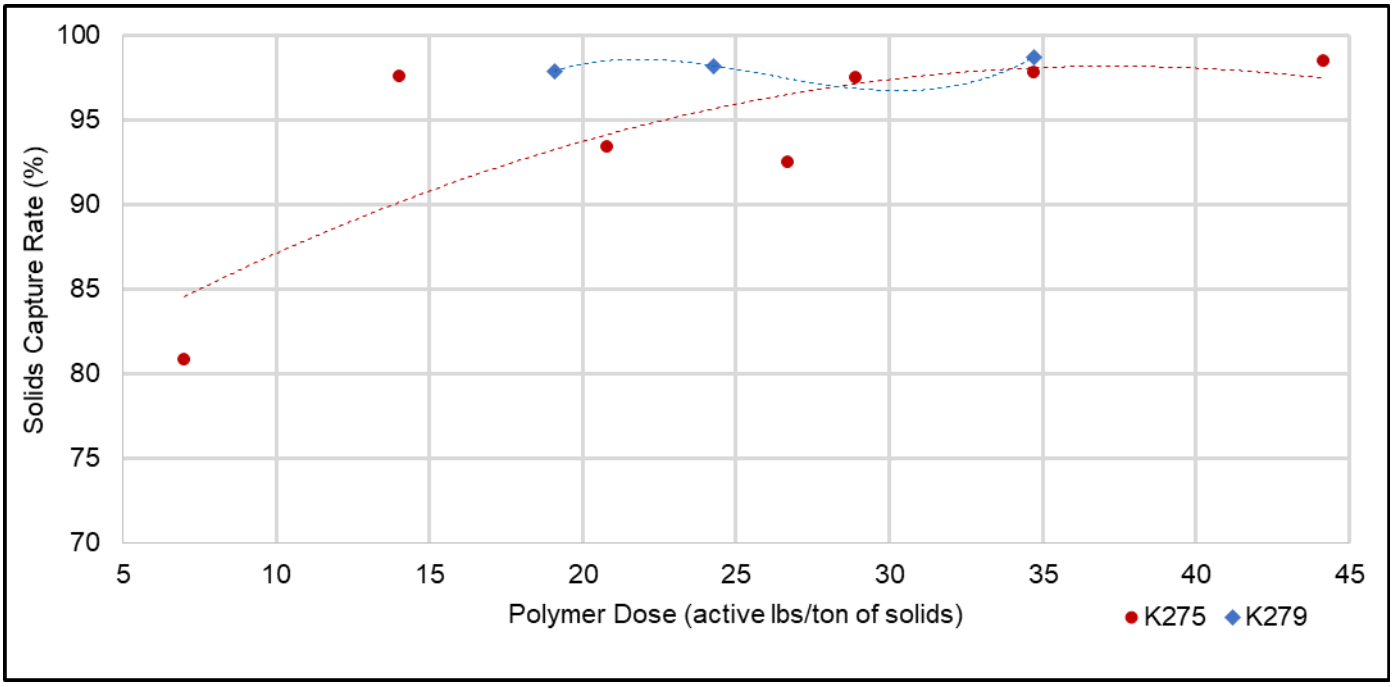


Figure 6: Solids capture rates vs. polymer dose

During testing with K275 cake solids averaged 15.4% at dosages above 20 active lbs/ton with maximum cake solids recorded at 15.8%. Solids capture rate for dosages above 20 active lbs/ton averaged at 95.9% with maximum solids capture rate recorded at 98.5%. An underdosed state was noted at 7 active lbs/ton with the low cake solids recorded at 10.5% and low capture rate recorded at 80.8%. Overdosage did not have a notable effect with dosages as high as 44.2 active lbs/ton not having notable negative changes in cake solids and solids capture rate performance.

K279 had cake solids averaging 15.1% with maximum cake solids recorded at 15.4%. Solids capture rate averaged 98.3% with maximum solids capture rater recorded at 98.7%. Polymer dosage testing with K279 was not as comprehensive as K275 with the goal of comparing the optimal performances of each polymer.

The optimal dosage for throughput testing was chosen at approximately 30 active lbs/ton of K275. K275 exhibited drier cake solids than K279 at a similar dosage with better dewatering performance at lower polymer dosages.

5.5. Hydraulic Throughput

Throughput testing was conducted at the optimal dosage of approximately 30 active lbs/ton from a low throughput of 2 GPM (15 dry lbs/hour) to a high throughput of 12 GPM (60 dry lbs/hour), 13% to 80% of the unit's maximum throughput capacity of 15 GPM. Hydraulic throughput was chosen as the method of measurement due to influent sludge

solids averaging approximately 1%. The throughput correlations with cake solid percentages and drum/screw speeds are outlined in **Figure 7**.

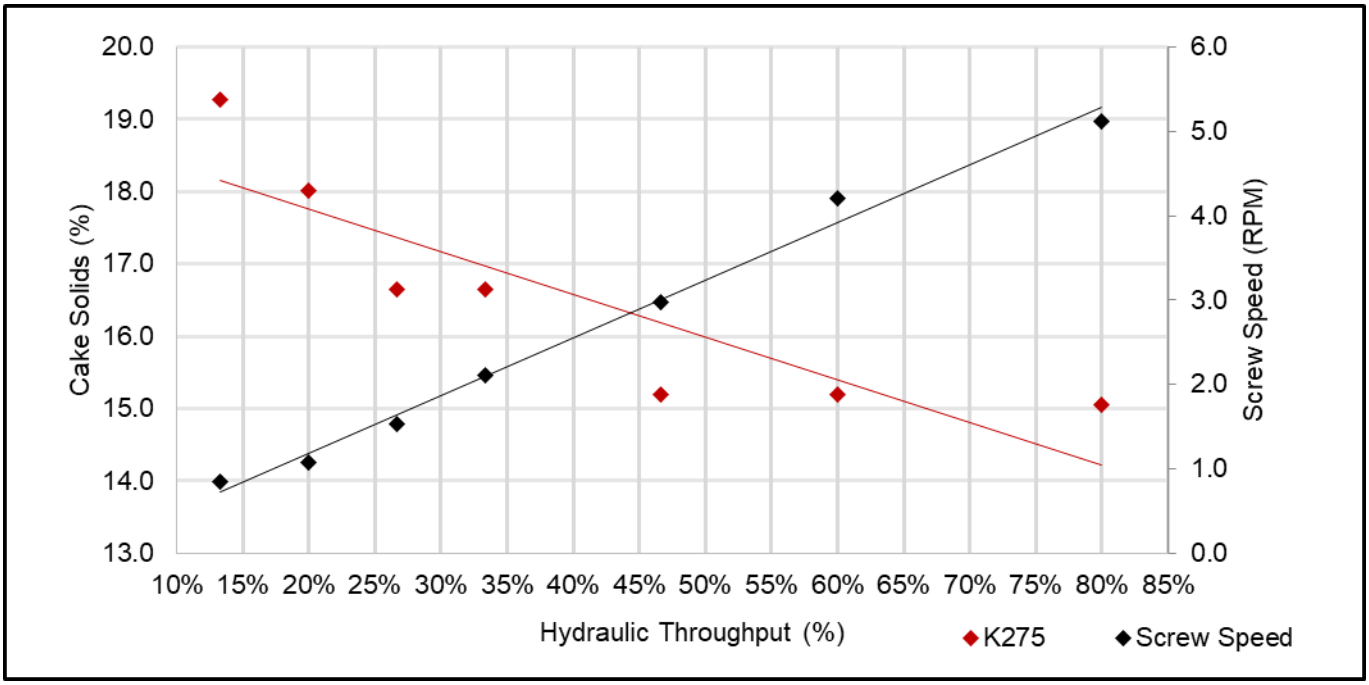


Figure 7: Cake solids & screw speed vs. throughput

Cake solids averaged 17.6% for all runs below 47% hydraulic throughput capacity. The highest cake solids dryness for the entire pilot was recorded at 19.3% during the 2 GPM low throughput run. Running the unit at a higher throughput and at a higher screw speed results in a decrease in cake solids performance as there is less time for dewatering to occur inside in the drum with notable decreases in cake dryness as screw speed increases in **Figure 7**. This also applies to solids capture performance, the floc inside the drum is broken up at higher screw speeds resulting in more solids escaping the drum. At the maximum throughput run of 12 GPM solids capture rate was recorded at 89.0%, well below the average solids capture rate of 97.4% recorded during dosage testing.

5.6. Power Consumption Analysis

Power readings for each component of the unit were taken during testing alongside sampling to determine the VDP's total power consumption. These values can be used to provide estimates for scaling up or down from initial pilot unit performance. The dewatering and total power usage at different throughputs is shown in **Figure 8**.

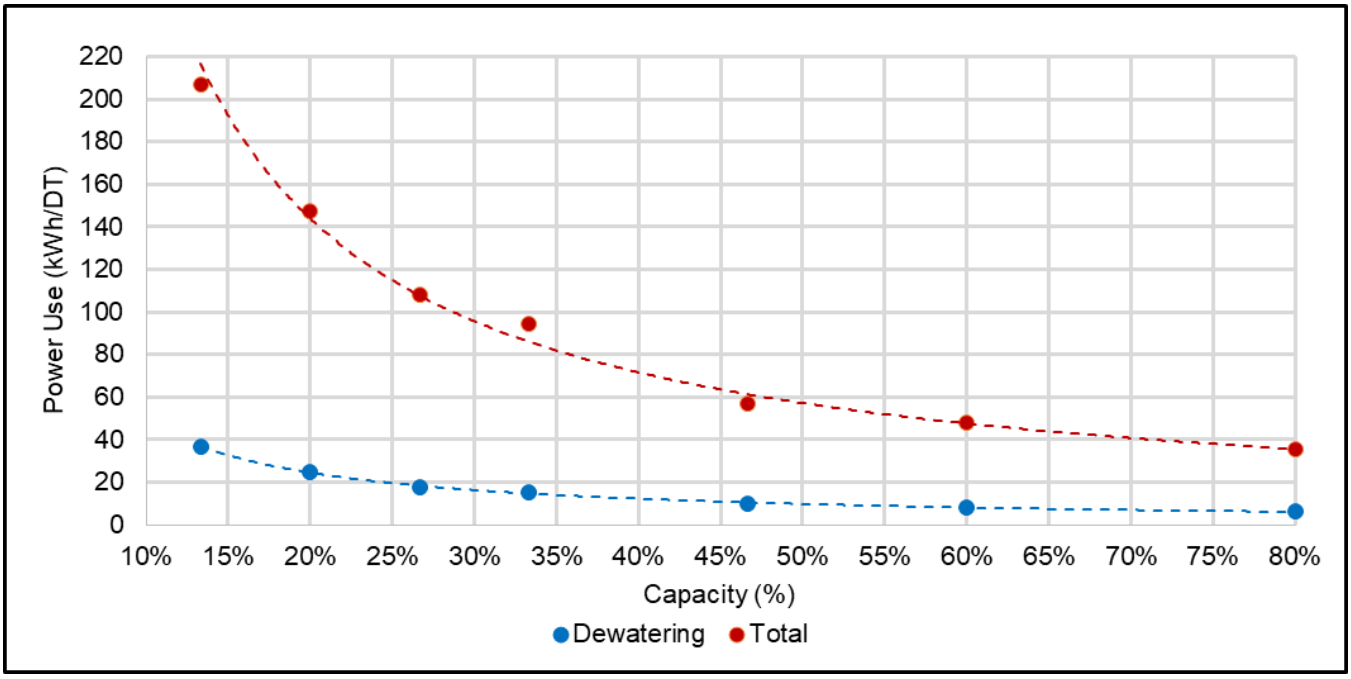


Figure 8: Power use vs. throughput capacity

Power use per ton of solids decreases with increasing capacity due to the power use not increasing at the same rate as the solids throughput. Dewatering power use only factors in the screw motors while total power is the power usage of all components in the system. As throughput increases the power usage in kilowatt hours per dry ton decreases with a minimum dewatering power usage at 6.15 kWh/DT and minimum total power usage at 35.3 kWh/DT at 80% capacity. Maximum dewatering power usage was recorded at 36.9 kWh/DT and total power usage at 207.0 kWh/DT at 13% capacity for all throughput runs. Dewatering power use averaged 13.2 kWh/DT and total power use averaged 78.4 kWh/DT for all runs throughout the pilot.

6. Conclusion

The Volute Dewatering Press model ES-132 successfully demonstrated its ability to dewater digested sludge at Johnson Creek WWTP in Johnson Creek, WI.

The pilot unit produced cake as dry as 19.3% solids and averaged 17.6% solids for optimal runs with solids capture rate averaging at 97.0% with a maximum solid capture rate recorded at 99.5%

The unit's reliability, ease of operation, low wash water requirements, and minimal maintenance requirements were all demonstrated to plant staff.

7. Acknowledgements

PWTech would like to extend a great deal of thanks to Johnson Creek WWTP plant staff assisting with the unit setup as well as helping throughout the pilot.

8. Appendix A- All Results

Date		2/6	2/6	2/6	2/6	2/6	2/7	2/7	2/7	2/7	2/7	2/8	2/8	2/8	2/8	2/8	2/8
Unit Parameters																	
Endplate gap	**[mm]**	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm	2mm
Drum Screw Speed	**[RPM]**	3.2	3.4	2.9	3.0	3.0	4.4	6.5	3.2	3.0	3.1	2.1	1.5	1.1	0.8	4.2	5.1
Flocculation Mixer Speed	**[RPM]**	20	20	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Flow	**[gpm]**	7	7	7	7	7	7	7	7	7	7	5	4	3	2	9	12
Chemical Dosing																	
Polymer		K275	K279	K279	K279	K275	K275	K275	K275	K275	K275	0	0	0	0	0	0
Raw Polymer Flow	**[mL/min]**	9	11	14	8	6	4	2	10	7	5.5	6	5.5	4	2.5	12	15
Percent Active	**[%]**	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Cost Per pound	**[$]**	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.64
Solids Concentration																	
Influent Solids	**[%]**	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cake Solids	**[%]**	15.2	15.6	15.8	15.2	15.3	11.3	10.5	15.3	15.4	14.6	16.7	16.6	18.0	19.3	15.2	15.1
Pressate Solids	**[mg/L]**	270	240	170	780	660	240	1900	130	180	210	350	200	96	50	87	1100
Calculated Parameters																	
Solids Throughput	**[#/hour]**	38	38	38	36	35	35	35	35	35	35	24	21	15	10	45	60
Solids Capture	**[%]**	97.5	97.8	98.5	92.5	93.4	97.6	80.8	98.7	98.2	97.9	96.3	98.1	99.0	99.5	99.1	89.0
Active Polymer Use	**[lbs/ton]**	29	35	44	27	21	14	7	35	24	19	31	32	30	29	32	30
Dewatering Energy Use	**[kWh/DT]**	10	10	10	10	11	11	11	11	11	11	15	18	25	37	8	6
Total Energy Use	**[kWh/DT]**	55	58	58	57	62	67	65	64	64	64	94	108	147	207	48	35
Polymer Cost per Ton	**[$]**	103	124	157	95	74	50	2	124	87	68	109	114	115	108	115	108

Table 2: All results from pilot testing

9. Appendix B- Table 2 Calculations expanded

Active Polymer Use relates polymer used to solids generated. It is the ratio of active polymer used to solids throughput and is commonly calculated as pounds of active polymer per dry ton of solids. In order to show this calculation, solids throughput and active polymer flowrate are calculated first. Sludge is assumed to have a specific gravity of 1.

Solids Throughput: calculated for one hour.

$$Sludge\ Flowrate\ (gpm) * 60\ \frac{min}{hour} * 8.35\ \frac{lb}{gallon} = pounds\ of\ sludge\ per\ hour$$

$$\frac{influent\ solids\ \%}{100} * \frac{lbs\ of\ sludge}{hour} = lbs\ of\ solids\ per\ hour$$

Active Polymer Flow for one hour is calculated from Raw Polymer Flow:

$$\frac{mLs\ of\ raw\ polymer}{minute} * 60\ \frac{min}{hr} * \frac{\%\ active}{100} * .0022\ \frac{lbs}{mL} = lbs\ of\ active\ polymer\ per\ hour$$

Active Polymer Use is the ratio of Active Polymer Flow to Solids Throughput:

$$\frac{lbs\ of\ active\ polymer\ per\ hour}{lbs\ of\ solids\ per\ hour} * 2000\frac{lbs}{ton} = lbs\ of\ active\ polymer\ per\ dry\ ton\ of\ solids$$

Polymer Cost per Ton of Solids is calculated from Active Polymer Use and Solids Throughput:

$$\frac{lbs\ of\ active\ polymer}{dry\ ton\ of\ solids} / \frac{\%\ active}{100} = lbs\ of\ raw\ polymer\ per\ dry\ ton\ of\ solids$$

$$\frac{lbs\ of\ raw\ polymer}{dry\ ton\ of\ solids} * \frac{\$}{lbs\ of\ raw\ polymer} = \$\ per\ dry\ ton\ of\ solids$$

The total and dewatering energy consumption in kilowatt-hours (kWh) of the Volute pilot unit can be calculated using the current and voltage obtained from the drum, flash tank mixer, and flocculation tank mixer motor VFDs within the Volute control panel. Amperage and Voltage readings are obtained during each hour-long run. The energy consumption can be scaled to larger production models by relating this value to the calculated solids throughput (dry lbs/hour) the unit was operating at.

Power use of each component (drum motors, flash tank mixer motor, flocculation tank mixer motor, feed pump) of the Volute:

$$Motor\ Amperage\ (A) \times Motor\ Voltage\ (V) \times \frac{1\ kW}{1000\ W} = Motor\ Power\ Usage\ (kW)$$

Total Energy Consumption (kW) is obtained by adding all Volute component motor power usages:

$$Total\ kW = [Feed\ Pump\ Motor\ Power\ (kW) + Drum\ Motors\ Power\ (kW) + Flash\ Mixer\ Motor\ Power\ (kW) + Floc\ Mixer\ Motor\ Power\ (kW)]$$

Total Energy Use (kWh/dry ton) is obtained by dividing the total power by the Solids Throughput per hour:

$$\frac{kWh}{ton} = [Total\ kW / (\frac{lbs\ of\ solids}{hour} \times \frac{1\ ton}{2000\ lbs})]$$

The Dewatering Energy Use is similarly calculated using the Drum Power:

$$\frac{kWh}{ton} = [Total\ Drums\ kW / (\frac{lbs\ of\ solids}{hour} \times \frac{1\ ton}{2000\ lbs})]$$

Example calculations for Sample # 4:

Note: Numbers in the spreadsheet are rounded to the nearest tenth place and nearest integer to keep it neat and easily readable. Numbers may vary slightly from the example calculations below.

Solids throughput:

$$7\ gpm\ *\ 60\ \frac{min}{hr}\ *\ 8.35\ \frac{lb}{gallon} = 3{,}507\ lbs\ of\ sludge\ per\ hour$$

$$\frac{1.04\%}{100} * \frac{3{,}507\ lbs}{hour} = 36.47\ lbs\ of\ solids\ per\ hour$$

Active Polymer Flow for one hour is calculated from Raw Polymer Flow:

$$\frac{8\ mLs}{minute} * 60\ \frac{min}{hr} * \frac{46\%}{100} * .0022\ \frac{lbs}{mL} = 0.49\ lbs\ per\ hour$$

Active Polymer Use is the ratio of Active Polymer Flow to Solids Throughput:

$$\frac{0.49\ lbs\ polymer}{36.47\ lbs\ solids} * 2000\frac{lbs}{ton} = 26.32\ lbs\ of\ active\ polymer\ per\ dry\ ton\ of\ solids$$

Polymer Cost per Ton of Solids is calculated from Active Polymer Use and Solids Throughput:

$$\frac{26.32\ lbs}{dry\ ton\ of\ solids} * \frac{100}{46\%} = 57.22\ lbs\ of\ raw\ polymer\ per\ dry\ ton\ of\ solids$$

$$\frac{57.22\ lbs\ of\ raw\ polymer}{dry\ ton\ of\ solids} * \frac{\$\ 1.5}{lbs\ of\ raw\ polymer} = \$85.83\ per\ dry\ ton\ of\ solids$$

Power use of each component (drum motors, flash tank mixer motor, flocculation tank mixer motor, feed pump) of the Volute:

$$Drum\ 1\ Motor\ Power\ = 0.4A * 233.2V * \frac{1kW}{1000W} = 0.093\ kW$$

$$Drum\ 1\ Motor\ Power\ = 0.4A * 228.9V * \frac{1kW}{1000W} = 0.092\ kW$$

$$Floc\ Tank\ Mixer\ Motor\ Power\ = 0.4A * 229V * \frac{1kW}{1000W} = 0.092\ kW$$

$$Flash\ Tank\ Mixer\ Motor\ Power\ = 0.4A * 230.6V * \frac{1kW}{1000W} = 0.092\ kW$$

$$Feed\ Pump\ Motor\ Power\ = 3.3A * 230.2V * \frac{1kW}{1000W} = 0.76\ kW$$

Total Energy Consumption (kW) is obtained by adding all Volute component motor power usages:

$$Total\ Energy\ Consumption\ (kW) = 0.093kW + 0.092kW + \ 0.092\ kW + 0.092kW + 0.76Kw$$
$$= \ 1.13\ kW$$

Total Energy Use (kWh/dry ton) is obtained by dividing the Total Energy Consumption by the Solids Throughput per hour:

$$\frac{1.13\ kW}{(\frac{57.22\ dry\ lbs}{hour} * \frac{1\ ton}{2000\ lbs})} = \frac{39.45\ kWh}{dry\ ton}$$

Dewatering Energy use (kWh/dry ton) is obtained by dividing the Total Drum Power by the Solids Throughput per hour:

$$\frac{0.185\ kW}{(\frac{57.22\ dry\ lbs}{hour} * \frac{1\ ton}{2000\ lbs})} = \frac{6.467\ kWh}{dry\ ton}$$

Sigtermans, Louis

From: aj@Shincci-USA.com <aj@sunstateinc.com>
Sent: Tuesday, February 13, 2024 8:50 PM
To: Sigtermans, Louis
Cc: Daniels, Peter; Moring, Christian; Friel, John; 'Abdullah Jalal'; 'Greg Miller'; 'Meena Jamil'; 'Rick Miller'; 'Paul Nygaard'; 'Greg Nygaard'
Subject: RE: Johnson Creek sludge trialPaul Nygaard <pauln@theicsgrp.com>
Attachments: IMG_5687.jpg

Follow Up Flag: Follow up
Flag Status: Completed

Hello all,

Everything I sent yesterday in the document applies to our technology.

I checked with Rick to determine why the dried biosolids is at 64% TS. He indicated that the dried materials are very dry, and they are close to bone dry biosolids. He sent me a picture which I am sharing with you.

I requested that he checks his weighing and weigh the materials again. He found out that he recorded the final weight incorrectly by not subtracting the weight of the bucket that contained the dried biosolids. He weighed the materials again and found out that the weight of the bucket is 5.65 lbs.

When subtracting the weight of the bucket the weight of the dried materials can be determined as 11.6 lbs.

If you plug the 11.6 lbs. into the spreadsheet for the final weight, percent total solids (solids concentration) is actually 94.9% as shown in the spreadsheet shown below. The materials themselves are very dry as shown in the picture.

Initial					
Solids concentration	14%				
Total weight	78.6	lbs			
Solids weight	11.0	lbs			
Water weight	67.6	lbs			
Final					
Solids concentration	94.9%				
Total weight	11.6	lbs			
Solids weight	11.0	lbs	Assumes 100% capture		
Water weight	0.6	lbs			

Thank you,

AJ

AJ Tamimi, PhD, Executive Vice President-Engineering, Design and Technology Officer
SHINCCI-USA
4743 E. 30th Place, Yuma, AZ 85365
Tel: +1 (520) 834-2433
Email: AJ@Shincci-USA.com
URL: http://www.Shincci-USA.com
Low Cost Efficient Water-Solids Separation Technologies for Beneficial Reuse
Low Temperature Mesh-Belt Type Sludge Dehumidification Systems

From: aj@Shincci-USA.com <aj@sunstateinc.com>
Sent: Monday, February 12, 2024 6:13 PM
To: 'Sigtermans, Louis' <louis.sigtermans@stantec.com>
Cc: 'AJ Tamimi' <aj@shincci-usa.com>; 'Daniels, Peter' <peter.daniels@stantec.com>; 'Moring, Christian' <Christian.Moring@stantec.com>; 'Friel, John' <John.Friel@stantec.com>; 'Abdullah Jalal' <Adam@shincci-usa.com>; 'Greg Miller' <greg@shincci-usa.com>; 'Meena Jamil' <meenatamimi@gmail.com>; 'Rick Miller' <rick.miller4@icloud.com>; 'Paul Nygaard' <pauln@theicsgrp.com>; 'Greg Nygaard' <gregn@theicsgrp.com>
Subject: RE: Johnson Creek sludge trialPaul Nygaard <pauln@theicsgrp.com>

Hello Louis,

Please see attached file answers to your questions.

Thank you,

AJ

AJ Tamimi, PhD, Executive Vice President-Engineering, Design and Technology Officer
SHINCCI-USA
4743 E. 30th Place, Yuma, AZ 85365
Tel: +1 (520) 834-2433
Email: AJ@Shincci-USA.com
URL: http://www.Shincci-USA.com
Low Cost Efficient Water-Solids Separation Technologies for Beneficial Reuse
Low Temperature Mesh-Belt Type Sludge Dehumidification Systems

From: Sigtermans, Louis <louis.sigtermans@stantec.com>
Sent: Monday, February 12, 2024 11:04 AM
To: Rick Miller <rick.miller4@icloud.com>; Greg Nygaard <gregn@theicsgrp.com>; Paul Nygaard <pauln@theicsgrp.com>
Cc: AJ Tamimi <aj@shincci-usa.com>; Daniels, Peter <peter.daniels@stantec.com>; Moring, Christian <Christian.Moring@stantec.com>; Friel, John <John.Friel@stantec.com>; Abdullah Jalal <Adam@shincci-usa.com>; Greg Miller <greg@shincci-usa.com>; Meena Jamil <meenatamimi@gmail.com>
Subject: RE: Johnson Creek sludge trial

Thanks Rick. We don't need the sample shipped back.

Greg/Paul – can you follow up with PWTech to confirm that they will share a final report on the volute press pilot? Were they able to achieve 18-20% solids?

Some questions for the team:

- We did some rough math (see attached), and it looks like you achieved about 64% solids. One of the primary drivers of this project is to achieve 90+% solids and Class A biosolids. Can you confirm our math and let us know if you'd still expect to be able to get to 90+ percent in full scale operation?
- How does digestion of sludge impact the performance of the dryer – did this sample exhibit any issues related to partially digested or undigested secondary solids? Note that there are no primary clarifiers at this facility, but there is an aerobic digester.
- Is there anything else other than improving upstream dewatering performance that would be recommended to optimize the dryer results to reach 90+%?
- Are any revisions needed for the Shincci or PWTech proposals based on last week's test results?

Louis Sigtermans PE (MN)
Environmental Engineer

Direct: (612) 895-5022
Mobile: (952) 378-0040
louis.sigtermans@stantec.com

Stantec
733 Marquette Avenue Suite 1000
Minneapolis MN 55402-2314

From: Rick Miller <rick.miller4@icloud.com>
Sent: Friday, February 9, 2024 9:06 AM
To: Sigtermans, Louis <louis.sigtermans@stantec.com>; Paul Nygaard <pauln@theicsgrp.com>; AJ Tamimi <aj@shincci-usa.com>; Daniels, Peter <peter.daniels@stantec.com>; Moring, Christian <Christian.Moring@stantec.com>; Friel, John <John.Friel@stantec.com>; Abdullah Jalal <Adam@shincci-usa.com>; Greg Miller <greg@shincci-usa.com>; Meena Jamil <meenatamimi@gmail.com>; Greg Nygaard <gregn@theicsgrp.com>
Subject: Johnson Creek sludge trial

Download full resolution images
Available until Mar 10, 2024

To all,

2/9/24 we received the sludge samples. We ran the samples in our pilot dryer. The sludge was estimated to be 14% dry after processing through PW Tech screw press.
Sludge was able to shape and hold its shape. The material formed short “noodles” rather than long strands. I left the dryer settings the same as I dry 18-20% sludge. Sludge dried very well. Initial weight was 78.6 lbs. final weight was 17.25 lbs.
if dewatering could be increased to 20% the final product should be better. Let me know if you would like to have a sample (all or part) shipped back. Contact us if you have any questions or concerns. Thanks.

Click to Download
IMG_5618.MOV
0 bytes

Click to Download
IMG_5617.MOV
0 bytes

Rick Miller
President SES Inc.
928-920-9056

Ziploc
FOLD & FILL

SHINCCI-USA

Johnson Greek WWTP Project, Johnson Greek, WI

Engineer's Comments and Questions Regarding the Shincci-USA Dehumidification System

Updated February 12, 2024

Engineers New Questions via email dated February 12, 2024

- We did some rough math (see attached), and it looks like you achieved about 64% solids. One of the primary drivers of this project is to achieve 90+% solids and Class A biosolids. Can you confirm our math and let us know if you'd still expect to be able to get to 90+ percent in full scale operation?

The math is correct. Final product % total solids is based on optimized operational parameters that are arrived at after commissioning the system by different trials using factorial analysis. The mobile unit is optimized and has the operational parameters set to dry wet sludge cake from 20%. If you plug the 20% into the spreadsheet, the final product would be at 91.3%.

The 14% total solids measured by PWTech uses the burn method is not accurate. From experience, I know that the burn method inflates the reading by at least 2%. All % total solids we use have to be completed in the lab using the U.S. EPA protocol: drying in an oven at 106℃ for at least 24 hours.

We guarantee that if the Shincci-USA dehumidification system receives wet sludge cake with a minimum % total solids of 18%, the system will dry the sludge cake to at least 90%. Percent total solids of the final product is dependent on drying time and other optimized operational parameters as indicted above.

We also guarantee that the final product will meet Class A biosolids as per Alternative 1 of the WDNR regulations.

- How does digestion of sludge impact the performance of the dryer – did this sample exhibit any issues related to partially digested or undigested secondary solids? Note that there are no primary clarifiers at this facility, but there is an aerobic digester.

From my experience, aerobic digesters serve as holding tanks with aeration to avoid liquid sludge going septic. Residence time is usually a few days at the most and not too much digestion takes place. If this is not the case, please let me know.

The Shincci-USA dehumidificaiton system will work with digested, undigested, primary, secondary or a blend of primary and secondary at any ratio. The system will operate based on

the experimental optimized operational parameters that are obtained during commissioning. We can claim the above statement since the dehumidification system is designed based on evaporative capacity and volume of water that the system is capable of evaporating per unit time.

- Is there anything else other than improving upstream dewatering performance that would be recommended to optimize the dryer results to reach 90+%?

The Johnson Creek dehumidification system was designed to dry wet sludge cake from at least 18% to a minimum of 90%. If those design parameters are not realistic and the wet sludge cake is going to be at %TS lower than 18%; and there is a need to see % TS of final dry product higher than 90%; then please provide us with the new parameters and we will modify the design.

- Are any revisions needed for the Shincci or PWTech proposals based on last week's test results?

That is up to the consulting engineer and the owner. My understanding is that the wet sludge cake produced after the sample was sent achieved 18%. Also, the PWTech trial unit that was used to dewater liquid sludge does not use optimized polymer types and dose. PWTech only uses one polymer that fits that small unit. Which means that the PWTech press will be able to produce at least 18% total solids when polymer type and quantity are optimized. Please let me know if you think otherwise.

Appendix H – Concept Design Sketches

FIGURE 1A - SLUDGE DEWATERING AND THERMAL TREATMENT CONCEPT PLAN

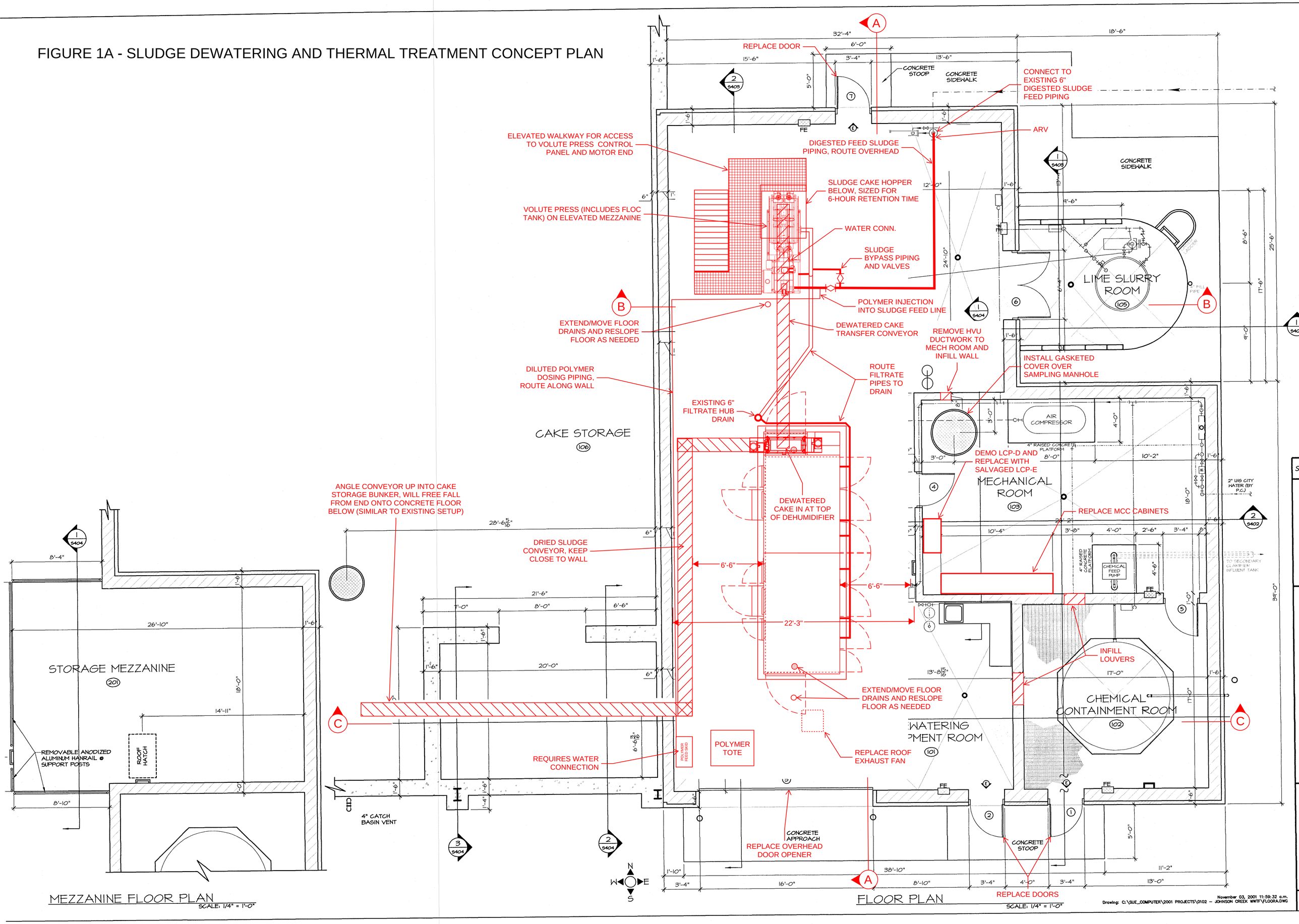
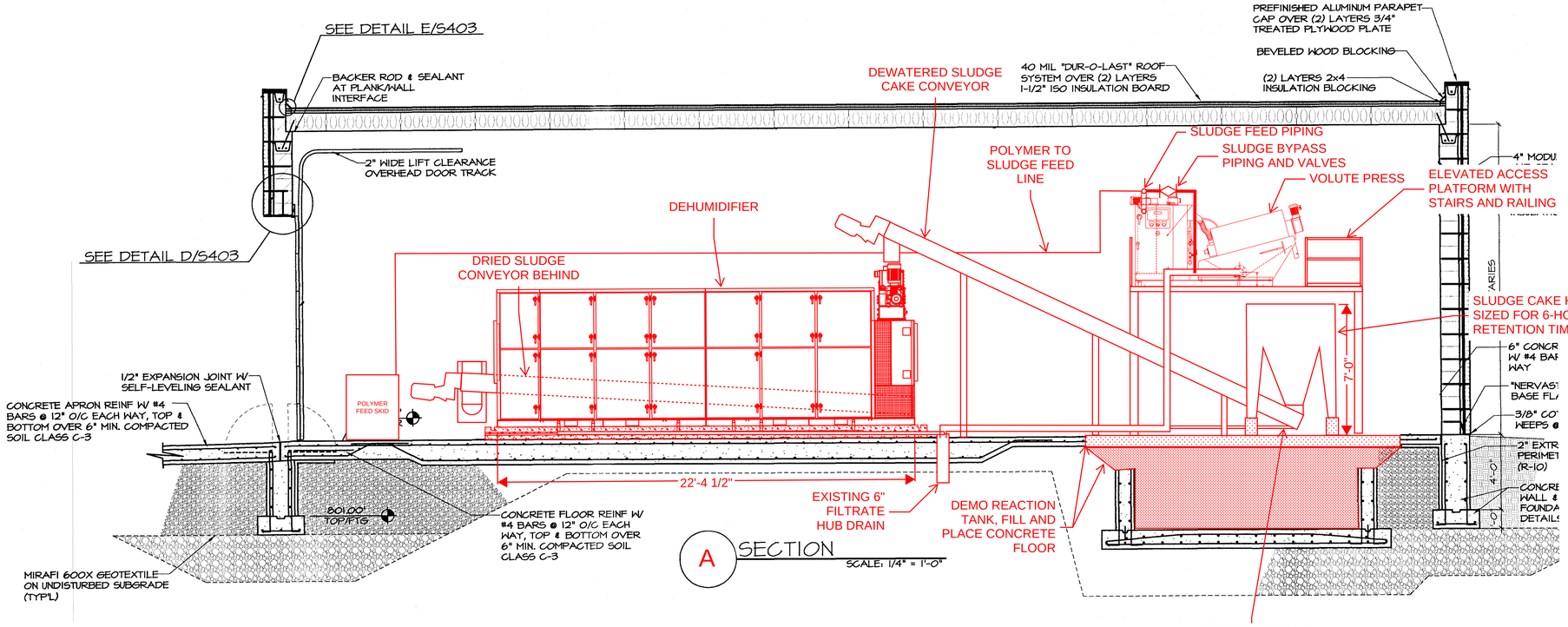
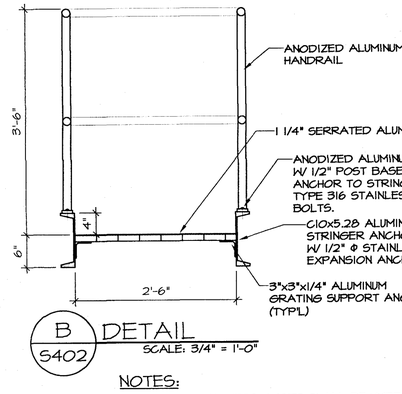


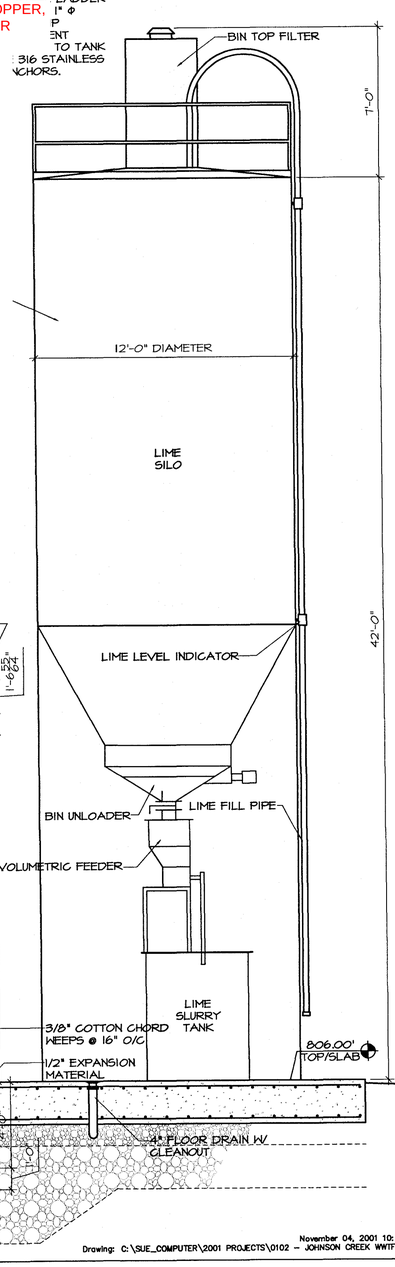
FIGURE 1B - SLUDGE DEWATERING AND THERMAL TREATMENT CONCEPT SECTIONS





NOTES:

1. ALL BOLTS, WASHERS, & NUTS SHALL BE TYPE STAINLESS STEEL.
2. PROVIDE WASHERS UNDER ALL BOLT HEADS
3. PROVIDE BEVELED WASHERS AS REQUIRED T PROVIDE UNIFORM BOLT OR NUT BEARING.



November 04, 2001 10:25:00 a.m.
Drawing: C:\SUE_COMPUTER\2001 PROJECTS\0102 - JOHNSON CREEK WWTF\SECA.DWG

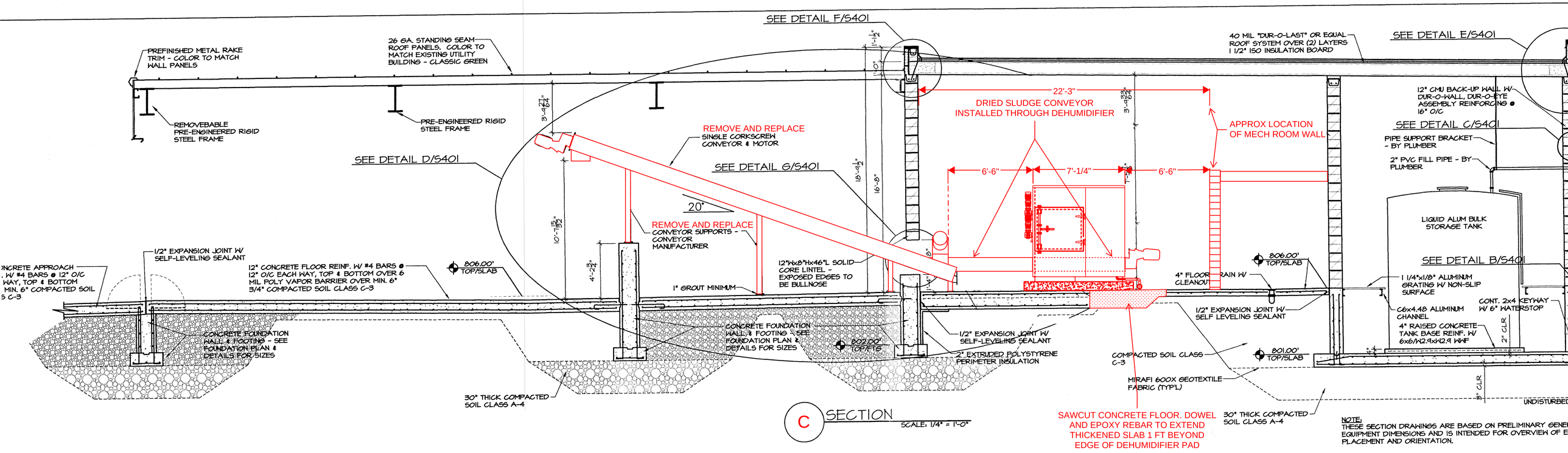


FIGURE 1C - SLUDGE DEWATERING AND THERMAL TREATMENT CONCEPT SECTIONS