Petawawa Net Zero Facility Design and Operations Report

Amended June 20, 2025

Contents

1 Introduction

This Design and Operations Report has been written in accordance with the guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP) in May 2019 entitled: "Chapter 6: Guidance for preparing the Design and Operations Report" as presented on the Government of Ontario website. This report is required by the MECP to satisfy part of the requirements for a Renewable Energy Approval (REA) under Ontario Regulation 359/09 Renewable Energy Approvals Under Part V.0.1. Of the Environmental Protection Act (O. Reg. 359/09).

Specially, the Design and Operation Plan Report will describe the following:

- The site plan;
- The design of the facility and the equipment to be used (Facility Design Plan);
- How the facility will be operated (Facility Operations Plan);
- How environmental effects will be monitored and mitigated (Environmental Effects Monitoring Plan (EEMP)); and
- Emergency Response and Communication Plans

1.1 Report Requirements

The Design and Operation Report is the principal document where the details of the renewable energy project are presented. Aspects of the Project outside of the operation phase such as construction and decommissioning are addressed within separate reports as part of the REA application.

This Design and Operations Report has been prepared in accordance with Table 1 of O. Reg. 359/09.

2 Project Overview

The Petawawa Net Zero project (Project) will transform Petawawa Water Pollution Control Plant (WPCP) into a Resource Recovery Facility by upgrading its anaerobic digesters to divert waste from landfill and boost biogas production for use as electricity, making the plant energy neutral or positive, and reducing GHG emissions. This will involve the generation and utilization of biogas at site in a Combined Heat and Power (CHP) Unit and move the WPCP towards Net Zero, and in the future include upgrading biogas to Renewable Natural Gas (RNG).

The location of the project site is situated within the Petawawa WPCP (Water Pollution Control Plant) located at 560 Abbie Lane, Petawawa, County of Renfrew, K8H 2X2 (Site).

The basic components of the Town of Petawawa Net Zero Energy project will include the following:

- Slurry & Septage Reception Skid
- Dedicated Insulated & Heat-Traced Organics Reception Tank

- Organics Slurry feed pumps to Anaerobic Digestion
- Sludge Screw Thickener (SST) skid
- Anaerobic Digester (s) Mixers
- Replacement of existing Anaerobic Digester Roof with double membrane geo textile roof.
- Upgrade of existing biogas system
    - Combined Heat and Power Unit
    - Biogas Upgrading to RNG
- Overall process control system.

The Project will be constructed and developed in two phases:

Phase 0

- Upgrades to existing digesters to co-digest biosolids and organic slurry to produce renewable energy.
- Installation of a Combined Heat & Power (CHP) Engine to combust biogas produced from co digestion of biosolids and polished organic slurry and generate electricity and heat. Electricity will be used to offset plant electrical demand and heat will be used to heat anaerobic digesters.

Phase 1-2

- Augment digestate management with dewatering. The dry digestate (Cake) will be sent out for beneficial use.
- Additional biogas generated will be used for producing RNG. RNG will be injected in the natural gas grid system.

3 Project Location

The location of the project site is situated within the Petawawa Water Pollution Control Plant, located at 560 Abbie Lane, Petawawa, County of Renfrew, K8H 2X2 (Site).

The land required for the Petawawa Net Zero will be built around the existing Digesters # 3 and # 4. There is also a corner of the north western portion of the site utilized for the emergency flare and biogas conditioning and utilizing systems (CHP and RNG).

There is an existing electricity distribution connection owned and operated by HydroOne Inc. that will be used to connect the Project to the local grid.

4 Site Plan

The site plans for the project are provided in Appendix A. The principal elements of the site plan are:

Existing sludge digestion infrastructure:

- Digester # 3 and # 4
- Digester Gallery between Digesters # 3 and # 4
- Digester # 1 and # 2

- Digester Gallery between Digesters # 1 and # 2
- Sludge Holding Tanks
- Digesters # 1 and # 2 are not be upgraded as part of the Project
- The project will not make any modifications to the WPCP liquid treatment train

Phase 0:

- Upgrades of Digesters #3 and #4 including new membrane roofs
- Organic slurry reception skid
- An H_2S removal system;
- A biogas conditioning skid;
- A containerized Combined Heat and Power (CHP) unit;
- Emergency flare;

Phase 1-2:

- Thickener Building;
- Buffer Tank;
- Slurry Holding Tank;
- Scale;
- Dewatering Building;
- A H_2S removal system upgrade;
- A second biogas conditioning skid;
- A biogas to RNG upgrading system (membrane based);

No easements, etc. are required for the project. The only areas on the site where emissions are discharged to the air are the silencer / exhausts of CHP and biogas upgrade units and the flare. The Site Plan was prepared in accordance with O. Reg. 359/09 and the guidance provided in Chapter 5 of the Technical Guide to Renewable Energy Approvals (MOE, 2019). Site plans are generally required to include one or more maps or diagram that depict the following at and within 300 m of the Project Location:

- Buildings or Structures:
- Road, utility corridors, rights-of-way, and easements;
- Groundwater and surface water supplies used at the facility (i.e. wells);
- Any things from which contaminants are discharged into the air;

- Any works for the collection, transmission, treatment, and disposal of sewage;
- Any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of;
- Any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility;
- Transformer substation location; and
- Land contours indicating surface drainage.

5 Biogas Plant Design

Please refer to mechanical drawings in the Appendix B, providing the following details:

- Schematic drawings of the following areas:
  - Thickener Building;
  - Digesters # 3 and 4;
  - Dewatering Building;
  - Biogas Processing;
- Technical descriptions of the following processes:
  - Buffer Tank (including all ancillaries);
  - Slurry Storage Tank (including all ancillaries);
  - Thickener Building;
  - Digester # 3 and 4 Retrofits;
  - Biogas Upgrades; and,
  - Dewatering Building;

The Project will be built in phases, primarily Phase 0 and Phase 1-2. The first is Phase 0, which include addition of CHP, upgrades to digesters and organics receiving. Phase 1-2 involves the addition of a waste reception building, sludge thickening, biosolids dewatering and the capability of producing Renewable Natural Gas with a biogas upgrading unit, along with an increase in the amount of organics received at the facility. Phase 0 will be implemented in the near term, with future phases following on the lessons learned in Phase 0.

5.1 Process Design

The Petawawa Net Zero Facility will take a clean food waste slurry and co-digest it with biosolids from the WPCP (refer to Appendix C for and isometric drawing of Phase 0 and block flow diagrams of phases 0 and 1-2). Existing digester tanks at the Petawawa WPCP, which are not currently in operation, will be refurbished and enhanced to allow for the co-digestion of these organics waste stream.

The following sections of the plan will describe the processes that will accept and process WPCP biosolids and trucked in polished organic slurry.

5.2 Buffer Storage Tank (WPCP Biosolids Storage, Phase 1-2)

Primary sludge and Thickened Waste Activated Sludge is conveyed from the Petawawa WPCP to the buffer tank, bolted steel tank (Vol. 345 m^3, Dim: 6.83 m Dia. x 11 m height).

Equipment installed in the buffer storage tank, includes a high solid mixer, used to keep solids circulating within the buffer storage tank, and a heating coil to ensure that a minimum temperature is maintained within the buffer storage tank (10 C).

The buffer storage tank is used to fed to the thickeners.

5.3 Slurry Holding Tank (Phase 1-2)

The slurry holding tank is a bolted steel tank (Vol. 400 m^3, Dim: 8.51 m Dia. x 8.53 m height).

Equipment installed in the slurry holding tank, includes a high solid mixer, used to keep solids circulating within

the buffer storage tank, and a heating coil to ensure that a minimum temperature is maintained within the buffer storage tank (10 C).

The slurry holding tank is then fed to digesters # 3 and 4.

5.4 Thickener Building (Phase 1-2)

The thickener building houses the following components:

- Slurry Reception Skid;
- Septage Receiving Skid;
- Thickener;
    - Polymer Make-down System
- Chemical Dosage System;
- Transfer Pumps;
- Building Ancillaries; and,
- Building structures.

5.4.1 Slurry Reception Skid (Phase 0 and 1-2)

The slurry is transported to site via truck, which will be received through a camlock connection feeding through a rock trap, macerator, and feed pump to the slurry holding tank. A slurry reception skid is also included in Phase 0 and will be located in the digester gallery.

Capacity of the skidded unit: 200 GPM – 500 GPM;

5.4.2 Septage Reception Skid (Phase 1-2)

The septage is transported to site via truck, which will be received through a camlock connection feeding through a rock trap, grinder, and solids separator. The liquid portion of the septage is conveyed to the slurry holding tank, the solid portion of the septage is disposed of using a rolling bin.

Capacity of the septage reception unit: 400 GPM.

5.4.3 Thickener (Phase 1-2)

From the buffer tank, transfer pumps feed duty/standby thickener screw presses, which thicken the solids content of the sludge from 1-6% solids to 12-14% solids. The thickened stream is conveyed via progressive cavity pumps to digesters #3 and 4. The filtrate from the screw press drains by gravity the building sump where duty / standby sump pumps will convey the sump contents to a leachate return line located in the building between digesters # 1 and 2, which will return the sump contents to the head of the WPCP. .

The thickening units themselves consist of an inline mixer, flocculation tank, and thickener unit all skid mounted onto extension legs, with a mezzanine located around the thickening unit to allow for access.

Capacity of Thickener:	35 m3/hr @ 2% Inlet TSS
	11 m3/hr @ 6% Inlet TSS
Solids Capacity:	700 kg TSS/hr

A progressive cavity pump is placed below the solids outlet of the thickener with a hopper to allow for thickened solids collection and conveyance to Digesters # 3 and 4.

5.4.4 Polymer Make-down System (Phase 1-2)

To provide reliable thickening, polymer addition is required to ensure proper floc formation. A polymer make-down system is provided for each thickening unit and requires a water supply with a minimum flowrate and pressure (40 GPM @ 40 PSI) to make-down the polymer and allow for addition to the flocculation tank.

Capacity range of polymer make-down system: 25 to 2.5 kg/hr @ 5.2 bar (assuming 1/10 turndown ratio)

5.4.5 Chemical Dosing System (Phase 0 and 1-2)

To support digester operation a chemical dosing skid is located in the Thickening building allowing for operators to support digester operation through the addition of nutrients, anti-foam, or pH adjusting chemicals. A chemical dosing system is also included in Phase 0 and will be located in the digester gallery.

5.4.6 Transfer Pumps (Phase 1-2)

Transfer pumps include:

- Thickener (SST) Feed Pumps; (From Buffer Tank to SST # 1 and 2)
    - P&ID No: P-21101, P-21102
    - Capacity @ Pressure: 38.5 to 12 m^3/hr @ 5 bar
    - Type: Rotary Lobe Pump;
- Slurry Feed Pumps (From Solids Holding Tank to Digesters # 3 and 4)
    - P&ID No: P-15103, P-15104
    - Capacity @ Pressure: 10 to 0.48 m^3/hr @ 5 bar
    - Type: Rotary Lobe Pump;
- Slurry Transfer Pump (From Septage Receiving to Solids Holding Tank)
    - P&ID No: P-15101
    - Capacity @ Pressure: 114 to 45 m^3/hr @ 70 psi
    - Type: Rotary Lobe Pump
- Septage Transfer Pump (From Septage Transfer Pump to Solids Holding Tank)
    - P&ID No: P-15102
    - Capacity @ Pressure: 10 to 0.48 m^3/hr @ 5 bar
    - Type: Rotary Lobe Pump;
- Thickened Sludge Transfer Pumps (From SST # 1 and # 2 to Digester # 3 and # 4)
    - P&ID No: P-47101A, P-47101B
    - Capacity @ Pressure: 6.93 to 4.05 m^3/hr @ 5 bar
    - Type: Progressive Cavity Pump
- Sump Pumps
    - P&ID No: P-47103A, P-471013B
    - Capacity @ Pressure: 80 m^3/hr @ 2 bar
    - Type: Submersible Pump

5.4.7 Building Ancillaries (Phase 1-2)

All buildings will be provided with the following systems.

- Heating, Ventilation, and Air Conditioning (HVAC);
- Lighting;
- Gas Analysis / Alarms;
- Fire Detection / Sprinklers;

5.5 Digesters (Phase 0 and 1-2)

The existing digesters #3 and 4 are to be re-utilized and upgraded. Total volume is 1,194 m^3; operating capacity is 995 m^3. Design retention time is 27.5 to 19.6 days. It is insulated and metal clad and the floor is roughly 2m below finished grade. Interior exposed concrete in the headspace is sealed with a gas-tight membrane to prevent corrosion. Structural drawings have been designed and stamped by a Professional Engineer and regular inspections during construction are required.

Biogas produced in the digester is collected within the headspace of the tank and directed to a combined biogas line on the roof of the digester gallery via a pipeline.

5.5.1 Digester Gallery Equipment (Phase 0);

5.5.1.1 Biogas Blower and Biogas Common Manifold (Phase 0 and 1-2)

After H2S removal the biogas will pass through a condensate trap and be conveyed to a common biogas manifold through a biogas compressor/blower. By feeding the flowrate to a common manifold all of the processes (CHP, Biogas Upgrade, Flare, and existing boiler) can be utilized as required, feeding biogas from the common manifold as the H2S of the biogas is removed.

Biogas blowers Capacity: 460 to 89 Nm^3/hr @ 1 PSI

5.5.2 Digesters (Phase 0);

The existing digesters # 3 and 4 are to be reutilized. After inspection and rehabilitation of the existing digester walls and coatings, new components will be installed on the digesters, retrofitting the existing digesters to be capable of accepting greater organic loading within the same digester volume.

New additions to the digesters include:

- One Double Digester Membrane Cover per digester, including;
    - Double Membrane (including air and gas membranes) (550 m^3 of gas storage per digester)
    - Center Column
    - Net Support System
    - Instrumentation
- Two Digester Membrane Blowers per digester;
- Digester Mixers, including the following for each digester;
    - 2 x Guide rail;
    - 2 x High pressure service box; and

- 2 x PSM Mixers.

5.5.3 Digester Heating and Ancillary Equipment Housed in Digester Gallery # 3 and 4 (Phase 0 and 1-2)

In addition to the equipment housed in the digesters, additional equipment is housed in the digester gallery # 3 and 4. Equipment will be divided into two categories, heating equipment and transfer pumps.

5.5.3.1 Digester Gallery # 3 and 4 – Heating (Phase 0)

Heating equipment in Digester Gallery # 3 and 4 include the heat exchanger, hot water pump, and heat exchange recirculation pumps.

- Heat Exchanger:
  - P&ID No: HX-44101
  - Capacity: 300 kW
  - Type: Heat Exchanger
- Hot Water Pump:
  - P&ID No: P-44103
  - Capacity @ Pressure: 50 to 14.838 m^3/hr @ 5 bar
  - Type: Centrifugal
- Heat Exchanger Recirculation Pumps:
  - P&ID No: P-44101 & 44102
  - Capacity @ Pressure: 79.2 to 19.8 m^3/hr @ 5 bar
  - Type: Rotary Lobe Pump

In addition to this equipment, two hot water pumps will be used to circulate hot water to the buffer and solids holding tank to protect the tanks from heating utilizing the heating coils installed in the tanks.

5.5.3.2 Digester Gallery # 3 and 4 – Transfer Pumps (Phase 1-2)

- Dewatering Transfer Pump
  - P&ID No: P-52701A/B
  - Capacity @ Pressure: 17.6 to 4.125 m^3/hr @ 5 bar
  - Type: Rotary Lobe Pump

5.6 Dewatering and Cake Loading (Phase 1-2)

From the digesters, transfer pumps feed duty/standby dewatering screw presses, which dewater the solids content of the sludge from 4.6-4.7% solids to 22-28% solids. The dewatered solids are then conveyed via conveyors to a truck for disposal/further treatment. The filtrate from the screw press drains by gravity to a leachate return tank which is pumped to the return line located in the building between sludge storage tanks.

The dewatering units themselves consist of an inline mixer, flocculation tank, and dewatering unit all skid mounted onto mezzanine. The conveyors feeding the load out conveyor will be mounted on the top of the mezzanine, and the load out conveyor will be mounted to the bottom of the mezzanine.

Capacity of Dewatering Unit:	16 m3/hr @ 2% Inlet TSS 5.5 m3/hr @ 6% Inlet TSS
Dewatering Unit Solids Capacity:	325 kg TSS/hr
Solids Loading Conveyor Capacity:	4 m^3/hr

5.7 Biogas Treatment and Utilization (Phase 0 and 1-2)

By upgrading the anaerobic digesters, greater volumes of biogas will be generated. To utilize this biogas to provide power, heat, or to upgrade the biogas to renewable natural gas, a multi-step process must be utilized. These processes remove H_2S, siloxanes, water content, and impurities allowing biogas to be utilized in combined heat and power (CHP) applications (in phase 0 and 1-2). Further treatment can remove CO_2, which generates renewable natural gas (in phase 2).

The following system train will be utilized to provide biogas of sufficient quality to generate power, generate heat, allow for safe flaring, and to generate renewable natural gas.

Biogas treatment and utilization equipment are located on two pads:

- Desulphurization Pad;
    - Location: Northeast of Digester Gallery # 3 and 4
    - Foundation Requirements: 16’ x 32’ x 18”
    - PAD Material Specifications:
        - 6” Slab 30 MPa
        - 15M MAT 12” C.C. E.W.
        - 2’ from edge of pad – 24” x 12” SLAB THICKENING (4) 15M BAR CONTINUOUS, 15M STIRRUPS @ 24” C.C.
        - 2” RIGID INSULATION EXTEND 48” PAST SLAB;
        - MIN 6” COMPACTED GRANULAR A, 96% COMPACTION IN MAX 6” LIFTS;
    - Relevant drawings to reference;
    - Systems housed on desulphurization pad:
        - H2S Removal Vessels;

- Biogas Treatment and Utilization Pad;
    - Location: Northern Portion of Site, Northeast of Main Building
    - Dimensions: 92’ x 41’ x 8” (housing pad for chillers and skidded system);
      15’ x 15’ x 12” (12” thickened pad for emergency flare);
      10’ x 15’ x 20” (connection between thickened pad and housing pad)
      Complete pad shape appears as a reverse L shape.

    - Pad Specifications (See S-400 drawing):
    - Housing Pad:
        - Center of pad:

- 6” SLAB 30 MPa
- 15M MAT 12” C.C. E.W.
- 2” RIGID INSULATION
- Minimum 18” Compacted Granular A, 96% compaction in Max 6” Lifts;

▪ 2’ towards edge of pad:
- 6” SLAB 30 MPa;
- 15M MAT 12” C.C. E.W.
- 24” x 12” Slab Thickening (4) 15M BAR CONTINUOUS 15M STIRRUPS @ 24” C.C.
- 2” RIGID INSULATION
- Minimum 6” Compacted Granular A, 96% Compaction in Max 6” Lifts;

▪ 4’ away from edge of pad
- 1’ Native fill;
- 2” RIGID INSULATION;
- Minimum 6” Compacted Granular A, 96% Compaction in Max 6” Lifts;

o Thickened Pad:

▪ 12” thickened pad;
▪ 15M BAR MATS @ 12” C.C. E.W. T&B;
▪ 2” RIGID INSULATION;
▪ Minimum 6” Compacted Granular A, 96% Compaction in Max 6” Lifts;

o Connection Pad:
▪ Specifications identical to Housing Pad, except face connecting to thickened pad.

o Relevant drawings to reference;

o Systems housed on Biogas Treatment and Utilization Pad:
▪ Emergency Flare;
▪ Combined Heat and Power (CHP) Conditioning Skid;
▪ CHP Skid;
▪ Biogas Upgrade Conditioning Skid; and
▪ Biogas Upgrade and Injection Compressor Skids.

5.7.1 H2S Removal (Phase 0)

H_2S removal is necessary to protect biogas utilizing systems upstream. H_2S removal is accomplished in this application through utilizing H_2S adsorption media. H2S Removal Tanks

H2S Vessel containing adsorption media;

a. 1 vessel in phase 0 sized for 279 Nm3/hr;
b. 2 vessels in phase 1-2 sized for a combined total of 460 Nm3/hr.
c. Each vessel estimated size and weight:
   i. Dimensions: 8’ dia. x 14’ height (per vessel) / 21’ height (including base & top inlet)
   ii. Weight (empty/operational): ~8,000 lbs / 32,000 lbs
   iii. Inlet/Outlet: 3” 150# RF x 1” NPT Ports
   iv. Area around vessel must be capable of supporting forklift with +27,000 lbs to allow

for loading and removal of media.

5.7.1.1 Gas Analyzer (Phase 0)

a. Location of Gas Analyzer: Mounted on Wall of HX room in Digester Building;
b. Dimensions of Gas Analyzer: 564 mm x 700 mm x 268 mm
c. Weight of Gas Analyzer: 34 kg
d. Power Requirement: 80 W, 100-240 VAC, 60 Hz
e. Measuring Points: 1-4
f. Process connections: 4/6 mm SS, hose screw connection
g. Required Clearance: 1 m

5.7.1.2 Oxygen Injection System (Phase 0);

a. Location of Gas Cylinder; TBD (potential locations include, on pad or in digester gallery)
b. Number of Gas Cylinders: 4
c. Dimensions of Gas Cylinder: 30" (dia.) x 62"
d. Weight of Gas Cylinder (empty): 568 kg
e. Includes regulator and switch-over mechanism;

5.7.1.3 Foundation / Base Details (Phase 0);

The H2S removal vessels will be shipped to site via truck and offloaded by crane onto foundation pads which the vessels will be anchored into.

a.) Foundation Requirements: 16' x 32' x 18" – Pad Specifications
   a. PAD Material Specifications
      i. 6" Slab 30 MPa
      ii. 15M MAT 12" C.C. E.W.
      iii. 2' from edge of pad – 24" x 12" SLAB THICKENING (4) 15M BAR CONTINUOUS, 15M STIRRUPS @ 24" C.C.
      iv. 2" RIGID INSULATION EXTEND 48" PAST SLAB;
      v. MIN 6" COMPACTED GRANULAR A, 96% COMPACTION IN MAX 6" LIFTS;

5.7.2 Biogas Conditioning System (Phase 0 and 1-2)

Two biogas conditioning systems will be utilized at the Net Zero facility. The first biogas conditioning system will be installed in phase 0 and sized to feed conditioned biogas to the CHP (112 Nm^3/hr). A second conditioning system will be installed in Phase 1-2 allowing for the total biogas flowrate to be treated (384 Nm^3/hr), with the portion not utilized by the CHP being upgraded to become Renewable Natural Gas.

Except for two chillers and activated carbon vessels on biogas upgrade conditioning skids, all components of

the conditioning system will be skid mounted.

5.7.2.1 Biogas Conditioning System – CHP (Phase 0)

The biogas conditioning system will consist of the following components, a preliminary knock out tank, inlet blower, air cooler, heat exchangers, secondary knock out tank, and activated carbon tank (located on skid beside main skid).

The inlet blower increases the inlet pressure of the biogas from the collection manifold to allow the biogas to be treated by the conditioning skid. The knock-out tank, air coolers, and heat exchangers are utilized to cool the inlet biogas to below the dew point of the biogas allowing for removal of moisture from the biogas stream. The activated carbon tanks allow for the removal of siloxanes and other impurities which could affect the operational life of the CHP.

The biogas conditioning skid for the CHP is sized based on the CHP capacity (112 Nm^3/hr).

a.) Capacity: 112 Nm^3/hr
b.) Dimensions (LxWxH): 8’ wide x 20’ long
c.) Weight (kg): 6,803 kg
d.) Connections:
    a. IN – 575/3/60 Power (1”);
    b. IN – Water/Glycol (from Chiller) (2”);
    c. IN – Gas Inlet from H2S Vessel (6” Assumed);
    d. IN – Instrument Compressed Air (1/4”);
    e. OUT – Gas to CHP (3”);
    f. OUT – Gas to Activated Carbon Vessel (3” (assumed));
    g. OUT – Water/Glycol (return to chiller) (2”)
    h. OUT – Condensate (1”)
    i. OUT – Communication cable to SCADA (1”)
e.) Power Supply: Approx. 7 kW, 575V/3/60Hz (power fed to on skid control panel).
f.) Clearance Required: 3’ minimum clearance required, 6’ preferred.

5.7.2.2 Biogas Conditioning System for CHP – Non-Rated Chiller (Phase 0)

Chiller utilized for the Biogas Conditioning Skid will be transported to site by truck separate from the skid. Chiller will be offloaded using a forklift to move the chiller from the truck onto the corresponding concrete pad. Mechanical and electrical set up will be carried out on the site by trained technologists.

Non-Rated Chiller (utilized for CHP Biogas Conditioning):

a.) Dimensions: 36” x 36” x 80” (LxWxH);
b.) Weight: 500 kg
c.) Connections: 2” inlet / outlet;
d.) Placement: Must be 10’ from all gas lines;
e.) Clearance: 1 m on all sides minimum, 2 m ideal;
f.) Cooling Capacity: 5 Tons;

g.) Power: 4.5 kW, 575/3/60

h.) Pumps included with chiller package;

5.7.2.3 Biogas Conditioning System – Biogas Upgrade (Phase 1-2)

The biogas conditioning system will consist of the following components, a preliminary knock out tank, inlet blower, air cooler, heat exchangers, secondary knock out tank, activated carbon tanks (located off skid beside main skid), and a compressor.

The inlet blower increases the inlet pressure of the biogas from the collection manifold to allow the biogas to be treated by the conditioning skid. The knock-out tank, air coolers, and heat exchangers are utilized to cool

the inlet biogas to below the dew point of the biogas allowing for removal of moisture from the biogas stream. The activated carbon tanks allow for the removal of siloxanes and other impurities which could affect the operational life of the CHP. The compressor allow for the gas inlet pressure to be increased to the point where it can be utilized in the biogas upgrade process (approx. 185 psig).

In order to meet demands of the biogas upgrade until, the conditioned gas is recirculated prior to being conveyed to the biogas upgrading unit.

The biogas conditioning skid for the CHP is sized based on the difference between the maximum anticipated biogas production rate and the CHP biogas utilization rate (384 Nm^3/hr).

a.) Container Details:
   a. Dimensions: 20’ x 8’ x 8.5’
   b. Weight: 3000 kg

b.) Electrical Connection: Power is fed from GFE MCC Panel
Contractor will need to run:
3-Phase Power to Blower from MCC (6 kW);
3-Phase Power to Compressor from MCC (80 kW);
120V Power to Junction Box;
24V Power to Junction Box;
Communications Wire;

c.) Piping Connections:
   a. IN – 575/3/60 Power (1”);
   b. IN – Water/Glycol (from Chiller) (2”);
   c. IN – Gas Inlet from H2S Vessel (6” Assumed);
   d. IN – Instrument Compressed Air (1/4”);
   e. OUT – Gas to CHP (3”);
   f. OUT – Gas to Activated Carbon Vessel (3” (assumed));
   g. OUT – Water/Glycol (return to chiller) (2”)
   h. OUT – Condensate (1”)
   i. OUT – Communication cable to SCADA (1”)

5.7.2.4 Activated Carbon Vessels (off-skid, Phase 1-2);

d.) Container Details:
    a. Dimensions: 5’ dia. x 7’ (body) vessels
    b. Weight: 1500 kg (empty) / 4350 kg with media
e.) Piping Connections:
    a. 75 DN, (Material specification) – Vessel Inlet Piping;
    b. 75 DN, (Material specification) – Vessel Outlet Piping;

5.7.2.5 Chiller (for Biogas Upgrade, Phase 1-2)

a.) Container Details:
    a. Dimensions: 36” x 46” x 98”
    b. Weight: 900 kg
b.) Electrical Connection: 14 kW, 575V/3/60Hz;
c.) Piping Connections:
    a. 50 DN, (Material specification) – Chiller line inlet;
    b. 50 DN, (Material specification) – Chiller line outlet;
d.) Pumps included with chiller package;

5.7.2.6 Biogas Upgrade Injection Compressor (Phase 1-2)

a.) Electrical Connection: 80 kW, 575V/3/60Hz;
b.) Piping Connections:
    a. 50 DN, (Material specification) –Inlet Piping;
    b. 25 DN, (Material specification) –Outlet Lines;

5.7.3 Emergency Flare (Phase 0 and Phase 1-2)

The emergency flare is designed to efficiently burn the quantity of gas potentially produced by the biogas plant in the event of the engine being down. The flare is equipped with a flame arrester and starts automatically when the engine cannot consume the quantity of gas produced.

The emergency flare will require a natural gas line to provide pilot gas to ensure that the flare remains in constant operation in case emergency flaring is required.

The emergency flare capacity is sized for the total anticipated biogas flowrate 279 Nm^3/hr for Phase 0 and 413 Nm^3/hr for Phase 1-2.

a.) Design Data:
    a. Type: Digester gas;
    b. Composition: 65% CH_4 (design); 50 to 65% CH_4 (range);
    35% CO_2 (design); 35 to 45% CO_2 (range)
    0% O_2 (design); 0 to 1.5% O_2 (range)
    0% N_2 (design); 0 to 6% N_2 (range)
    3500 ppm H_2S (max);
    c. Lower Heating Value: 592 BTU/SCF (design)
    455 BTU/SCF to 592 BTU/SCF (range)

d. Flow rate: 286 SCFM (design normalized at 65% CH_4);
40 SCFM (minimum at 65% CH_4)

e. Heat Release: 10.2 MMBTU/hr (design at 65% CH_4)

f. Expected Emission Range (Design Flow)[1]

Parameter	Value	Unit
Overall Destruction Efficiency [2]	98	%
NOx emitted per MM BTU treated [3]	0.068	lb/MM BTU
CO emitted per MM BTU treated [4]	0.31	lb/MM BTU
VOC emitted per MM BTU treated [5]	98% DRE	lb/MM BTU

(1) Emissions and destruction efficiency stated are based on EPA 40 CFR 60.18 and AP-42 5th edition, Section 13.5

(2) Typical sulphur containing compounds are expected to have greater than 98% oxidation efficiency

(3) Excludes NOx from fixed nitrogen.

(4) Excludes CO contribution present in gas.

(5) VOC emissions will be the lesser of 98% DRE or 0.66 lbs/MMBTU

b.) Dimensions of Flare: 609 mm x 5.49 m

c.) Preliminary Design Data:

a. Windload (per ASCE 7-95): 120 MPH
b. Seismic (per UBC-1994): ZONE 4
c. Shear @ Base: 400 LB
d. Moment @ Base: 4,000 LB-FT
e. Deadload: 500 LBS
f. Shell Design Temperature: $150°F$
g. Corrosion Allowance: 0.0

d.) Electrical Connection: 120V/1/60Hz;

e.) Piping Connections:

a. 100 DN, 150# F.F. (Material specification) – Biogas Inlet Piping (Existing);
b. 15 DN, FNPT (Material specification) – Natural Gas Pilot Line (tied to control panel);
c. 15 DN, FNPT (Material specification) – Pilot Conduit Connection;
d. 15 DN, FNPT (Material specification) – Thermocouple Conduit Connection;
e. 20 DN, FNPT (Material specification) – Pilot Thermocouple Conduit Connection;
f. 15 DN, FNPT w Plug (Material specification) – Temperature Connection;
g. 25 DN, FNT w Plug (Material specification) – Flow Meter Connection;

f.) Components required to meet CSA suggested ancillaries;

a. 100 DN Check Valve x 2;

b. 100 DN Isolation Valve x 2;
c. 100 DN Pressure Regulating Valve;
d. 100 DN High Pressure Switch Actuated Valve;
e. 100 DN Low Pressure Switch Actuated Valve;
f. 100 DN Flame Arrestor (Biogas Feed Line);
g. Sample Valves x 3;
h. 15 DN Flame Arrestor (Pilot Gas Feed Line);
i. 15 DN Actuated Valve (Pilot Gas Feed Line);
j. 15 DN Flowmeter (Pilot Gas)

g.) Note: h, i, and j provided by Anaergia, contractor, or client;

Note: Due to intermittent nature of emergency flare operation, a constant source of pilot natural gas will need to be provided to the emergency flare. Anticipated quantity of natural gas to be used per year is 50 SCFH @ 10-15 PSIG, (or 14,070 Nm^3 / year). No natural gas will be utilized to generate electricity.

5.7.4 Combined Heat and Power (CHP) Unit (Phase 0)

Two biogas conditioning systems will be utilized at the Net Zero facility. The first biogas conditioning system will be installed in phase 0 and sized to feed conditioned biogas to the CHP (86 to 112 Nm3/hr). A second conditioning system will be installed in Phase 1-2 allowing for the total biogas flowrate to be treated (368 to 413 Nm3/hr), with the portion not utilized by the CHP being upgraded to become renewable natural gas.

Except for a chiller, which will be provided sized for all applications requiring cooling (including CHP, biogas conditioning prior to biogas upgrade, and biogas upgrade), all components of the conditioning system will be skid mounted.

Specifications for the CHP unit (including general arrangement drawings) are attached in Appendix B.1.

a.) Container Details:
   a. Capacity: 200 kW
   b. Dimensions: 5550 mm x 3000 mm x 6500 mm
   c. Weight: 9085 kg
b.) Electrical Connection: 575V/3/60Hz;
c.) Piping Connections:
   a. 75 DN, (Material specification) – Biogas Inlet Piping;
   b. 25 DN, (Material specification) – Condensate Lines;
   c. 150 DN, (Material specification) – Vent;
   d. 50 DN, (Material specification) – HW Lines (inlet);
   e. 50 DN, (Material specification) – HW Lines (outlet);
d.) Hot Water CHP Pump:
   a. Capacity @ Discharge Pressure: 10.67 to 16.83 m^3/hr @ 60.96 m to 40.45 m (46.98 to 74.1 GPM @ 200 ft to 132.7 ft)
   b. Inlet Temperature: 70 C (158 F)
   c. Weight (empty): 41.57 kg (91.651 lbs)

d. Type: Multi-Stage Pump
e. Dimensions: 300 mm x 215 mm x 914.4 mm

f. Inlet/Outlet: 50 DN / 50 DN (2" / 2")
g. Power / Voltage: 5 HP, 575V/3/60Hz
h. Motor Rating: Explosion Proof (XP PE Motor)

- Proposed generation equipment supplier;
  - Make/model: TEDOM / TB 200 G8V TW 86
  - Specifications: Please refer to Appendix B.2 for further details;
    - Number of cylinders: 6
    - Arrangement of cylinders: in series
    - Bore x stroke: 130 / 150 mm
    - Displacement: 729 cui
    - Compression ratio: 12:1
    - Speed: 1800 rpm
    - Oil Consumption, normal / max: 0.3/0.5 g/kWh
    - Max Engine Power: 200.7 kW

5.7.5 Biogas Upgrading System and Injection (Phase 1-2)

A second conditioning system will be installed allowing for the total biogas flowrate to be treated (368 Nm3/hr), with the portion not utilized by the CHP being upgraded to become renewable natural gas.

Except for a chiller and activated carbon filters, which will be provided sized for all applications requiring cooling (including CHP, biogas conditioning prior to biogas upgrade, and biogas upgrade) and filtration, respectively, all components of the conditioning system will be skid mounted.

5.8 Water Supply and Storage

Facility process water and potable domestic water is expected to be supplied via existing infrastructure. Water supply for firefighting is expected to be supplied via a hydrant on-site.

Existing water infrastructure to include:

- Existing water lines in the facility;
- Pumps;
- Monitoring equipment; and
- Fire hydrants.

5.9 Wastewater Management

Any wastewater generated on-site through the processes utilized in the Petawawa Net Zero will be returned to the headworks of the existing WPCP for treatment and discharged with the WPCP effluent.

The general components of the wastewater management system will include:

- Gravity pipes and forcemains connecting the existing building return lines to the sludge storage decant, filtrate discharges of the thickener, dewatering units, and building sumps.
- Sump pits to collect wastewater in buildings;
- Monitoring equipment and alarms;

Further details regarding the facility wastewater management design is provided in the Effluent Management Plan Report under a separate cover.

5.10 Erosion and Sedimentation Control

Stormwater runoff during construction and operation of a renewable energy facility contributes to erosion of the soil at the project location and transport of significant sediments to a receiving water or adjacent property.

Based on the following, there will be no need to treat any sewage or runoff on the site:

- Minor alterations of the existing drainage area;
- No significant modification of runoff coefficient;
- No process water, sanitary services, or large storm water management facilities required for the long-term operation of the facility;

Changes to impermeable surfaces are shown in the table below:

	Existing	Phase 0	Phase 1-2	Total
Impermeable Surfaces and Buildings	10,570	125	2,450	13,145
Impermeable Surfaces Collected to Sump	0	350	150	500

.

5.11 Air Emissions

The project will include a variety of equipment that will discharge contaminants into the air. All significant sources of air emission are detailed in the Emissions Summary and Dispersion Modelling (ESDM) Report, and listed below.

Phase 0 Air Emission Sources:

- Emergency Flare (Please refer to section 5.7.3 for unit details);
- Combined Heat and Power System (Please refer to sections 5.7.2.1 and 5.7.4 for equipment details);

Phase 1-2: Air Emission Sources:

- Emergency Flare (Please refer to section 5.7.3 for unit details);
- Combined Heat and Power System (Please refer to sections 5.7.2.1 and 5.7.4 for equipment details);

- Biogas Upgrade System (Please refer to sections 5.7.2.3 and 5.7.5 for equipment details);

The heights of the emission points are further detailed in the building elevations and section details in the table below:

Source	Emission Elevation (m)
Emergency Flare	5.49
Combined Heat and Power System	6.50
Biogas Upgrade System	17.83

For further details regarding air emissions please refer to the ESDM report, provided under a separate cover.

5.12 Solid Waste

Biosolids produced by the process will be land-applied for beneficial use.

To ensure that levels are controlled in the buffer tank, solids loading tank, digesters, and digestate storage tanks, all tanks will be provided with the following equipment to ensure temperature and levels in the tanks are maintained at appropriate levels, with signals effecting influent and effluent pumps for each of the tanks:

- Temperature Transmitters;
- Pressure transmitter – used to determine tank level;
- Radar level Transmitter – used to determine tank level (and if antifoam is required);

Any additional waste generated as either screened waste from septage or maintenance based waste will be collected and disposed of through roll away bins and sent to a non-hazardous materials municipal landfill. Any material that is deemed hazardous will be disposed of appropriately, ensuring that the materials are disposed of through the sending the materials to a hazardous landfill.

5.12.1 Sampling and Analysis for Biomass /digestate intended for land application

In phase 0 digestate from the digesters will be transferred to the existing digestate storage tanks. These tanks are non-agitated. In phase 1-2, following dewatering, the dewatered sludge cake will be transferred into a truck bed. This truck bed will be non-agitated.

From the 2012 Sampling and Analysis Protocol for Ontario Regulation 267/03 Made under the Nutrient Management Act, 2002:

Non-agitated storage tanks or lagoons will likely have at least two distinct layers (settled solids and supernatant). Special care is required to obtain representative samples from materials that have stratified.

When sampling from a tank with at least two layers, and where each layer is to be land applied separately, separate samples must be taken and analyzed for each layer to be land applied. The depth of each layer must be determined before sampling to identify the sampling depth. The depth can be determined using a weighted tape measure, probe line or other suitable measuring device.

When sampling from a tank or lagoon with at least two layers where the layers will be land applied simultaneously, the sample taken must have a representative volume from each layer to be land applied.

To meet the sampling requirements, sampling will follow the minimum required samples as dictated in 2012 Sampling and Analysis Protocol.

Table 5-1 Minimum Number of Sub-Samples per Composite for Different Land Application Volumes

Volume Removed per Sampling Period	Minimum Number of Sub-Samples per Composite
Less than 1,000 m^3	5
1,000 m3 to 10,000 m^3	10
Greater than 10,000 m^3	15

Samples collected include:

- One 500 mL sample bottle for nitrogen, phosphorus, and TS analysis;
- One 500 mL sample bottle for metals analysis;
- Separate bottles for mercury and pathogen analysis;

Analysis Required includes:

- Hydrogen Ion (pH);
- Total Dry Matter/ Total Solids;
- Total Organic Matter (Volatile Solids);
- Total Kjeldahl Nitrogen (TKN);
- Ammonia and Ammonium – Nitrogen;
- Nitrate and Nitrite – Nitrogen;
- Organic Nitrogen;
- Metals – Cd, Cr, Co, Cu, Pb, Mo, Ni, and Zn;
- Mercury
- Arsenic and Selenium
- Total Phosphorus, Potassium, Sodium, and Boron;
- E. Coli
- Culturable Salmonella spp.
- Total Culturable Enteroviruses (a subset of total enteric viruses);
- Viable Helminth Ova;

Sampling protocols as laid out in the 2012 Sampling and Analysis Protocol for Ontario Regulation 267/03 Made under the Nutrient Management Act, 2002 are to be followed.

As summarized in the Certificate of Approval for the Petawawa WPCP, existing equipment to be reutilized by the net zero facility in phase 0 for solids disposal and storage include:

- The existing sludge holding and Truck Loading System:
    - Two (2) digested sludge holding tanks, each 24.7 metres diameter, 8.8 metres sidewater depth, each with a 4,200 cubic metres working volume, equipped with supernatant withdrawal equipment and connected to three (3) sludge mixing and transfer pumps;
    - three (3) digested sludge mixing/transfer pumps each rated at 4.5 cubic metres per minute at 12.2 metres TDH;
    - a sludge truck loading arm and piping;

During phase 0, sludge will be stored in the storage tanks and only removed during periods where land application is applicable (assumed to be late fall and early spring, consisting of approximately 8 weeks total). Only loading the material during these times ensure that potential negative environmental effects can be mitigated by limiting exposure.

During phase 1-2, a newly constructed dewatered sludge facility will collect dewatered sludge cake for land application.

6 Facility Operational Plan

The project will operate throughout the year for seven days per week and 24 hours per day. The facility will be staffed full time with appropriate automation controls, redundancies, and procedures to ensure an efficient, safe, and reliable facility.

The following summary table below describes the anticipated schedule of hours per day and days per year that aspects of the plant will be in operation.

Table 6-1: Plant Sub-System Operating Hours, Operating Days per Year, and Applicable Phases

Plant Sub-system	Operating Hours Assumed for Equipment Sizing / Working Day	Days/Year	Applicable Phase
Feedstock Reception	8	260	0 and 1-2
WPCP	24	365	0 and 1-2
Anaerobic Digestion	24	365	0 and 1-2
Dewatering+Cake Loadout	18	365	1-2
Thickener Operation	12	260	1-2
Combined Heat & Power	22	365	0 and 1-2
Liquid Land App. Loadout	8	260	0

Operations and maintenance procedures for the various processes at the Project are described below. Environmental impacts relating to water, wastewater, air emissions, biomass, and solid waste are also described.

6.1 Operations and Maintenance Procedures

The project will be monitored with a Programmable Logic Control (PLC) systems for field control and a Supervisory Control and Data Acquisition (SCADA) system for overall process control.

The PLC will perform self-diagnosis, accessible from the operator control console and engineering workstation for facility system troubleshooting from a central control room in the Net Zero Petawawa Facility. The SCADA system will monitor, control, display, and record process data from field sensors and this information will be used for general process supervision, execution of plant and equipment performance calculations, historical record keeping, and diagnostics for management and maintenance of the plant.

6.2 Daily Function

6.2.1 Feedstock Reception and Thickener Operation

6.2.1.1 Daily Operations

Feedstock reception will operate 8 hours per day, during weekdays, and thickener operations will operate 12 hours per day, including weekdays. There will be one operator per shift sharing duties in the thickening building including operating the slurry reception skid, thickeners, chemical dosing systems, and checking transfer pumps located in the thickener building. Shifts will be divided into 8 hours. With a morning shift consisting of one operator who will prepare the feedstock reception skid and maintain thickeners, and an afternoon shift consisting of one operator to shutdown the feedstock reception skid and maintain the thickeners. Only day shifts are required for Phase 0.

Occasionally, truck drivers will also be onsite to deliver chemicals to the thickener building or deliver polished organic slurry or septage. Drivers are expected to operate the truck scale upon entry and exit, and to coordinate with operators to offload deliveries.

The thickener building operators will be responsible to ensure all equipment, including but not limited to, in-line mixers, flocculators, thickeners, progressive cavity pumps, transfer pumps, chemical dosing systems, and slurry reception skid are all functioning as designed.

6.2.1.2 Scheduled Maintenance

Maintenance staff will consist of a flexible two person crew, capable of servicing Feedstock Reception, Thickener Operation, Anaerobic Digestion, Biogas Treatment, and Dewatering systems at all times throughout the year. The crew will have the appropriate metal working, electrical, and instrumentation control skills as required. As a team, they will assist each other in the daily maintenance issues to sustain the operation of the plant and perform their individual preventative maintenance tasks. They will also perform regular inspections of equipment to ensure all systems are functioning properly.

In addition to the preventative maintenance tasks and inspections, every five to seven years, an approximate two week maintenance outage will be performed for a major inspection and overhaul of boiler, chiller, and auxiliaries, as required.

6.2.1.3 Unscheduled Maintenance

Unanticipated maintenance or repairs that cannot be readily addressed by the on-site maintenance crew will be performed by qualified contractors brought in for specific work orders.

6.2.2 WPCP

6.2.2.1 Daily Operations

The wastewater treatment plant providing primary sludge and thickened waste activated sludge will operating 24 hours a day, 7 days a week. This is staffed OCWA currently, and will not require any additional staff explicitly for the Net Zero Facility unless otherwise stated in other sections.

6.2.3 Anaerobic Digestion

6.2.3.1 Daily Operations

The anaerobic digesters will be operating 24 hours a day, 7 days a week. This is staffed OCWA currently, and will not require any additional staff explicitly for the Net Zero Facility unless otherwise stated in other sections.

The digesters will be operated so the hydraulic retention time (HRT) will be maintained at 20 days or more. Accordingly, the mixture of Primary Sludge (PS) and Waste Activated Sludge (WAS) along with Organic Slurry will depend on the flows of PS and WAS from the WPCP and the availability of organic feedstock. Two scenarios are set out in Table 6-2 that describe a scenario when WPCP sludge is at a maximum (i.e. when the WPCP flows are at or near design capacity), and another scenario where Organic Slurry is at a maximum of 41.1 MT/day for Phase 0. Maximum solids loading occurs in the maximum organic slurry scenario, and is 3.2 kgVS/d/m^3.

Table 6-2: Anaerobic digester feedstock operating scenarios.

Scenario	Feedstock	PS	WAS	Organic Slurry	Total
Max WPCP Sludge	Design Flow MT/y	10,859	17,885	7,500	36,244
	MT/ Calender Day [MT/d]	29.8	49.0	20.5	99.3
Max Organic Slurry	Design Flow MT/y	7,950	13,250	15,000	36,200
	MT/ Calender Day [MT/d]	21.8	36.3	41.1	99.2

Operating and monitoring parameters for the anaerobic digesters are set out in Table 6-3.

Table 6-3: Operating and Monitoring Parameters for the Net Zero Facility Anaerobic Digestion Process

Parameter	Monitoring Frequency	Method	Typical Range
Feedstock Total Solids	5 d/wk or as required for feedstock reception	Lab analysis	2-15%
Feedstock Volatile Solids	5 d/wk or as required for feedstock reception	Lab analysis	65-95%
Digestate Total Solids	1 d/wk	Lab analysis	1.5-3% (depending on feedstock mix)
Digestate Volatile Solids	1 d/wk	Lab analysis	25-40% (depending on feedstock mix)
Digestate pH	1 d/wk	Lab analysis	6.8-8
Digestate Temperature	Continuous	Sensor/probe	35-40 C

Parameter	Monitoring Frequency	Method	Typical Range
Biogas Methane %	Daily	Sensor/probe	55-65%
Biogas H2S %	Daily	Sensor/probe	500-1,500 ppm
VFA:Alkalinity Ratio FOS/TAC	1 d/wk	Calculation	0.1-0.4
Volatile Fatty Acids (FOS)	1 d/wk	Lab analysis	N/A
Alkalinity (TAC)	1 d/wk	Lab analysis	N/A
HRT	1 d/wk	Calculation	20 days
Organic Loading Rate	1 d/wk	Calculation	<4 kg VS/m^3/d
Volatile Solids Reduction (%VSR)	1 d/wk	Calculation	40-70% (depends on feedstock mix)
Digestate: (TKN, Ammonia, Total Solids, Total Suspended Solids, Alkalinity, pH)	Once per quarter (3rd party lab)	Lab analysis	N/A

The Organic Slurry (biowaste) added to the anaerobic digesters will be from sources within the provinces of Ontario and Quebec, and include:

- Preprocessed SSO from the Town of Petawawa and Garrison Petawawa, as well as fats, oil and greases (FOG) from both locations
- Organic slurry from SSO originating from domestic curbside collection programs operated by a municipality or on behalf of a municipality, produced off-site;
- IC&I sources of the following waste types:
    - Fats, Oil and Grease
    - Slurry originating from IC&I SSO sources, produced off-site;
    - Liquid biowaste from food or feed manufacturing, processing, preparation or distribution facilities;
    - Pet food waste;
    - Biowaste from production of ethanol or biodiesel;
    - Biowaste produced in a dissolved air flotation process used for the treatment of wastewater from food or feed processing or preparation facilities
- Liquid Primary and Secondary wastewater solids from municipal wastewater treatment plants;
- Interceptor and septic waste

None of the IC&I waste sources are expected to have a concentration of *E.coli* greater than the primary and TWAS sludge produced by the Petawawa WPCP. The IC&I is expected to have lower *E.coli* levels than domestic sewage sludge.

6.2.4 Dewatering and Cake Loadout (Phase 1-2)

6.2.4.1 Daily Operations

Dewatering and cake loadout operations will operate 18 hours per day, 7 days a week. There will be one

operator per shift for maintaining scale records, dewatering operation, chemical dosing systems, and checking transfer pumps located in the dewatering building. Shifts will be divided into 8 hour periods.

Occasionally truck drivers will also be onsite to deliver chemicals to the dewatering building or load their trucks with dewatered solids. Drivers are expected to operate the truck scale upon entry and exit, and to coordinate with operators to offload deliveries.

The dewatering building operators will be responsible to ensure all equipment, including but not limited to, in-line mixers, flocculators, dewatering units, transfer pumps, chemical dosing systems, and conveyors are all functioning as designed.

6.2.4.2 Scheduled Maintenance

Refer to Section 6.2.1.2.

6.2.4.3 Unscheduled Maintenance

Refer to Section 6.2.1.3.

6.2.5 Biogas Treatment and Application

6.2.5.1 Daily Operations

Biogas Treatment and Application will operate 22 hours per day, during 7 days per week. There will one operator per shift sharing duties in the maintain heating systems for digesters and tanks, H2S removal, flare operation, operation of conditioning systems, CHP, and biogas upgrade system. Shifts will be divided into 8 hours.

The biogas treatment operators will be responsible to ensure all equipment, including but not limited to, H2S removal system, biogas conditioning systems, flare, CHP, and biogas upgrading system are all functioning as designed. In addition they will be responsible for maintaining records for RNG injection.

6.2.5.2 Schedule Maintenance

Refer to Section 6.2.1.2.

6.2.5.3 Unscheduled Maintenance

Refer to Section 6.2.1.3.

6.2.6 Liquid Land Application Loadout (Phase 0)

6.2.6.1 Daily Operations

The liquid land application loadout occurs two times a year – once in the spring and once in the fall over a two-week period in each season. Tanker trucks load digestate from the digestate storage tanks and haul to land application sites. This operation is staffed by OCWA currently, and will not require any additional staff explicitly for the Net Zero Facility unless otherwise stated in other sections.

The facility will be able accommodate digestate hauling trucks onsite during the digestate hauling seasons without needing to park on municipal roads. The current contractor uses trucks with a capacity 20 or 40 m^3

and the site can accommodate three tanker trucks at a time. If the digestate storage tanks are full, 8,400 m^3 of digestate must be hauled offsite, which requires 280 truckloads over a two-week period assuming an average truck capacity of 30 m^3 (8,400 ÷ 30). If only 10 days are available during the two-week period, there would be 28 trucks per day. The practice is to haul digestate 12 hours per day (7am – 7pm), so the average number of trucks per hour would be 2.3. It takes approximately 20 minutes to fill a truck, so three trucks onsite can be filled in one hour. Truck routing on the site is shown in blue arrows on Figure 6-1.

Figure 6-1: Truck routing diagram for digestate hauling trucks onsite.

6.2.6.2 Scheduled Maintenance

Refer to Section 6.2.1.2.

6.2.6.3 Unscheduled Maintenance

Refer to Section 6.2.1.3.

6.3 Non-Standard Operation

6.3.1 Electrical Source

The plant essential service loads, necessary for the functions needed when the power plant is not in operation, will be supplied by the existing stand-by diesel generator system. The plant essential service loads will include at minimum lighting, security, fire alarms, pumps, HVAC, communications, building controls, and freeze

protection.

The stand-by diesel generator system will provide all power required for safe shutdown and start-up.

6.3.2 Upset Conditions

Upset conditions are those which for equipment stress or safety purposes, are outside of specified design conditions. Upset conditions may have operating circumstances other than normal continuous operation, such an unplanned start-up and shutdown, equipment malfunction, and emergency events. Upset conditions will be established during detailed design to protect the environment and ensure safety of site personnel, the local community, and equipment at the facility.

Enbridge also has specified conditions under which the facility will need to meet to inject renewable natural gas. If the facility is operating outside its specified parameters, injection to the grid is to immediately stop until the problem at the facility is resolved.

6.3.3 Cold Weather Operation

Heat trace will be installed on piping where the temperature may drop below 0 C. Tanks will also provided insulation and heated water lines for heating coils to maintain minimum temperatures (10 C).

6.4 Safety

6.4.1 General

All project work during construction, operation, maintenance, and decommissioning will comply with the Ontario Occupational Health and Safety Act.

6.4.2 Pre-Start Safety Review

There will be pre-start safety review of the project prior to operation in accordance with regulatory requirements. This review will ensure that all equipment has been installed as designed, commissioned appropriately, and that safety procedures and a training program are in place.

6.4.3 Security

The site is equipped with a slide gate at the access road entrance to deter unauthorized entry.

6.4.4 Fire and Explosion Protection

All site building will be designed and equipped in accordance with the National Fire Code of Canada, including suitable fire protection equipment such as siamese connections, hydrants, hose stations, and fire extinguishers. All fire protection equipment requiring water will be connected to the hydrant line.

All buildings with connections to the digesters will be equipped with combustion gas/fire alarm system, and explosion vent panels.

The site will also be equipped with fire and gas detection equipment, and manual alarm pull stations.

6.4.5 Emergency Shutdown

Control systems will be in place to trigger an "Emergency Shutdown" for shutdown of the entire facility, or a "Unit Shutdown" for shutdown and isolation of individual processes or equipment. The facility will be equipped with local and remote mounted push buttons to initiate the shutdowns (E-stops). Unit shutdowns will require manual reset locally by operators. Emergency shutdowns will follow the detailed start-up procedures to bring the plant back online.

Warning beacons for fire and gas will be indicated with an indicator beacon. Emergency and egress lighting will be provided by battery backed units or the emergency stand-by generator. A two tone horn will be used on site to indicate a hazardous condition and/or plant shutdown. Horn protocols will be developed for evacuation, all clear, and testing.

6.4.6 Roof Access

Exterior ladders will be provided for access to the site building roofs. All roofs will have provisions for fall arrest anchor points to provide safe access and movement of maintenance personnel on to and around the entire roof area.

Metal stairways and platforms will be provided on buffer tank and slurry holding tanks.

6.5 Environmental Impacts

6.5.1 Water Use

Municipal water currently available at the project location will be used for primary and backup sources of water for use by the Project. Project water demand is expected to include the following:

Table 6-2: Water Use Flowrate and Duration of Operation

Units	Flowrate (L/s)	Duration / day
Polymer Make-down Feed (Thickener)	0.64	12
Thickener Unit (water demand)	0.16 to 0.23	4.8
Domestic water supply - Thickener	0.8	8
Polymer Make-down Feed (Dewatering)	0.64	18
Dewatering Unit (water demand)	0.16 to 0.23	4.8
Domestic water supply - Dewatering	0.8	8

Since the units are intended to be in operation during the same period, the water line will be required to provide a supply of 1.67 L/s of water to support project operations throughout the year in phase 0, and 3.34 L/s of water to support project operations throughout the year in phase 1-2. Estimated total water usage per year will be 236.9 m^3 per year in phase 0, and 473.7 m^3 per year in phase 1-2. Only incidental water use will be required in Phase 0 for equipment maintenance.

6.5.2 Wastewater Management

The project will produce process wastewater from the biogas treatment processes, filtrate from thickening and dewatering, and wash-up wastewater from site buildings.

Sanitary sewage flow estimates and wastewater generated by staff are not taken into account since these staff will be utilizing existing facilities in the WPCP.

Any sanitary sewage generated from portable toilets located onsite during construction will be removed and disposed of at an off-site facility as required by a qualified service provider.

Process wastewater is expected to be produced by the thickeners, dewatering units, condensate traps, H_2S removal system, conditioning skid, CHP, and Boilers. Wastewater will be collected in sumps and returned to the headworks of the WPCP. Descriptions of the process wastewater flows are provided in Table 6-3.

Table 6-3 Process Wastewater Flows

Building / Structure	Applicable Phase	Source	Description
Thickener Filtrate	1-2	Thickening	Filtrate stream from Thickeners. The resulting wastewater will have high BOD, TKN, and TP loadings.
Dewatering Filtrate	1-2	Dewatering	Filtrate stream from Dewatering. The resulting wastewater will have high BOD, TKN, and TP loadings.
Biogas Condensate Trap	0 and 1-2 (greater contributions in phase 1-2)	Condensate	Condensate from inlet raw biogas;
H2S Removal System	0 and (greater contributions in phase 1-2)	Condensate	Condensate from H2S Removal System;
Conditioning Skids	0 and (greater	Knock-out tank	Biogas is chilled to below dew point, condensation is collected and drained off the skid;

	contributions in phase 1-2)		
CHP	0	Condensate	Water generated in the utilization of biogas.
Digester Gallery	0 and (greater contributions in phase 1-2)	Boiler Blow Down	Water is wasted from the boiler to avoid increasing the concentration of impurities inside the boiler

Note: Due to the relatively small contributions anticipated to be provided from condensate processes, the wastewater generation estimates will focus on the non-condensate processes.

Wastewater will also be produced from wash-up activities, including wash-up from the thickening building and dewatering building. These effluent sources are described in the Table 6-4.

Table 6-4 Wash-up Wastewater Flows

Building / Structure	Source	Description
Thickening Building	Wash-up and Floor Drains	Cleaning and washing down equipment, the resulting wastewater will contain dirt and biomass as well as some trace oil and chemicals.
Dewatering Building	Wash-up and Floor Drains	Cleaning and washing down equipment and vehicles. The resulting wastewater will contain dirt and biomass as well as some trace oil and chemicals.

The expected quantity of wash-up wastewater is 5,760 L/day (assuming 1 hr of waste time). Wash-up wastewater is expected to have biosolids, slurry, and other solids that will be able to be biologically treated by the WPCP, and these streams are to be collected in sump pits and conveyed by pump to the return line to the WPCP's headworks.

Further details on process wastewater can be found in the Effluent Management Report under a separate cover.

6.5.3 Air Emissions

The main contaminants expected from the operation of the facility are CO_2, SO_2, and NOx. An air emissions model of the facility was developed based on all significant sources of air emissions at the Project. This model includes major contributors including the emergency flare, CHP plant, and biogas upgrading units. The details of the assessment are provided in the Emission Summary and Dispersion Modelling (ESDM) report under a separate cover.

6.5.4 Biomass Storage (Phase 1-2)

Biomass will be delivered to site as a polished organic slurry. This biomass stream will be transferred to the Slurry Holding Tank (400 m^3 capacity) and Buffer Tank (345 m^3 capacity), respectively. Both of these tanks will

be liquid and air tight, glass fused to steel bolted tanks with a liquid impermeable membrane on a concrete slab. These tanks are located over 300 m from the nearest water body. Each of these tanks will be equipped with a mixer to ensure that solids settling inside of the tanks doesn't occur.

The tanks are meant to hold the solids for transfer but will not store the solids for an extended period of time (anticipated maximum holding time of approx. 1 day for buffer tank, and 3 to 7 days for slurry holding tank during phase 1-2 operation).

Anticipated biomass use for the project is described in Table 6-5. Note that total biomass addition rate to the digesters will be limited to 99 MT per day so the HRT of the digesters will be a minimum of 20 days.

Table 6-5 Biomass Use

		Polished Organic Slurry	Biosolids from WPCP (PS+TWAS)
Phase 0	Maximum daily quantity that will be accepted	41.1 MT/day	43.44 + 71.54 MT/day
	Estimated annual average quantity that will be accepted	41.1 MT/day	21.75 + 36.3 MT/day
	Estimated average time that it will remain at the facility	<1 day (added to digesters when received)	Continuously produced by the WPCP
	Estimated average rate at which it will be used	5.1 MT/hr	Continuously produced by the WPCP
Phase 1-2	Maximum daily quantity that will be accepted	76.7	43.44+71.54
	Estimated annual average quantity that will be accepted	76.7	43.44+71.54
	Estimated average time that it will remain at the facility	Approx. 96 to 153 hrs	Continuously produced by the WPCP
	Estimated average rate at which it will be used	3.2 to 2.3 MT/hr	Continuously produced by the WPCP

6.5.5 Solid Waste

The project will produce digestate that will be a product of co-digestion of organic slurry and wastewater sludge. Digestate will be applied to land in accordance with the *Nutrient Management Act, 2002*. Quantities of digestate produced are set out in Table 6-6.

Table 6-6 Digestate Production

Phase 0	Maximum daily quantity digestate produced	95.8 MT/day

	Estimated annual average quantity that it will be produced. This value takes into account decanting to digestate to achieve a maximum of 5% total solids	44.7 MT/day
	Estimated average time that it will remain at the facility	180 days
	Estimated average rate at which it will be used	Contents of the digestate storage tanks land applied over two weeks in spring and fall
Phase 1-2	Maximum daily quantity that will be produced	125 MT/day
	Estimated annual average quantity that it will be produced	80 MT/day (@TS 4.5%)
	Estimated average time that it will remain at the facility	24 hours (no storage at facility)
	Estimated average rate at which it will be used	13.2 MT/day (@TS 25%)

The facility design and operators will ensure that dewatered biosolids collection systems (conveyors) installed in Phase 1-2 are functioning properly, and that the dewatered solids are used in a beneficial way. In addition, the dewatering building will include a floor drain to ensure biosolids are contained within the collection system and wash-up water runoff is treated by the wastewater treatment system (i.e. returned to the WPCP headworks).

7 Environmental Effects Monitoring Plan (EEMP)

An environmental effects monitoring plan has been prepared in accordance with the requirements of O. Reg. 359/09. The guiding principals that were used to establish the plan are summarized below. The details of the environmental effects monitoring plan are provided in Table 7-1.

Table 7-1 Environmental Effects Monitoring Plan

Potential Negative Environmental Effect	Performance Objective	Mitigation Strategy	Proposed Monitoring and Contingency Measures
• Spills of organic slurry may enter waterways or wetlands (low likelihood)	• Spills will not reach waterways or wetlands	• The organic slurry loading area is located in an area with a sump that would collect any spill and prevent it from entering waterways or wetlands. The sump discharges to the head of the wastewater treatment plant. • Organic slurry will only be received during operating hours of the WPCP, so staff will be onsite to monitor for spills. • The site is graded to direct major organic slurry spills into swales, which channel the flow into the secondary containment dry pond, effectively preventing any release to waterways or wetlands.	• Organic slurry receiving will be monitored by WPCP staff • If a spill occurs, flow of slurry will stop and spills will be washed into the sump located in the slurry receiving area. • In the event of a major spill requiring the use of the secondary containment dry pond, operators will close the pond's outlet valve and immediately contact a spill response team for cleanup.
• Odours from slurry reception or digestate loading may impact neighbouring residences (low likelihood)	• No increase in odours over the current operation of the WPCP	• Slurry is loaded from tanker trucks with a hose connection to the slurry receiving station. The slurry receiving station is a pump with a rock trap, which discharges into air tight digesters. • Digestate is loaded from the sludge storage tanks into tanker trucks using the existing truck loading arm and piping. Digestate is only loaded during land application periods, so it is not a constant source of odour. Approximately 20-30 minutes are needed to load a truck. Approximately 15-30 trucks are loaded per day over a total of four to eight weeks (depending on suitable weather) in the spring and fall.	• Plant staff will monitor for excessive odours. Also, a complaint procedure is in place for neighbours to notify operations staff. • Contingency measures include ceasing digestate loading and slurry offloading should excessive odours occur. Also, loading and offloading can be scheduled during times when prevailing winds are blowing away from neighbouring residences.

• Spills from equipment may enter waterways or wetlands (low likelihood)	• Spills will not reach waterways or wetlands	• Equipment will be located on concrete pads or in buildings. Spills will be collected in sumps that send them to the headworks of the WPCP. • The plant is designed to direct all major equipment spills into the secondary containment dry pond. • The WPCP has a comprehensive spills response plan set out in the Facility Emergency Plan (Appendix D).	• Equipment will be monitored by WPCP staff • If a spill occurs, the source of the spill will be corrected and spills will be washed into sumps and returned to the headworks of the WPCP. • In the event of a major spill requiring the use of the secondary containment dry pond, operators will close the pond's outlet valve and immediately contact a spill response team for cleanup.
• Odours from biogas emissions may impact neighbouring residences (low likelihood)	• No odours from biogas	• Odour mitigation strategies in the design include connecting the headspaces of all buffer tanks to the digester biogas headspace such that all odours and biogas will be transported to the biogas treatment system, which removes odours	• Plant staff will monitor for excessive odours. Also, a complaint procedure is in place for neighbours to notify operations staff. • Odour from biogas would indicate a leak in the piping or equipment, which will be corrected immediately.
• Air emissions from the CHP or emergency flare may impact neighbouring residences	• Air emissions do not impact neighbouring residences	• Emissions calculations and modeling were completed for the Emission Summary and Dispersion Modeling report, and process emissions do not exceed limits at the points of reception modeled. • Equipment will be maintained according to manufacturer recommendations to reduce the likelihood of equipment malfunctions that could • increase emissions	• Equipment malfunctions that cause an increase in air emissions will be shut down and repaired

8 Emergency Response and Communication Plans

The Emergency Response and Communications Plan define the avenue for ongoing communication throughout Project Construction, Operation and Decommissioning phases. This will ensure members of the communication, Aboriginal communities, the local service board, and government ministries are informed of pertinent Project activities, in addition to any emergencies that may occur.

The emergency response and communication plans will be reviewed and updated as appropriate by the parties responsible for Project Activity according to each phase. Any updates to the plans will be communicated to all stakeholders as they are made.

8.1 Communications Plan for Emergency

OCWA will finalize a detailed updated Emergency Response Plan (ERP) in collaboration with the appropriate emergency service departments building off of the existing ERP for WPCP (provided in appendix D). A current version of the ERP will be kept at the Net Zero Facility. The ERP will contain current contain information for emergency responders, including police and fire contacts, and will outline the chain of communication between on-site personnel, Town of Petawawa, emergency contacts, the local community and other pertinent stakeholders in the event that an emergency situation should occur.

Potential emergency situations which could occur generally include fire, personal injury and spills. All incidents will be properly documented and kept on file. Documentation will include date of incident, date of reporting, name of reporter, description of incident, cause of incident, actions taken, communication with internal and external personnel, and follow-up required. In the event of an emergency, 911 will be called as well as the MECP Spills Action Centre as necessary.

8.2 Communications Plan for Project Updates and Activities (Non-Emergency)

All non-emergency communications will be disseminated through a variety of media avenues to keep stakeholders apprised of Project updates and activity. Where applicable, these avenues will include:

- Project website (https://www.petawawa.ca/residents/public-works/wastewater-treatment-collection/notice-of-public-meeting-petawawa-net-zero-project-9099.html);
- Newspaper notices;
- Posting of notices in the local community;
- Construction signage; and,
- Email and/or letters.

Project updates will include any legally required notices as well as any information that the Town of Petawawa, OCWA, and/or contractor considers relevant to inform the public of and ensure their safety. Signage is present

at the gate of the site with contact information as well as contact information for the project is available on the project's website.

Correspondence regarding the project will recorded and kept in the project file. Since the project is located on the site of the Petawawa WPCP, the complaints procedure for the WPCP will be followed and any complaints will be documented in the WPCP annual report, as required by the Certificate of Approval.

9 Report Conclusion

Safe and reliable operation of the Town of Petawawa Net Zero Project can be implemented without causing significant adverse environmental effects. This will be achieved through proper design, operation and maintenance of the facility, and implementation of mitigation, monitoring, and contingency measures outlined in this report.

Appendix A: Site Plans

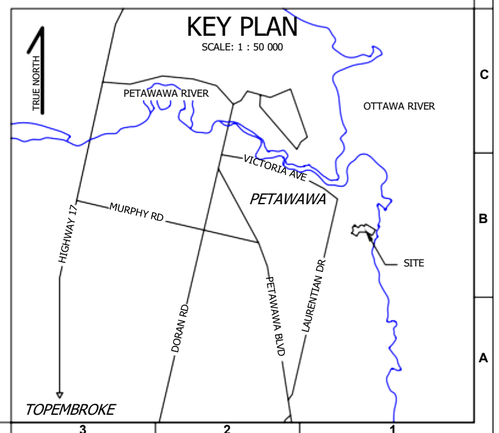
PLAN NORTH
TRUE NORTH
28°

LEGEND

- SITE SERVICING
- DEMOLITION / REMOVED
- NEW FEATURE (PHASE 1/2 NOTED)
- EXISTING FEATURE
- *RESIDENTIAL* — LAND USE (OFFICIAL PLAN 2013)
- WETLAND
- WATER FEATURE
- CONTOUR (5M) ASSUMED
- FLOOD PLAIN
- DIRECTION OF SURFACE DRAINAGE

OUTLINE OF WETLAND
300M SITE OFFSET (ACTIVE SITE AREA)
APPROX. FLOOD PLAIN EXTENT
OTTAWA RIVER
LAURENTIAN DR
RESIDENTIAL
BAYSHOR DR
EARL ST
IRMA ST
JAN DR
EAST ST
ABBIE LN
UTM NORTHING 5 085 500
UTM EASTING 325 500
DECIDUOUS BUSH
MIXED BUSH

KEY PLAN
SCALE: 1 : 50 000



PRELIMINARY - NOT FOR CONSTRUCTION

H:\Anaergia\200902 - Petawawa\200902 - 06 - REA\200902-GA-001 - REA Site Plan.DWG
2022-06-17

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMNARY	SW		2022-05-25

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

Rosebush Wilson

DESIGNED:
DRAWN: SWilson
CHECKED:
APPROVED:
REFERENCE#:
PROJECT NO.: 200902
SCALE: 1:2000

PETAWAWA

REA SITE PLAN
SHOWING SURROUNDING LAND USES

DRAWING NUMBER
GA-001
REV A

PRELIMINARY - NOT FOR CONSTRUCTION

H:\Anaergia\200902-0 - Petawawa - Phase 0\200902-0 - 06 - REA\2C0902-GA-001 - REA Site Plan - 22-09-28.dwg
2022-10-03

NORTH

STAGING AREA
370 SQ M

GAS CONDITIONING AND CHP AREA
CONCRETE PAD w. (2) SUMPS 350M²
[PHASE 0]

SITE ENTRANCE/EXIT

NEW FLARE

Vessel w. carbon filter

60,82

7,5

REPLACE/EXTEND 100 BG LINE w. 200
BG LINE FROM DIGESTER 3/4 GALLERY
TO NORTH WALL OF BOILER BUILDING

New CHP and Activated Carbon Filter

BOILER BUILDING

OFFICE | GARAGE

(9,14) (9,14)

DIGESTER 3 & 4 UPGRADE
[PHASE 0]

D2 D1

New H2S Scrubber

D4 D3

DIGESTER D3 & D4 REFURBISHMENT
[PHASE 0]

Existing Truck
Loading/Unloading Pad

(30,8)

EXISTING HYDRANT

SLUDGE 2 SLUDGE 1

Existing Digestate
Storage

Existing Digestate
Storage

New Organic Slurry Reception
Skid (inside existing building)

RECEPTION EQUIPMENT IN EXISTING BUILDING
& CONTAINER/PAD MOUNTED EQUIPMENT FOR CHP
[PHASE 0]

(19,03) (18,97)

LEGEND

- SITE SERVICING
- NEW FEATURE (PHASE 0)
- EXISTING FEATURE
- WATER FEATURE
- CONTOUR (0.25M)
- FLOOD PLAIN
- DIRECTION OF SURFACE DRAINAGE
- DIRECTION OF SWALE/DITCH DRAINAGE

SITE SURFACE SUMMARY (SQ M)

	EXISTING	PHASE 0			TOTAL
SITE AREA	42,800	0			42,800
IMPERMEABLE SURFACES AND BUILDINGS	10,570	125			10,695
IMPERMEABLE SURFACES COLLECTED TO SUMP	0	350			350

EXISTING TRUCK UNLOADING
CONTAINMENT PIT
35 SQ M

CHILLER PAD

SITE PLAN
SCALE: 1 : 500
ASSUMED EXISTING FEATURES

EXISTING UNLOADING AREA
SCALE: 1 : 100

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
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B	PRELIMNARY	WMcE		2022-09-28

ATTENTION:
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IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

Rosebush Wilson

DESIGNED:	
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

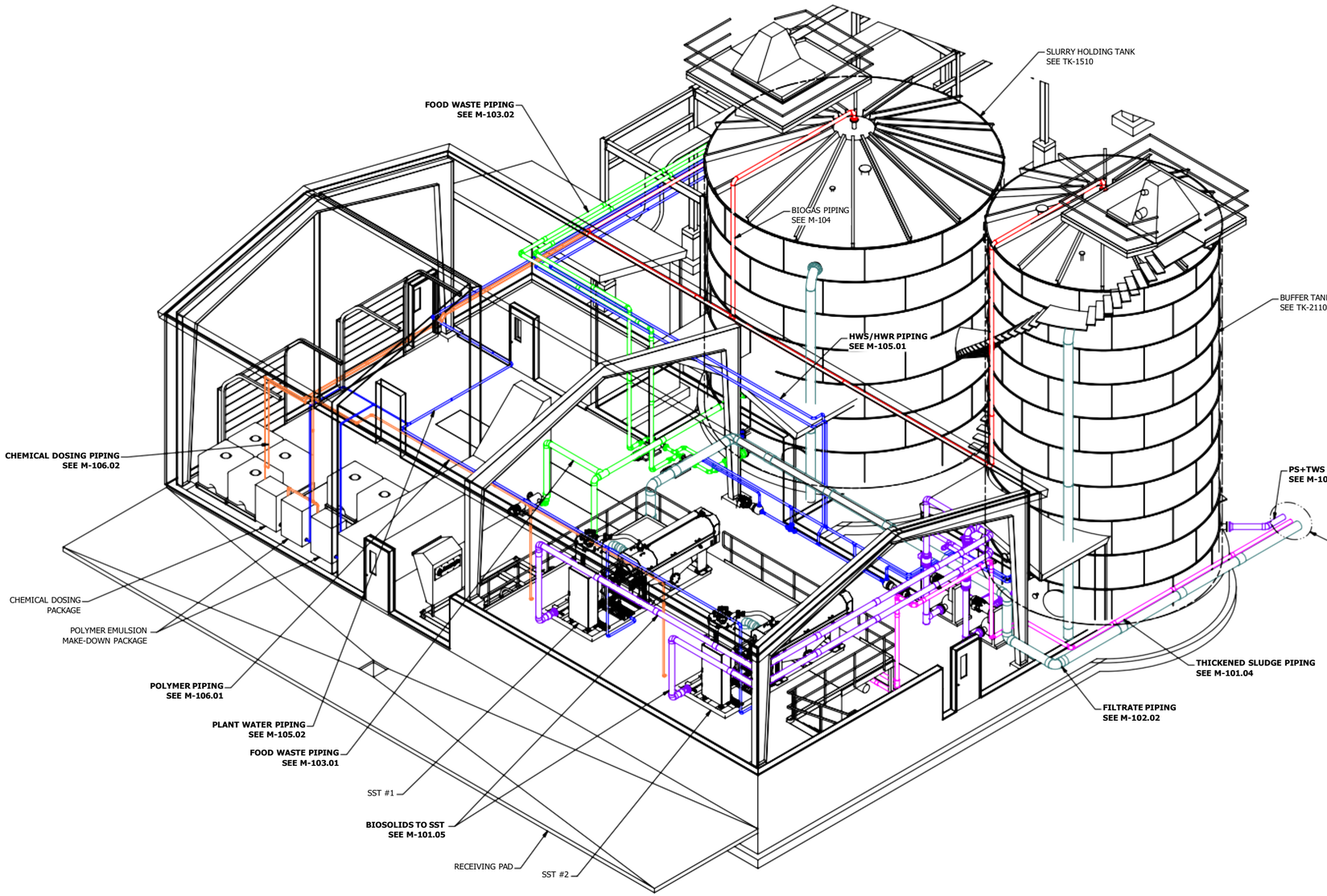
SITE PLAN ILLUSTRATING ONSITE SURFACES, FEATURES AND DRAINAGE

DRAWING NUMBER
GA-002
REV B

Appendix B: Mechanical Drawings

LEGEND

- THICKENED SLUDGE PIPING
- PS+TWS BIOSOLIDS PIPING
- FILTRATE
- WATER PIPING
- FOOD WASTE PIPING
- CHEMICAL PIPING
- BIOGAS PIPING



NE ISO VIEW

SCALE 1 : 70

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-100-ThickeningArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
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ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

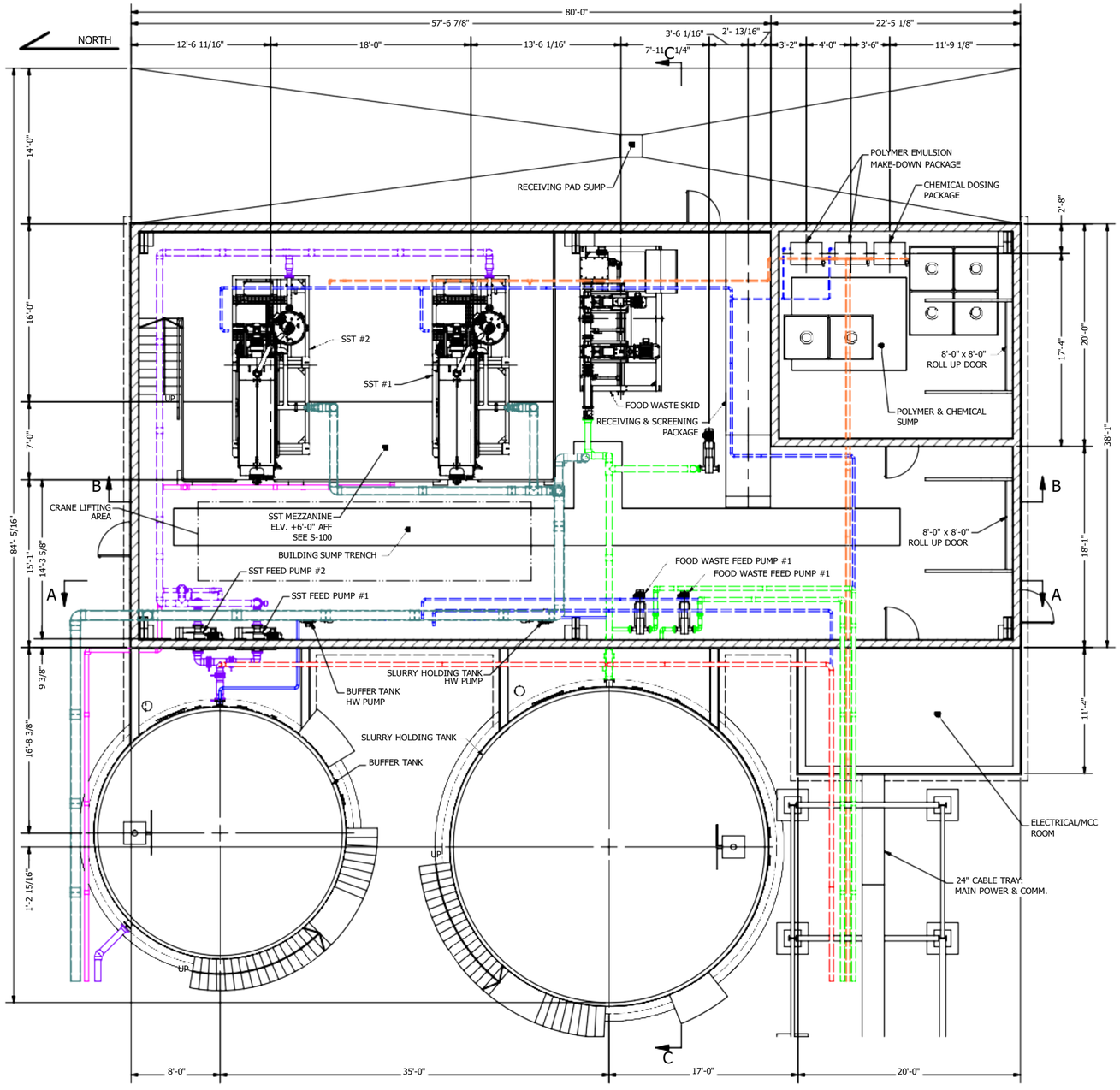
PETAWAWA

THICKENING BUILDING

DRAWING NUMBER

GA-100.1

REV A



PLAN VIEW

SCALE 1 : 70

ONTAINMENT NOTE:

- MAIN SUMP - 46,112 L
- RECEIVING PAD SUMP - TBD
- POLYMER SUMP - 6,937 L
- FLOOR - 18,926 L
- TOTAL - 71,975 L

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-100-ThickeningArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-23

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

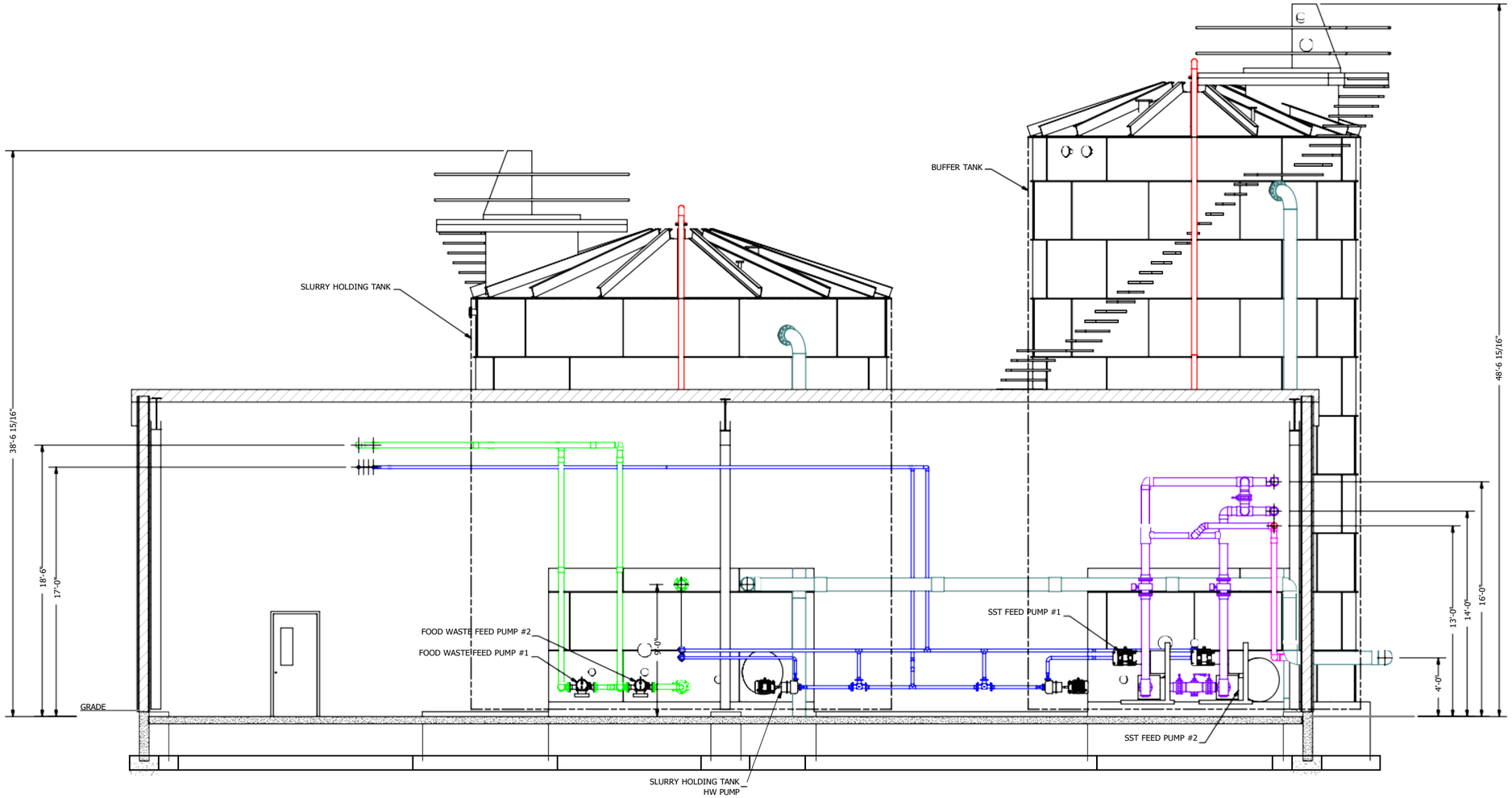
PETAWAWA

THICKENING BUILDING

DRAWING NUMBER

GA-100.2

REV A



SECTION A

SCALE 1 : 50

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-100-ThickeningArea.idw 2021-01-12

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ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

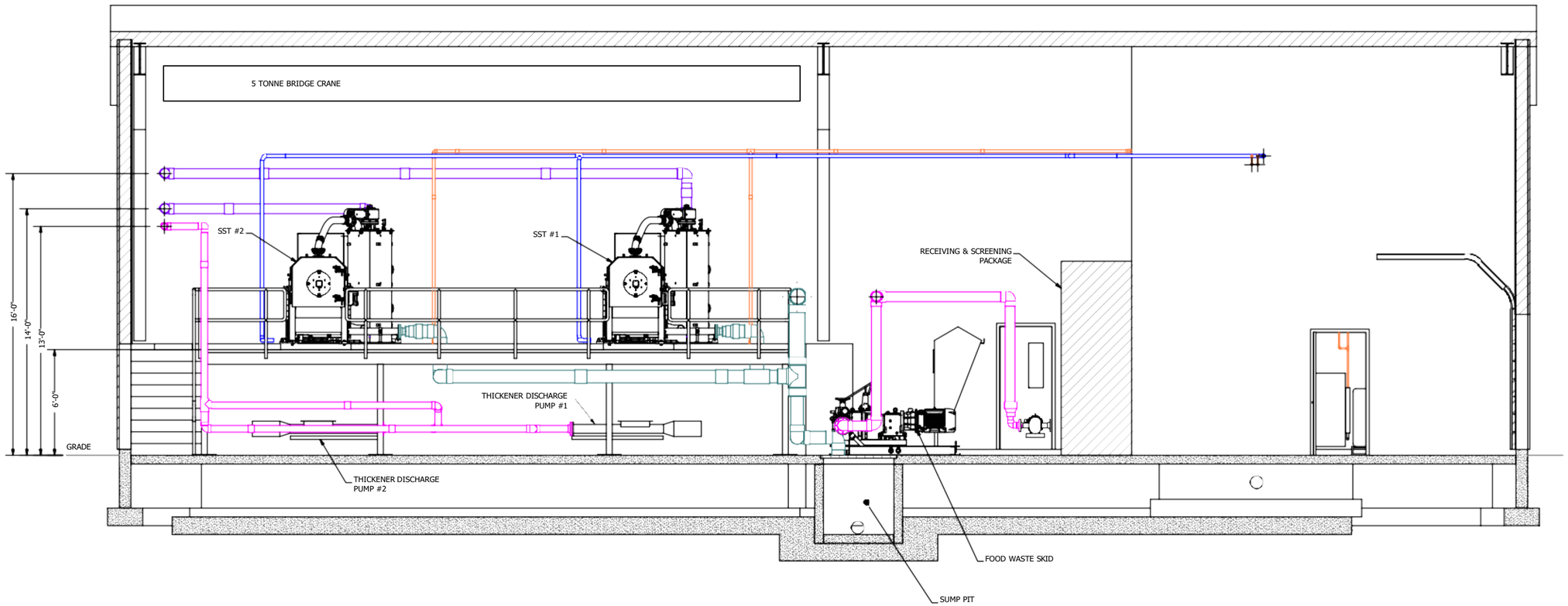
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

THICKENING BUILDING

DRAWING NUMBER: GA-100.3

REV: A



SECTION B
SCALE 1 : 40

PRELIMINARY - NOT FOR CONSTRUCTION

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ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

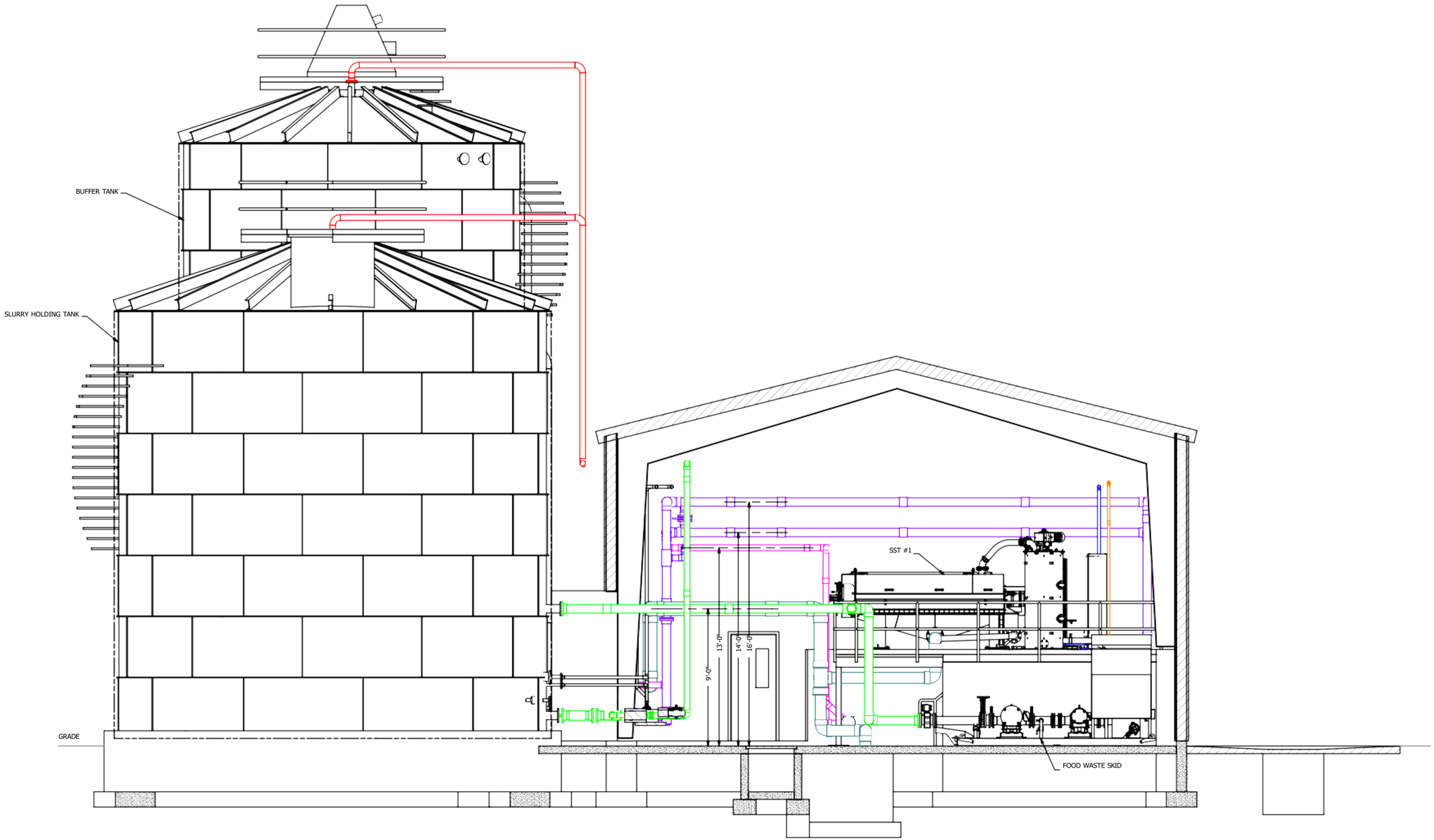
JDM Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

THICKENING BUILDING

DRAWING NUMBER
GA-100.4
REV A



SECTION C
SCALE 1 : 40

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-100-ThickeningArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
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ATTENTION:
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IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

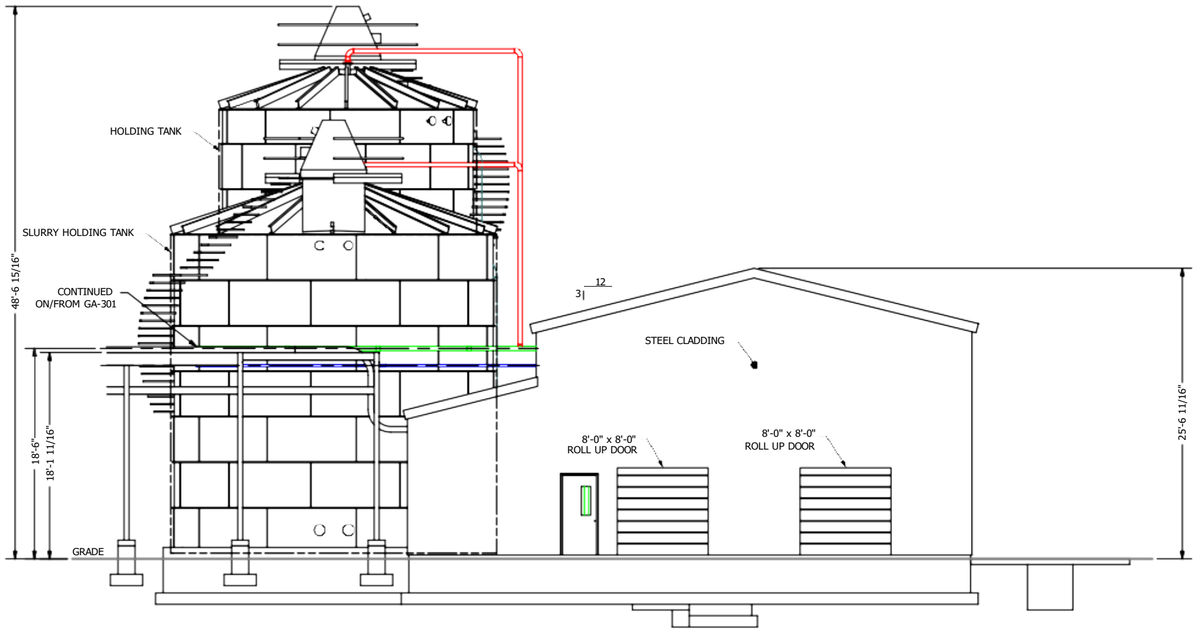
Anaergia
Breaking Barriers to Sustainability

DESIGNED: WMcEwan
DRAWN: WMcEwan
CHECKED:
APPROVED:
REFERENCE#:
PROJECT NO.: 200902
SCALE: AS NOTED

PETAWAWA

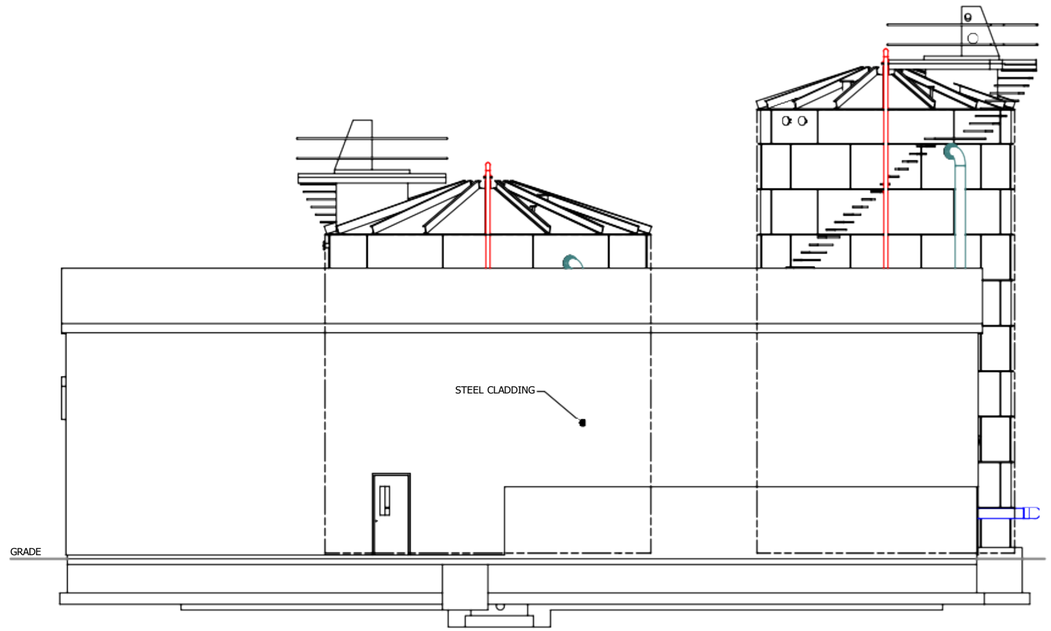
THICKENING BUILDING

DRAWING NUMBER
GA-100.5
REV
A



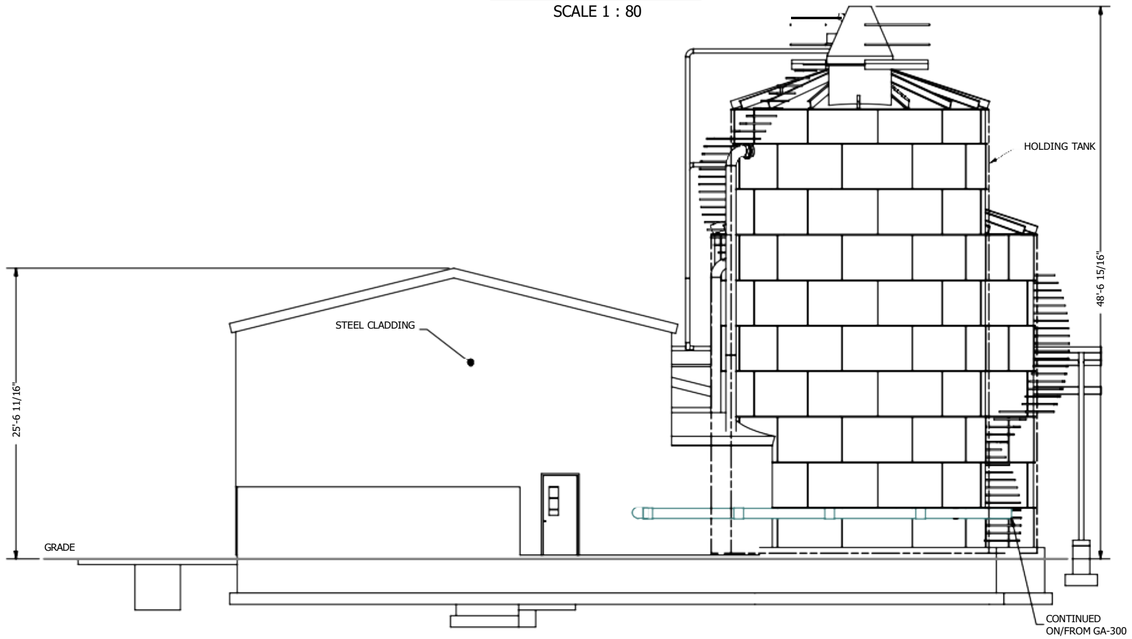
SOUTH ELEVATION

SCALE 1 : 80



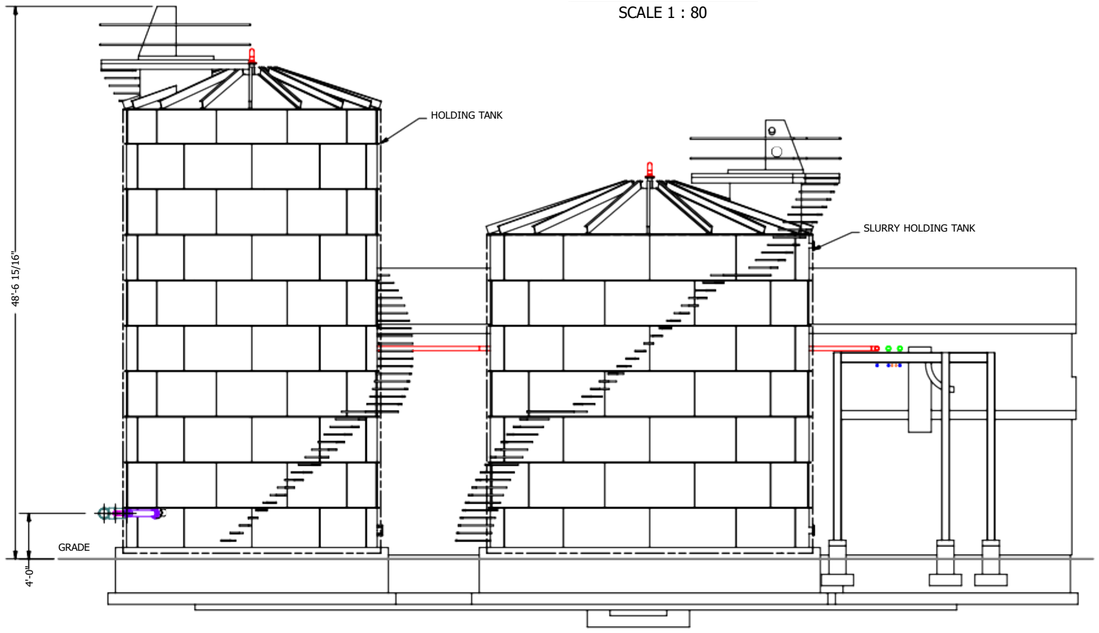
EAST ELEVATION

SCALE 1 : 80



NORTH ELEVATION

SCALE 1 : 80



WEST ELEVATION

SCALE 1 : 80

PRELIMINARY - NOT FOR CONSTRUCTION

20902-GA-100-ThickeningArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
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ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

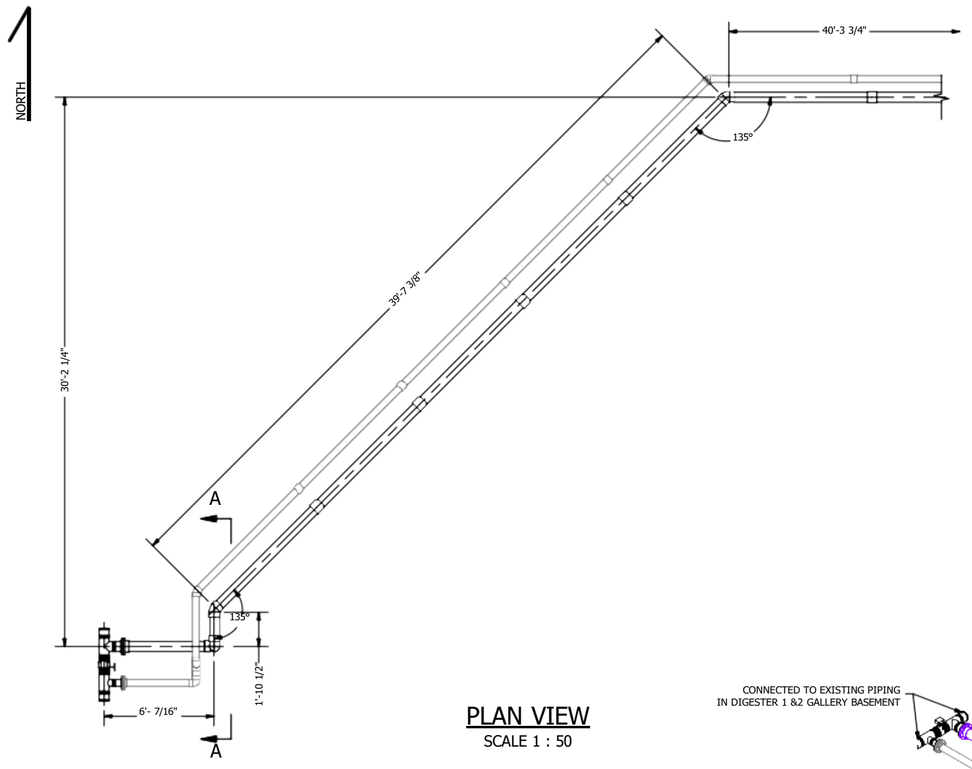
PETAWAWA

THICKENING BUILDING

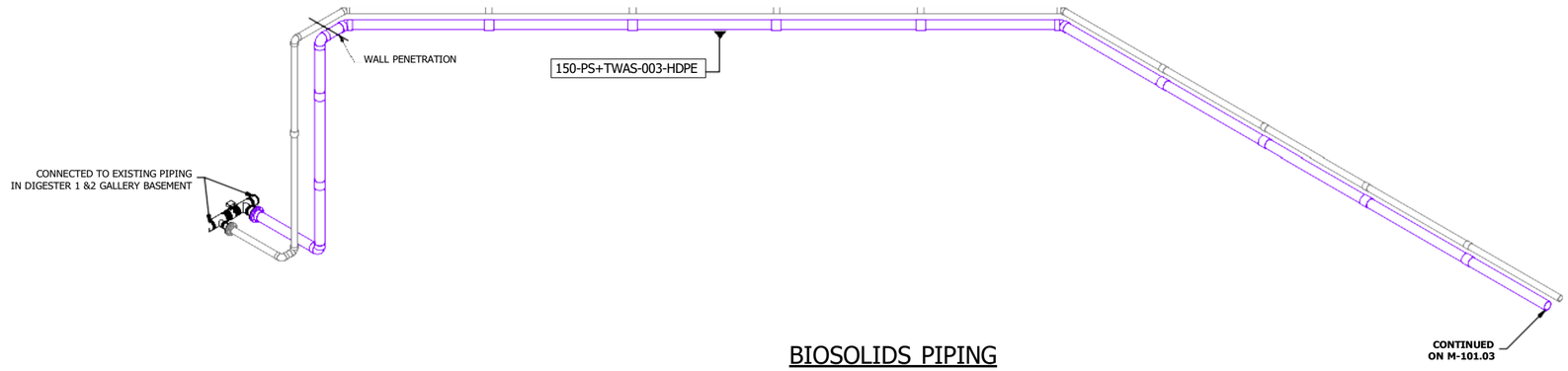
DRAWING NUMBER

GA-100.6

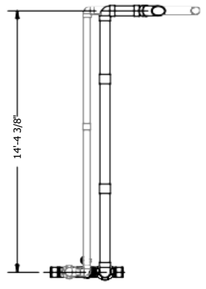
REV A



PLAN VIEW
SCALE 1 : 50



BIOSOLIDS PIPING
PS+TWS BIOSOLIDS TO BUFFERTANK REF: D-01
SCALE 1 : 50



SECTION A
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-101-Thickening&Sludge.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-20

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

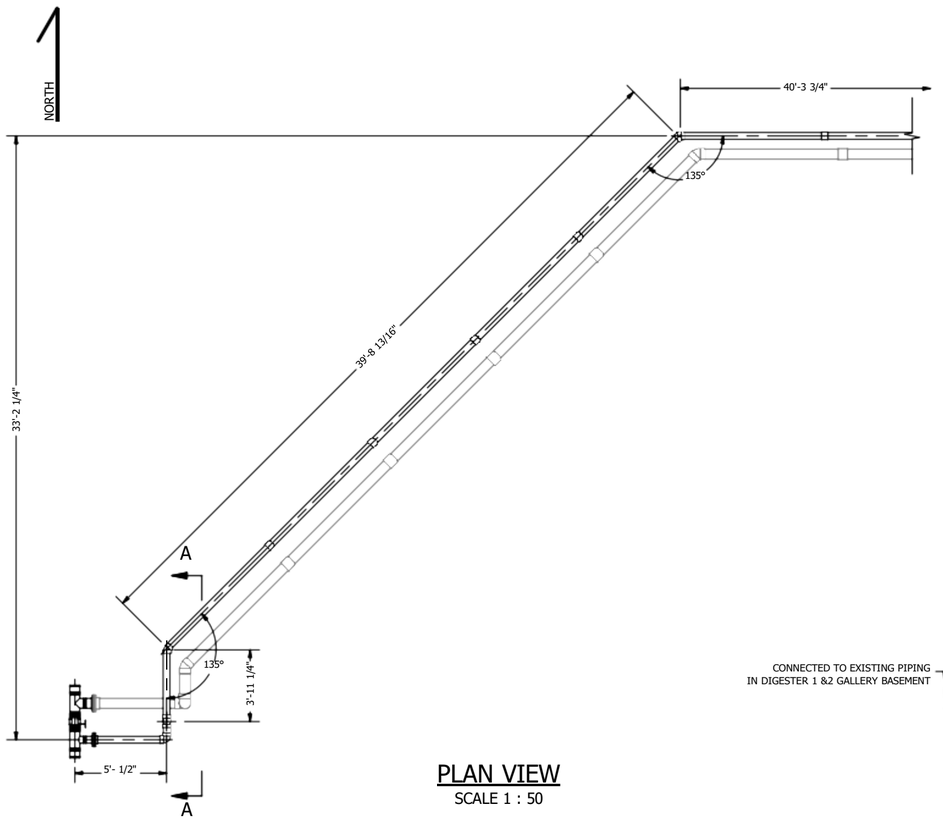
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-300
PROJECT NO.:	200902
SCALE:	AS NOTED

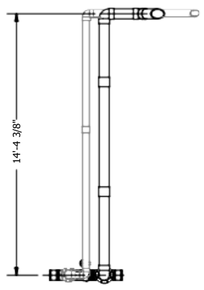
PETAWAWA

DIGESTER #1 & #2 BIOSOLIDS

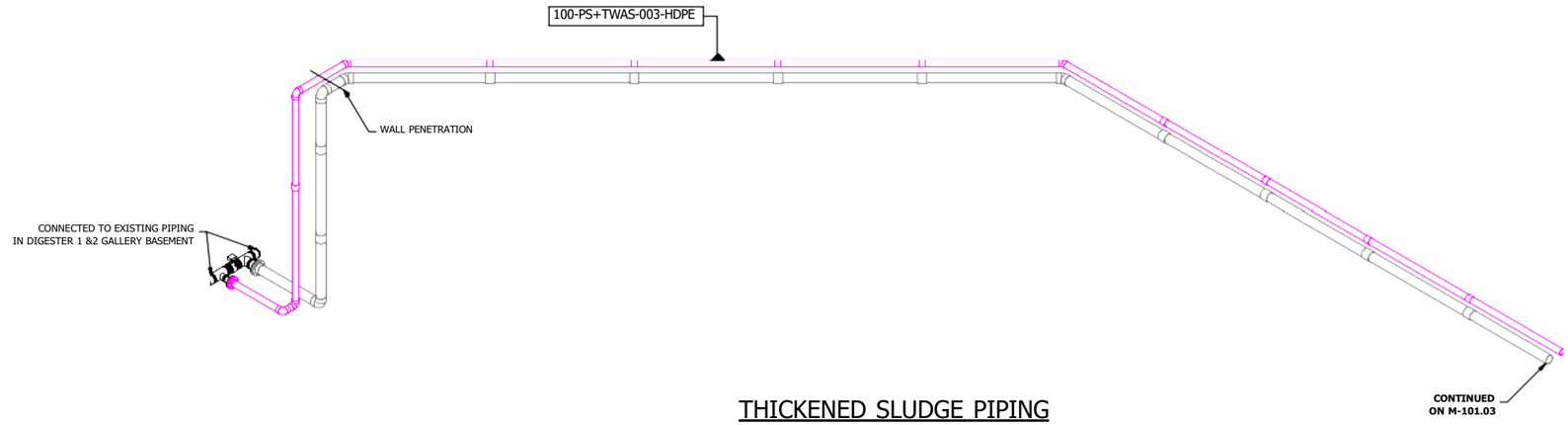
DRAWING NUMBER
M-101.01
REV
A



PLAN VIEW
SCALE 1 : 50



SECTION A
SCALE 1 : 50



THICKENED SLUDGE PIPING
THICKENED SLUDGE FORM SST REF: D-01
SCALE 1 : 50

DRAWING NOTES:
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-101- Thickening&Sludge.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-20

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

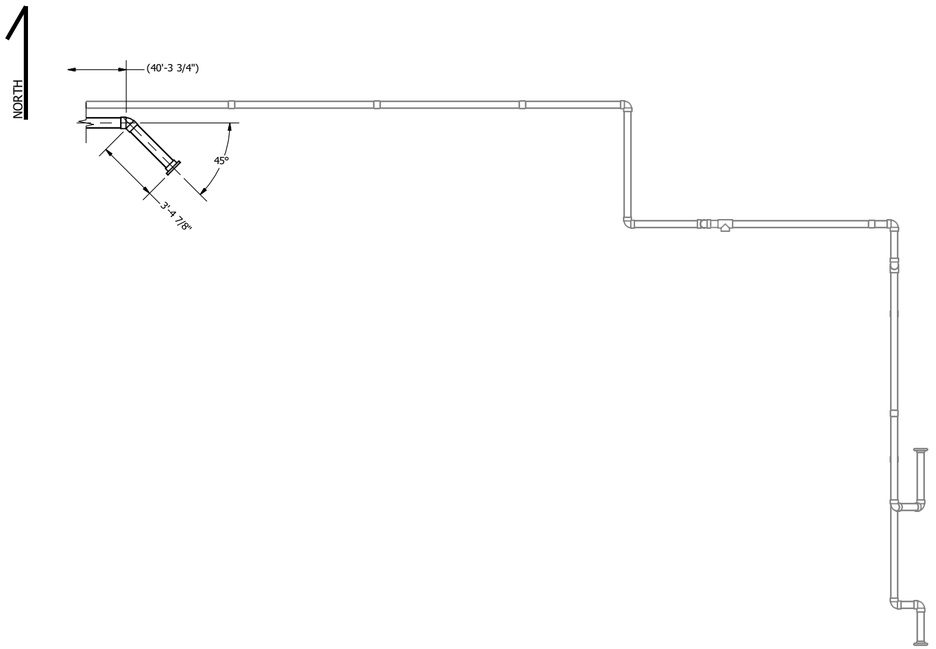
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

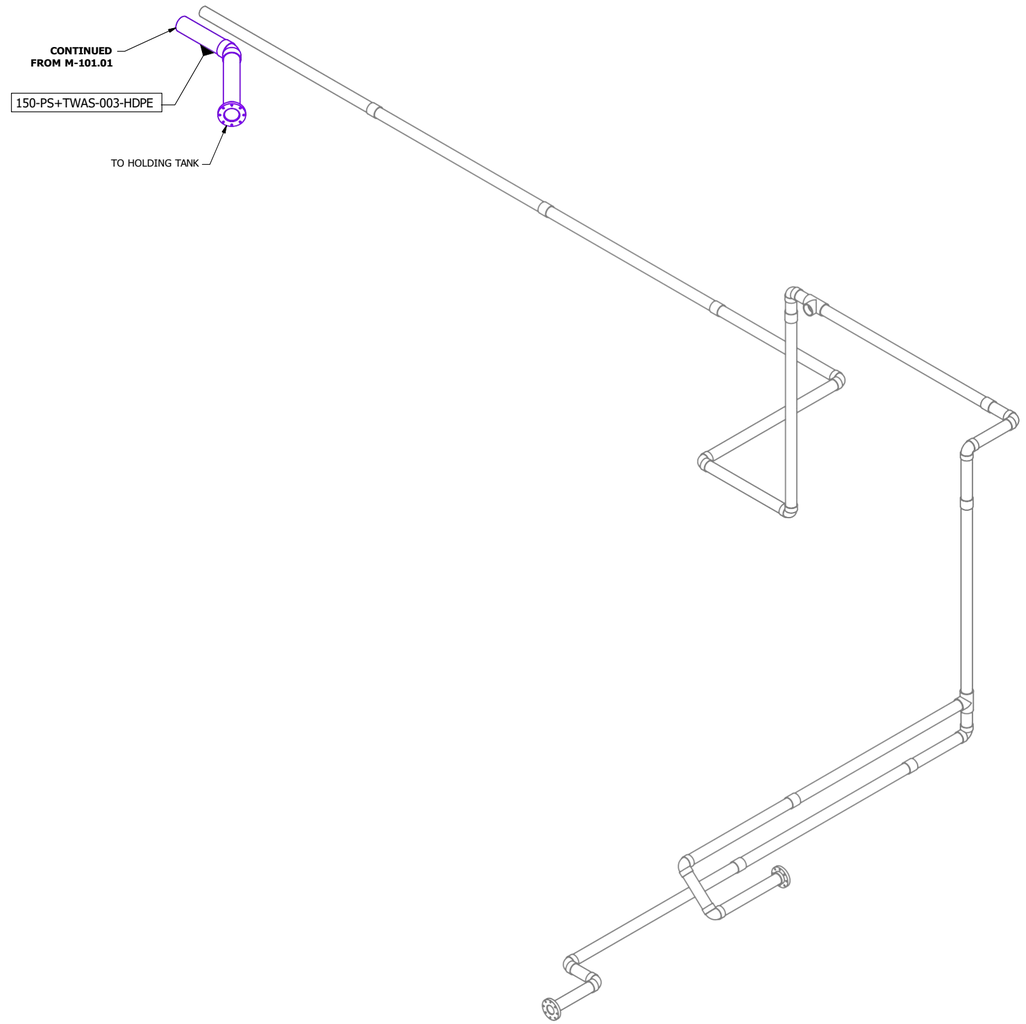
PETAWAWA

DIGESTER #1 & #2 THICKENED SLUDGE

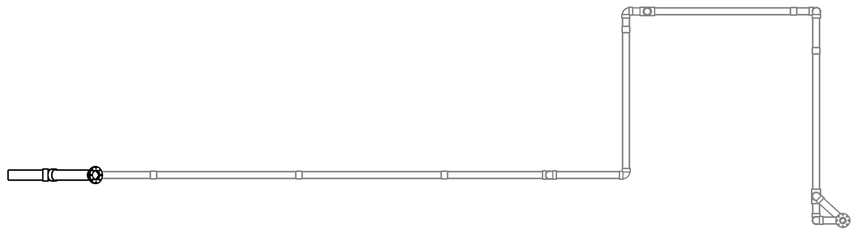
DRAWING NUMBER
M-101.02
REV
A



PLAN VIEW
SCALE 1 : 50



BIOSOLIDS PIPING
PS+TWS BIOSOLIDS TO BUFFERTANK REF: D-01
SCALE 1 : 30



SOUTH ELEVATION
SCALE 1 : 50

DRAWING NOTES:
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-101-Thickening&Sludge.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

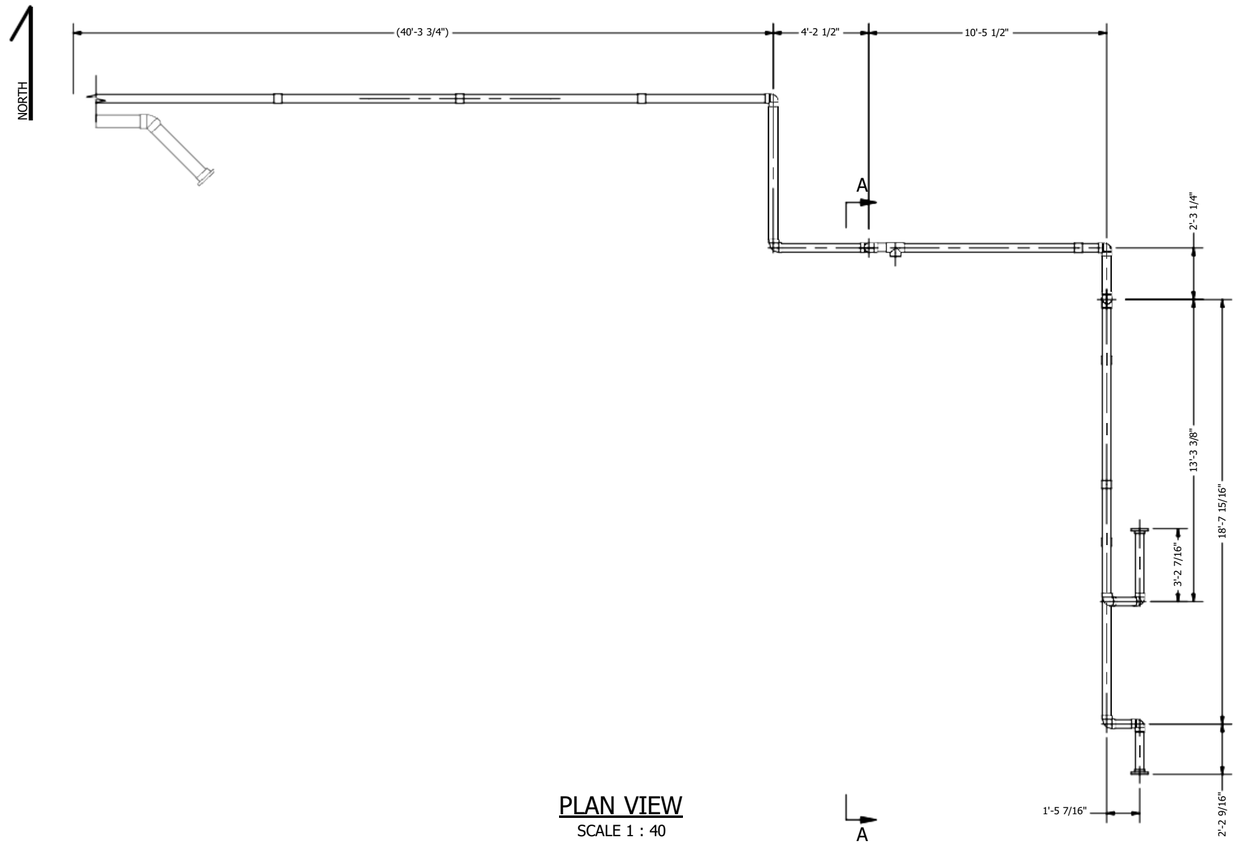
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

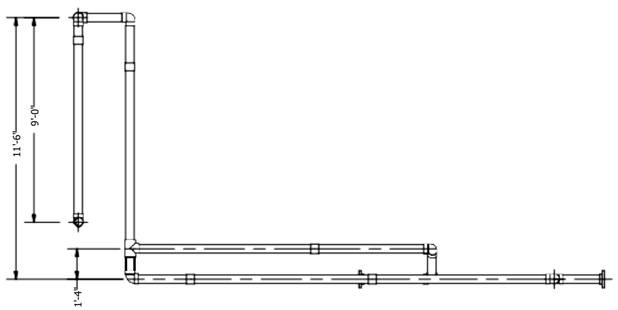
PETAWAWA

THICKENING BUILDING BIOSOLIDS

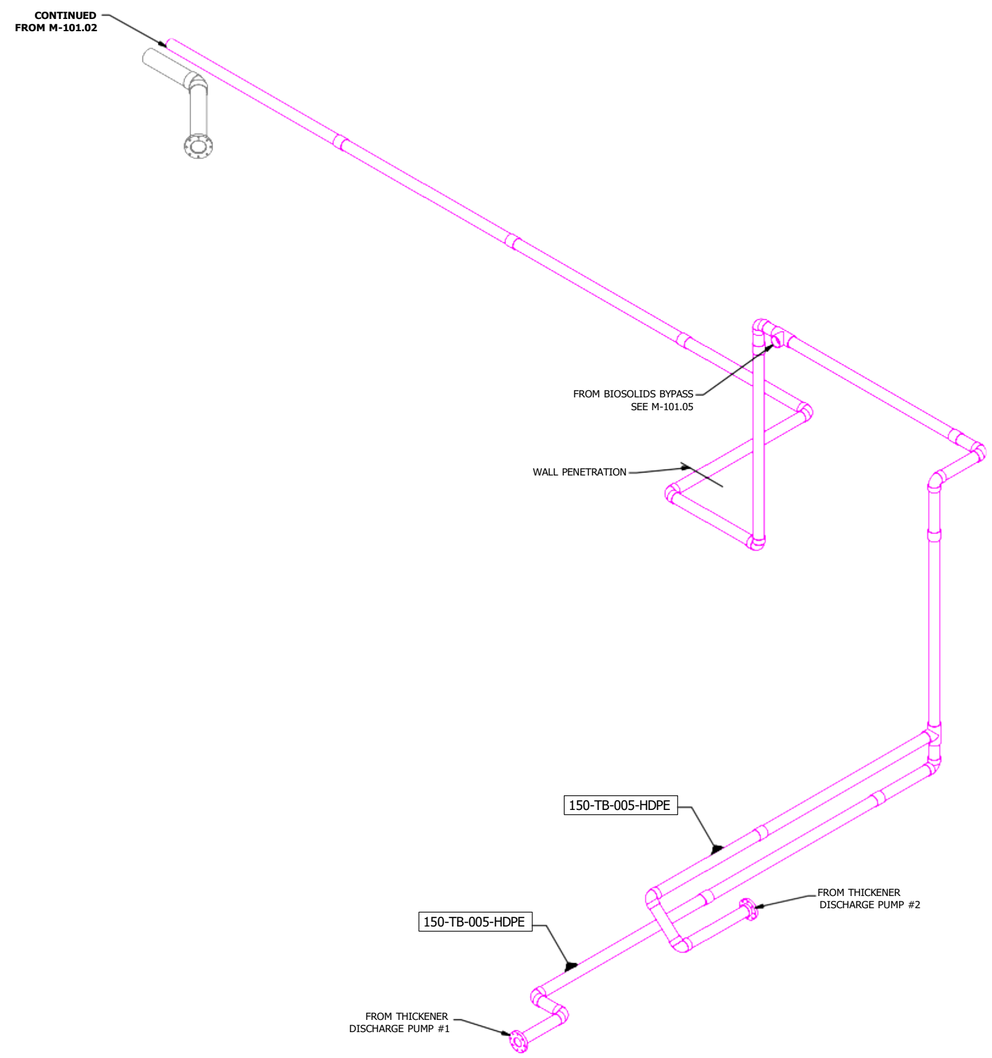
DRAWING NUMBER
M-101.03
REV A



PLAN VIEW
SCALE 1 : 40



SECTION A
SCALE 1 : 40



THICKENED SLUDGE PIPING
THICKENED SLUDGE FORM SST REF: D-01, D-06, D-07
SCALE 1 : 30

DRAWING NOTES:
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-101-Thickening&Sludge.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

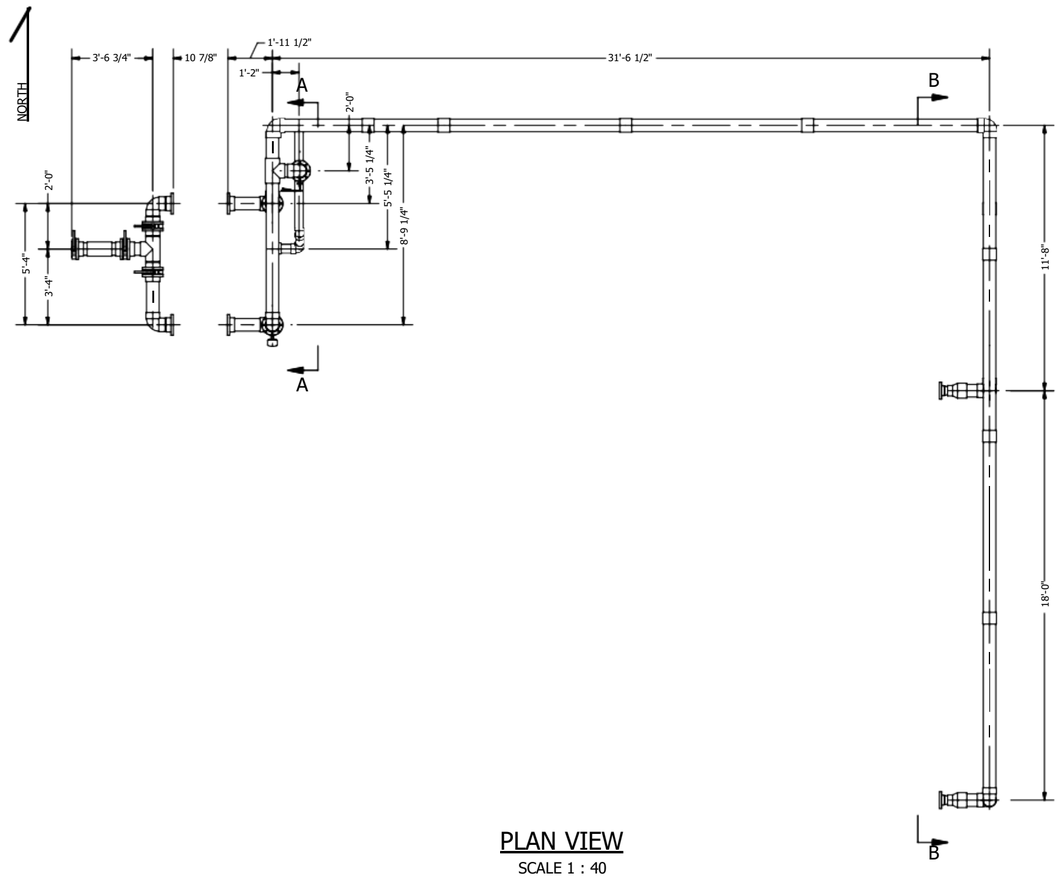
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

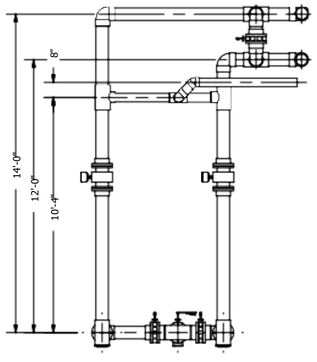
THICKENING BUILDING THICKENED SLUDGE

DRAWING NUMBER
M-101.04
REV A



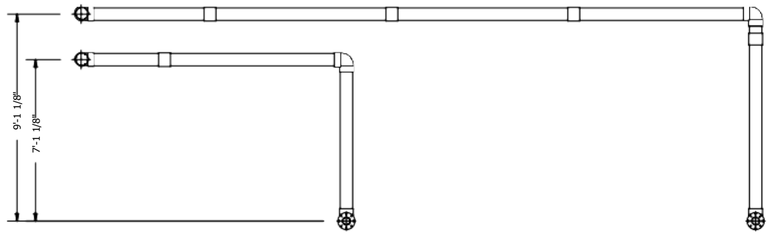
PLAN VIEW

SCALE 1 : 40



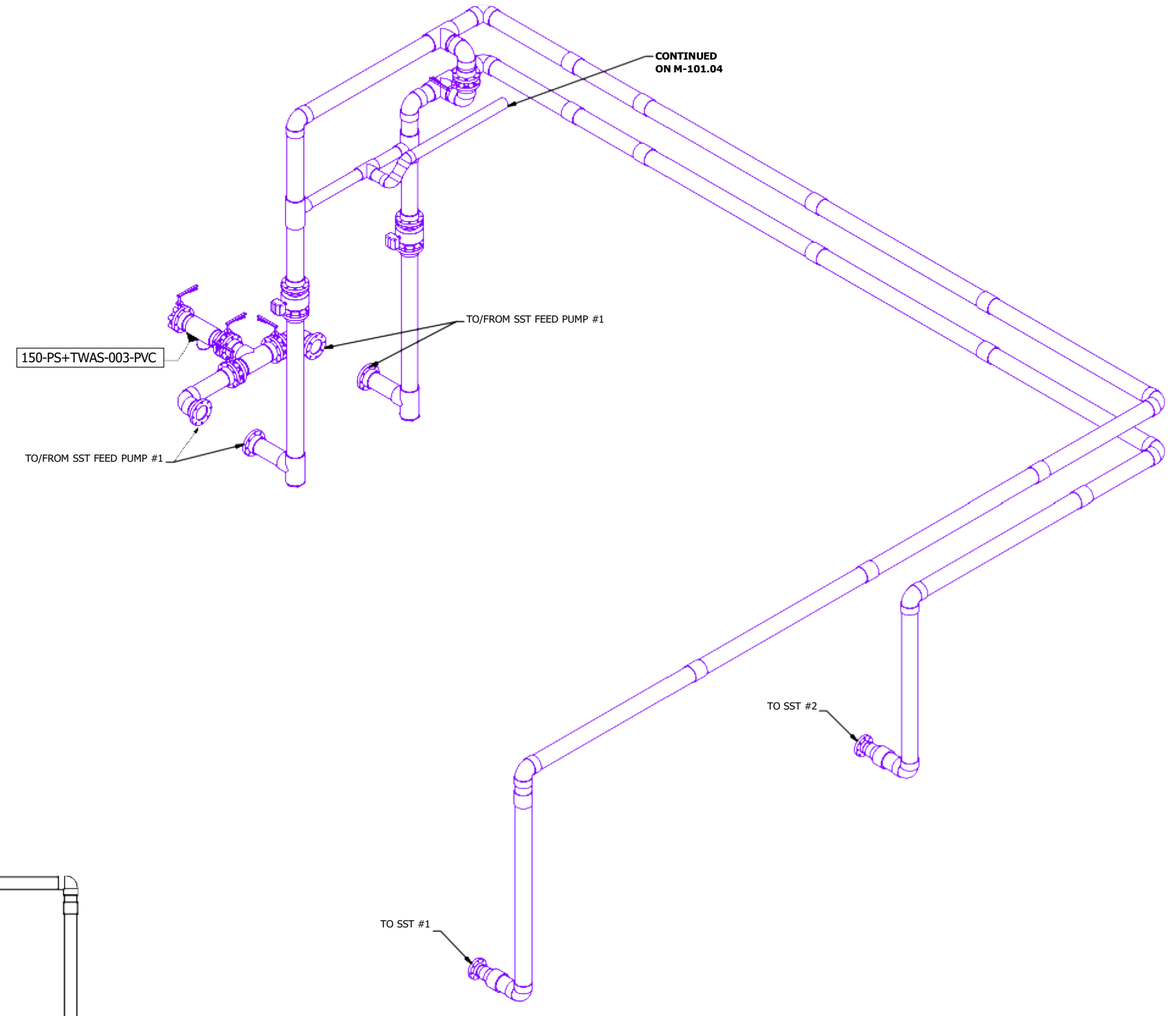
SECTION A

SCALE 1 : 40



SECTION B

SCALE 1 : 40



BIOSOLIDS PIPING

BIOSOLIDS TO SST REF: D-01, D-03, D-07, D-08

SCALE 1 : 30

DRAWING NOTES:

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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-101-Thickening&Sludge.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia

Breaking Barriers to Sustainability

JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

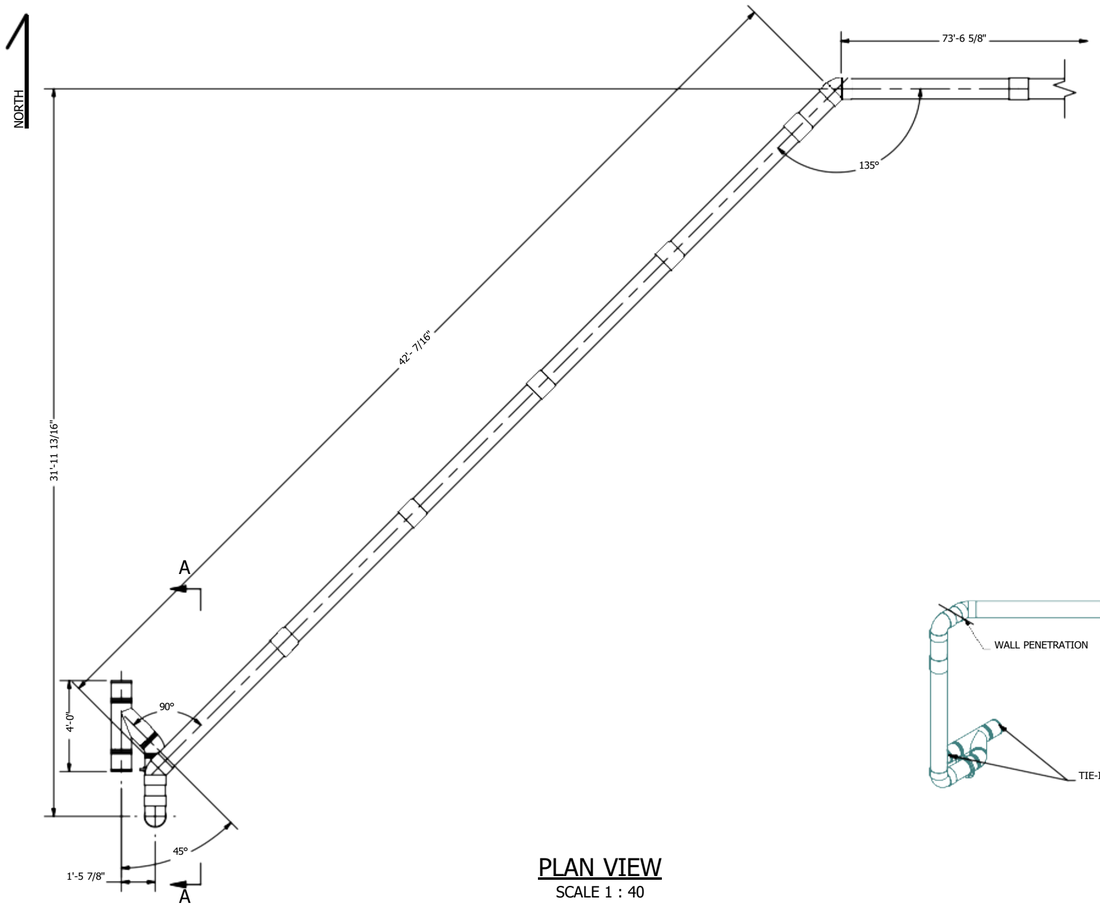
PETAWAWA

THICKENING BUILDING THICKENED SLUDGE

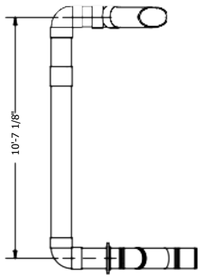
DRAWING NUMBER

M-101.05

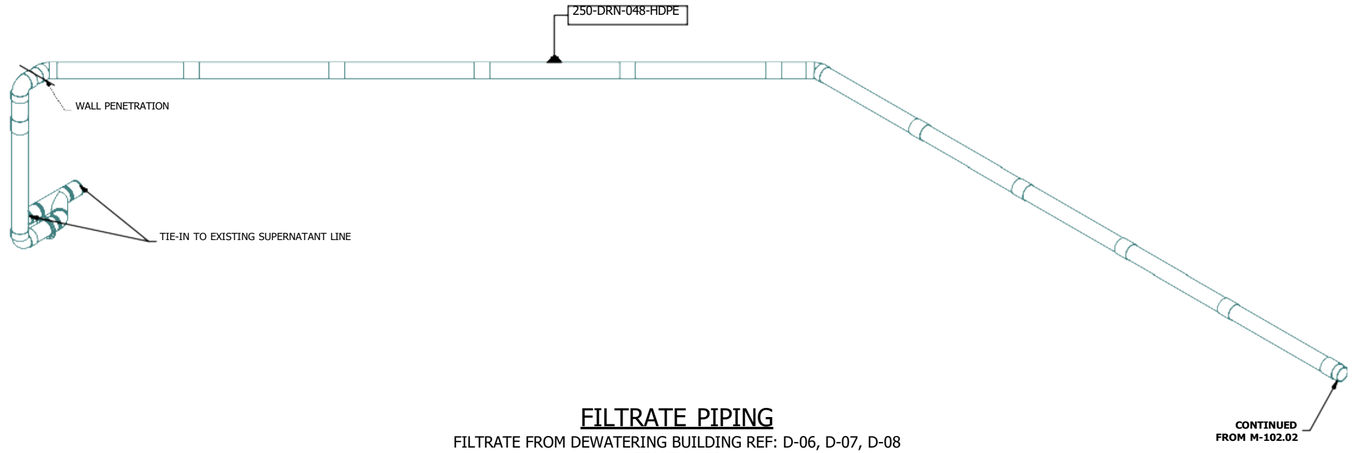
REV A



PLAN VIEW
SCALE 1 : 40



SECTION A
SCALE 1 : 40



FILTRATE PIPING
FILTRATE FROM DEWATERING BUILDING REF: D-06, D-07, D-08
SCALE 1 : 50

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-102-Thickening&Filtrate.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

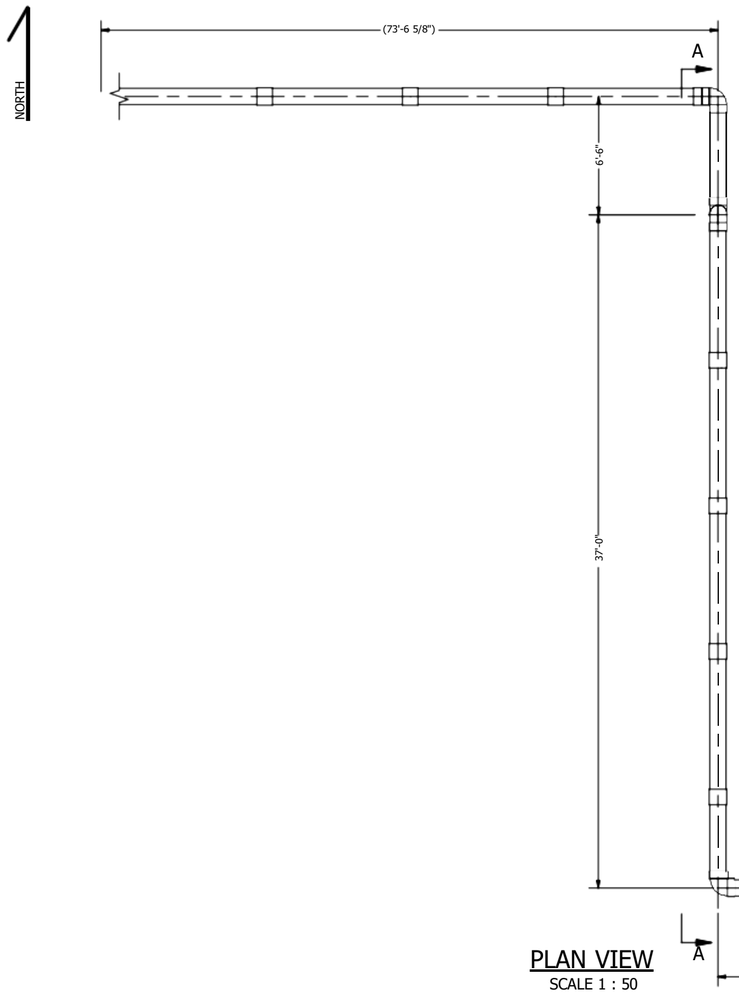
DESIGNWORKS
JDM
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-300
PROJECT NO.:	200902
SCALE:	AS NOTED

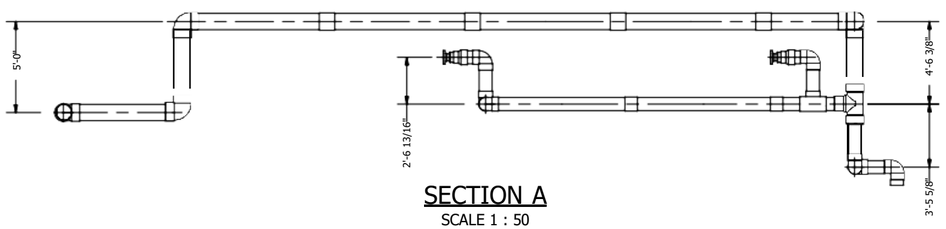
PETAWAWA

DIGESTER #1 & #2 FILTRATE

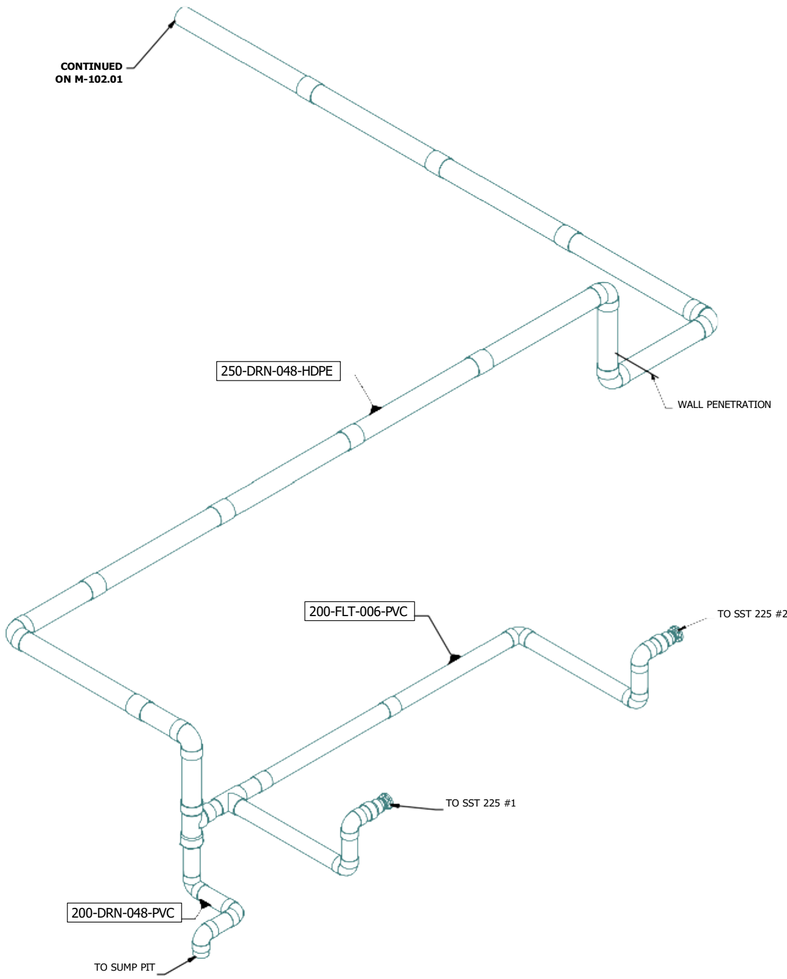
DRAWING NUMBER
M-102.1
REV
A



PLAN VIEW
SCALE 1 : 50



SECTION A
SCALE 1 : 50



FILTRATE PIPING
FILTRATE FROM DEWATERING BUILDING REF: D-06, D-07, D-08
SCALE 1 : 40

DRAWING NOTES:
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2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-102-Thickening&Filtrate.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

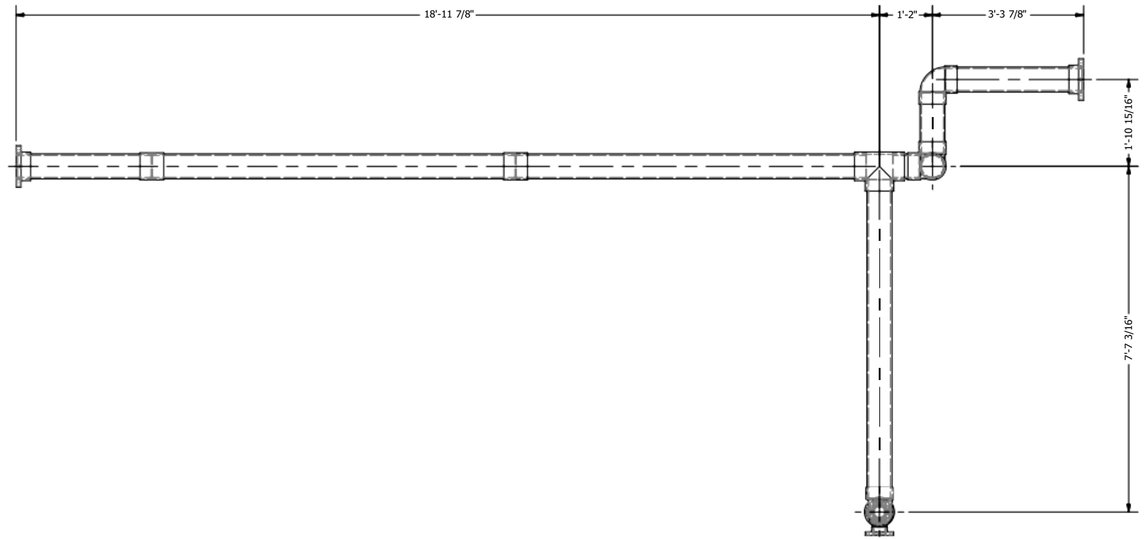
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

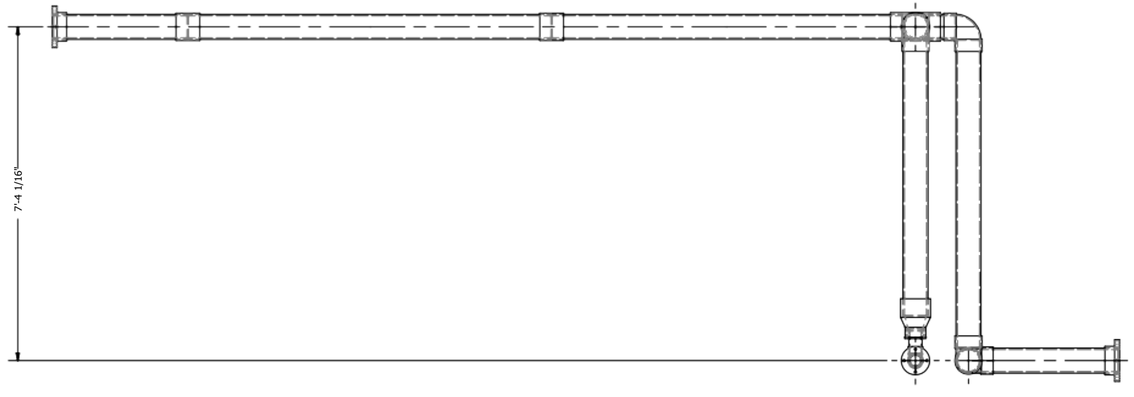
PETAWAWA

THICKENING BUILDING FILTRATE

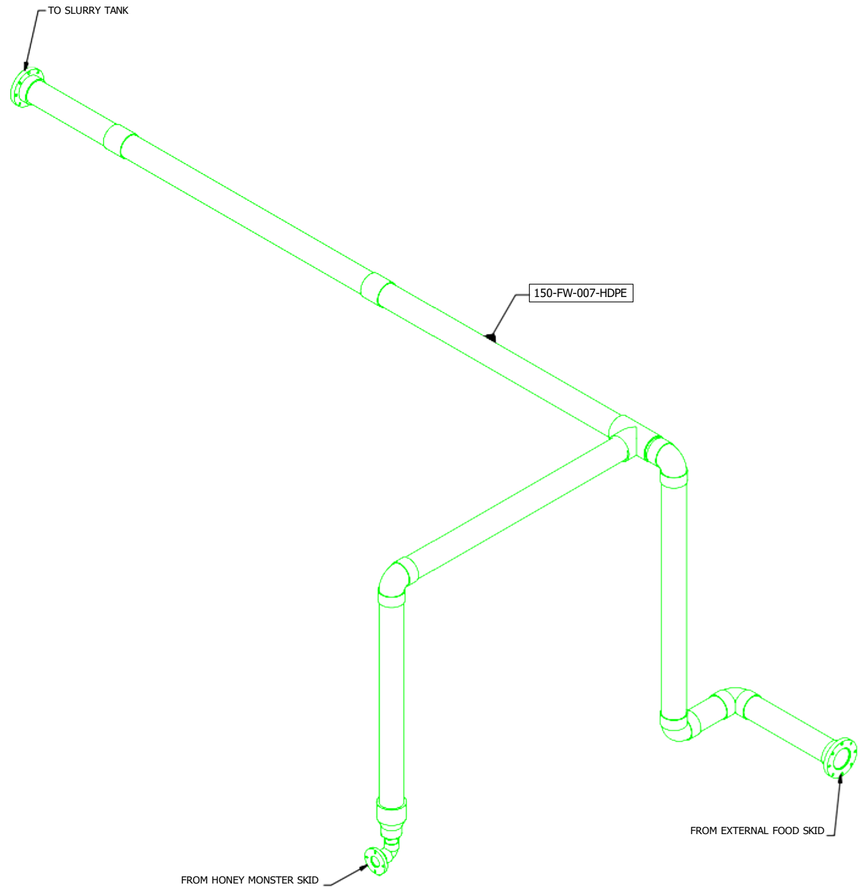
DRAWING NUMBER
M-102.2
REV A



PLAN VIEW
SCALE 1 : 20



VIEW33
SCALE 1 : 20



FOOD WASTE PIPING
EXTERNAL FOOD WASTE REF: D-02, D-05
SCALE 1 : 20

DRAWING NOTES:
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-103-Thickening&Slurry.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-20

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

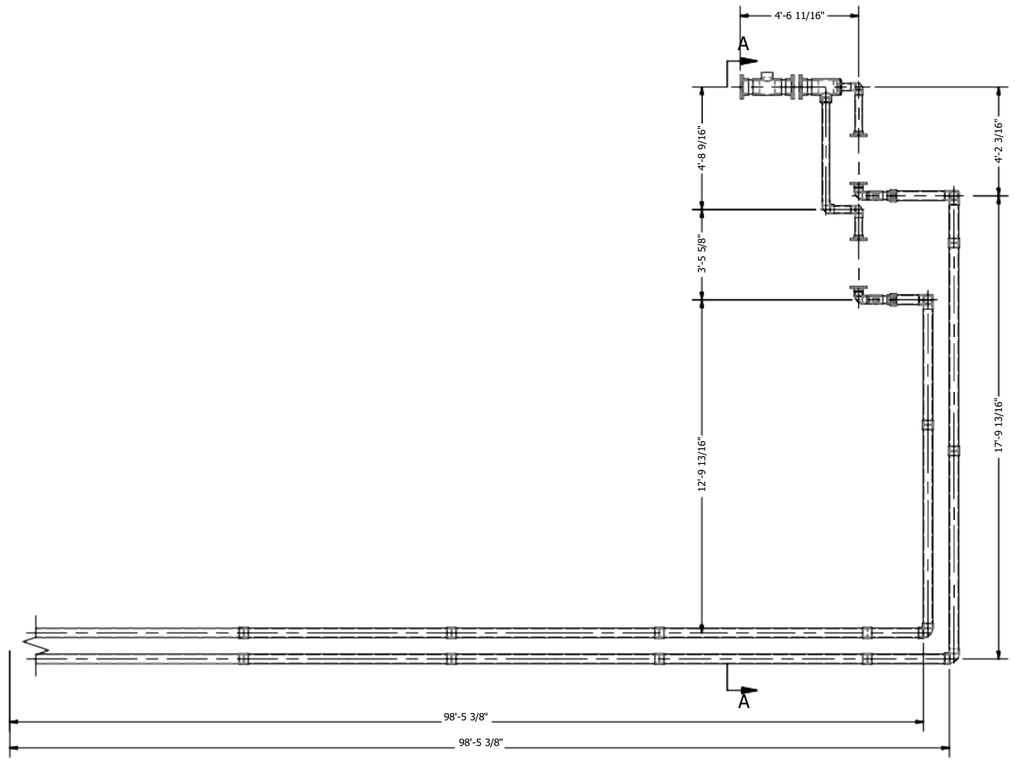
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

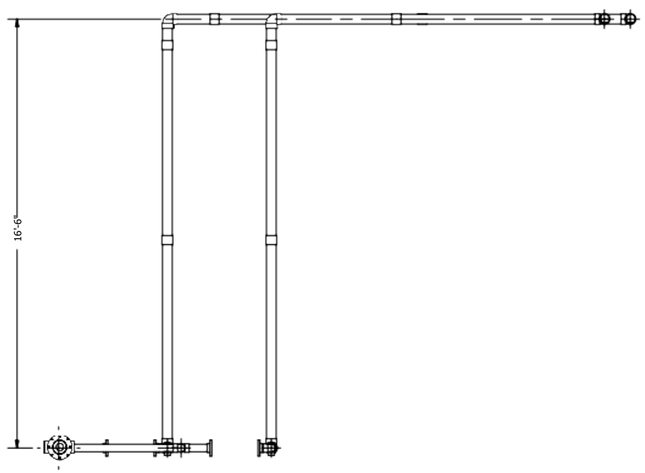
PETAWAWA

THICKENING BUILDING FOOD WASTE

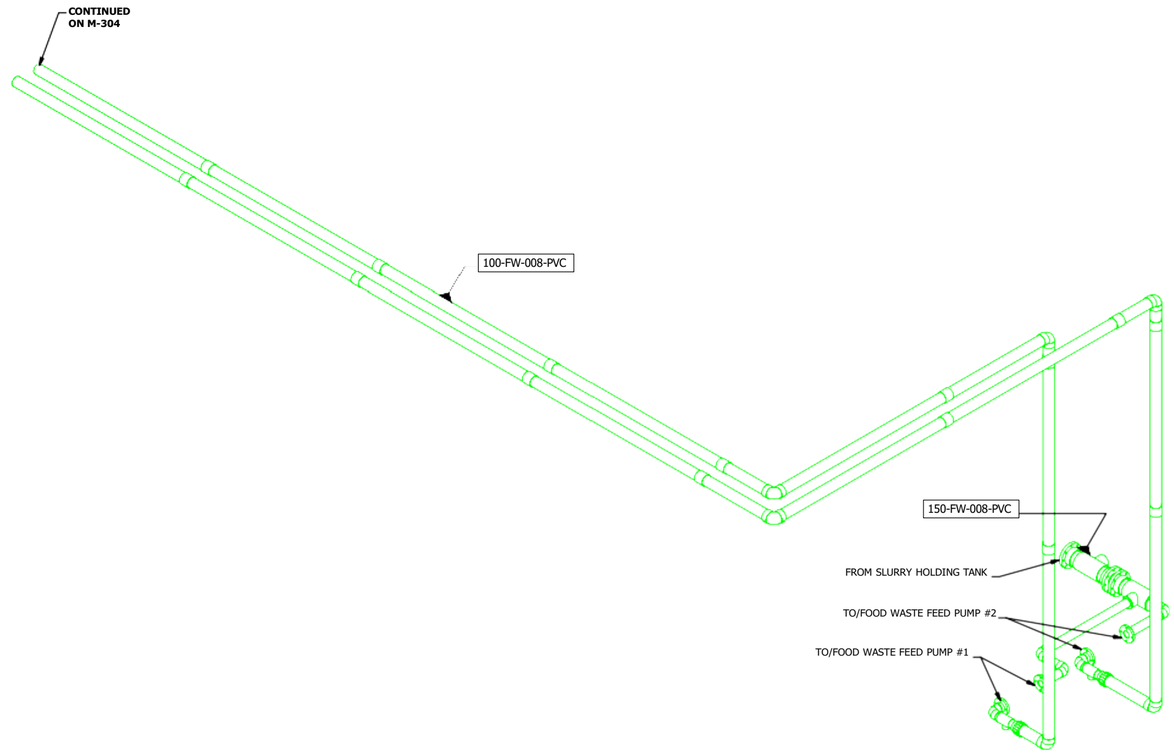
DRAWING NUMBER
M-103.1
REV A



PLAN VIEW
SCALE 1 : 35



SECTION A
SCALE 1 : 35



FOOD WASTE PIPING
FOOD WASTE TO DIGESTERS REF: D-05, D-09A, D-09B
SCALE 1 : 30

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
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PRELIMINARY - NOT FOR CONSTRUCTION

200902.M-103-Thickening&Slurry.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
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Anaergia
Breaking Barriers to Sustainability

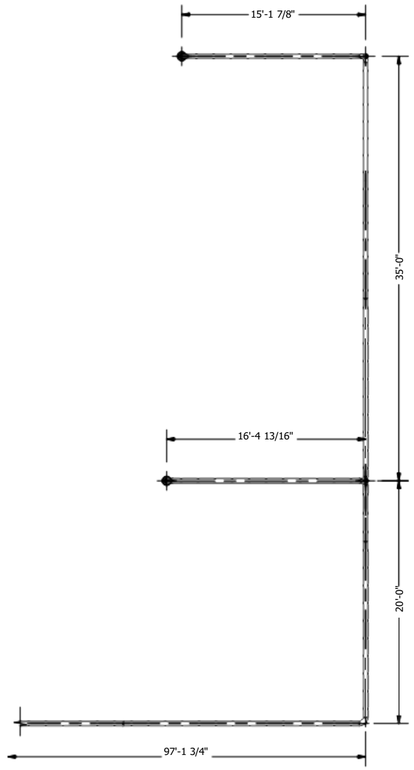
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

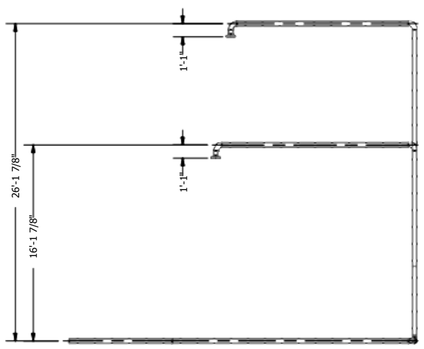
PETAWAWA

THICKENING BUILDING FOOD WASTE

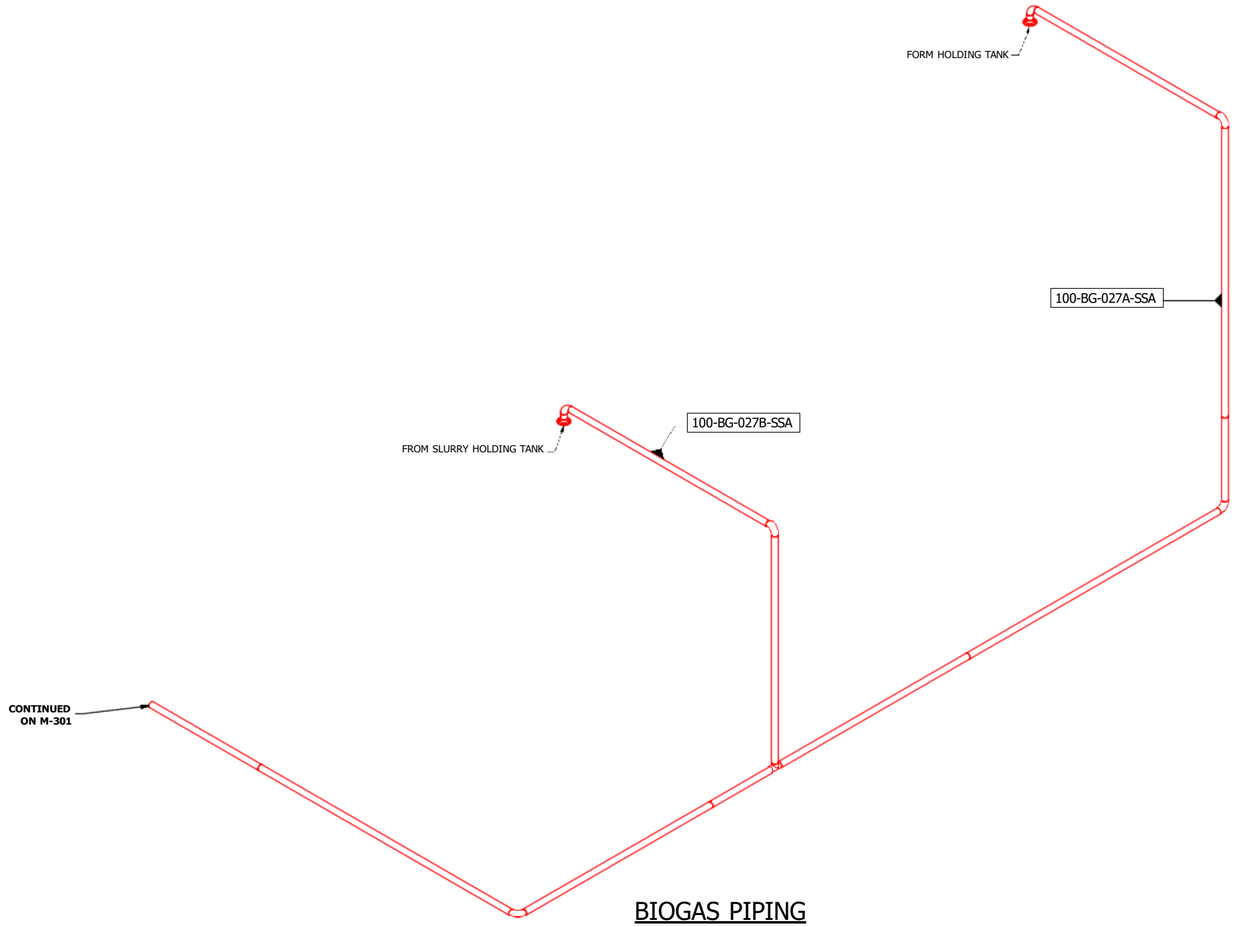
DRAWING NUMBER
M-103.2
REV
A



PLAN VIEW
SCALE 1 : 75



SOUTH ELEVATION
SCALE 1 : 75



BIOGAS PIPING
BIOGAS REF: D-02, D-05
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-104-Thickening&Biogas.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-20

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

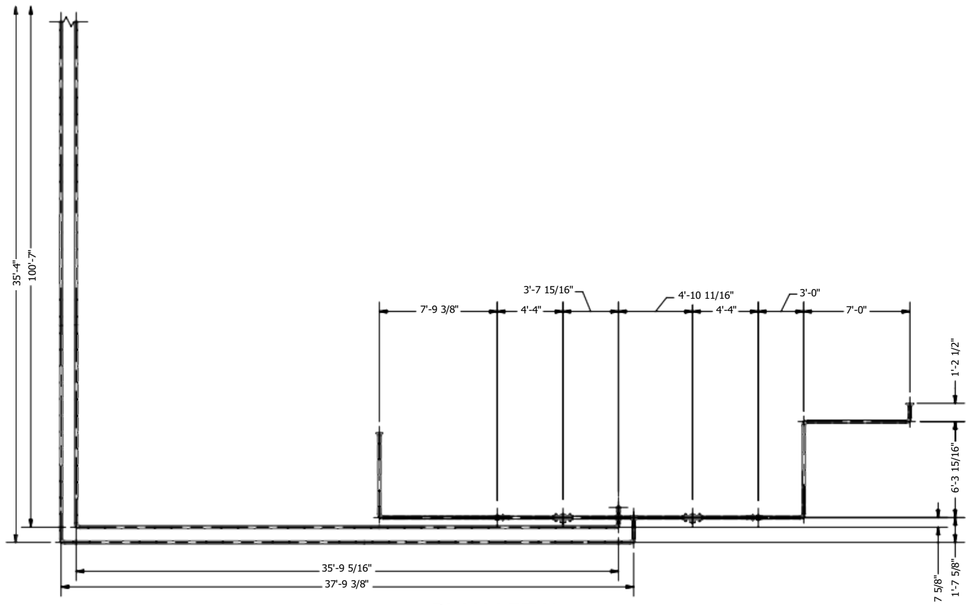
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

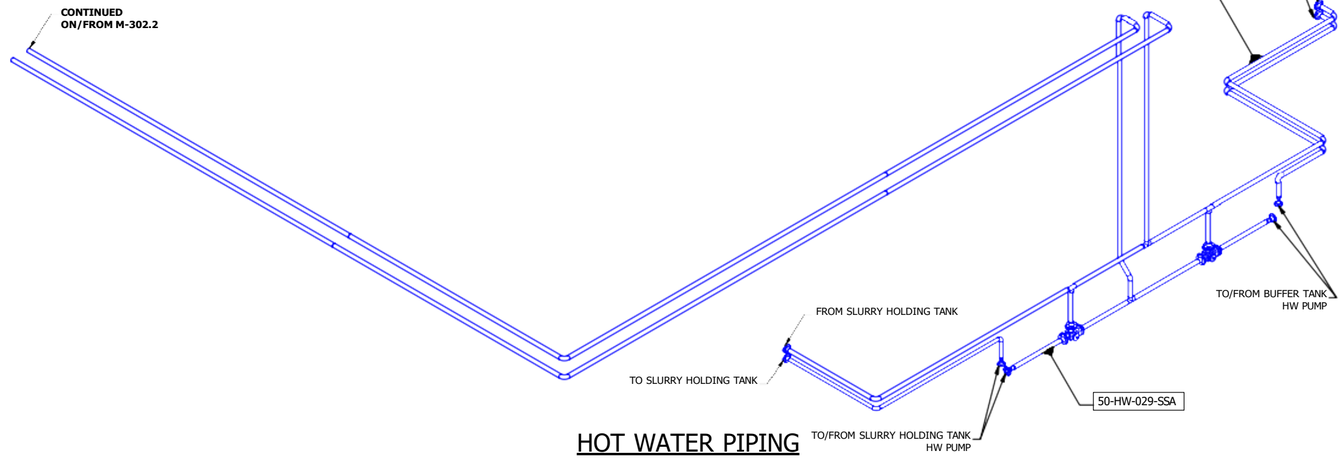
THICKENING BUILDING BIOGAS

DRAWING NUMBER
M-104
REV
A

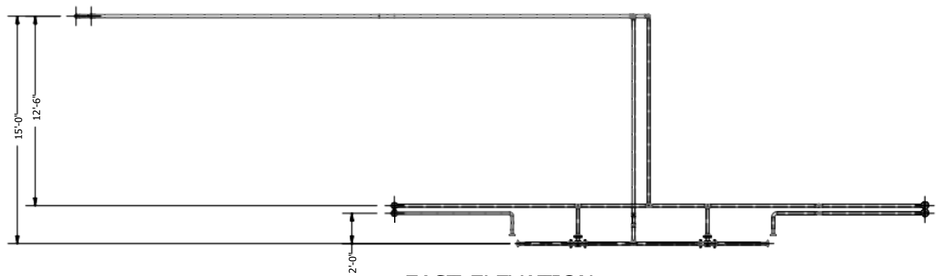
NORTH



PLAN VIEW
SCALE 1 : 60



HOT WATER PIPING
HOT WATER SUPPLY/RETURN REF: D-01, D-05
SCALE 1 : 40



EAST ELEVATION
SCALE 1 : 60

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-105-ThickeningHW.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

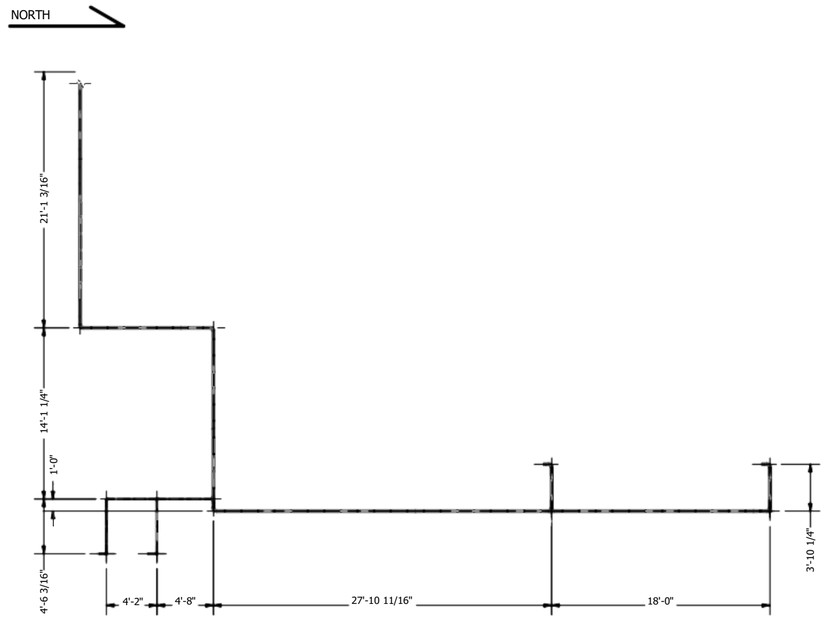
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

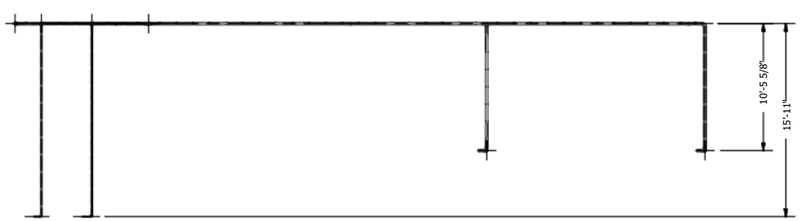
PETAWAWA

THICKENING BUILDING HWS/HWR

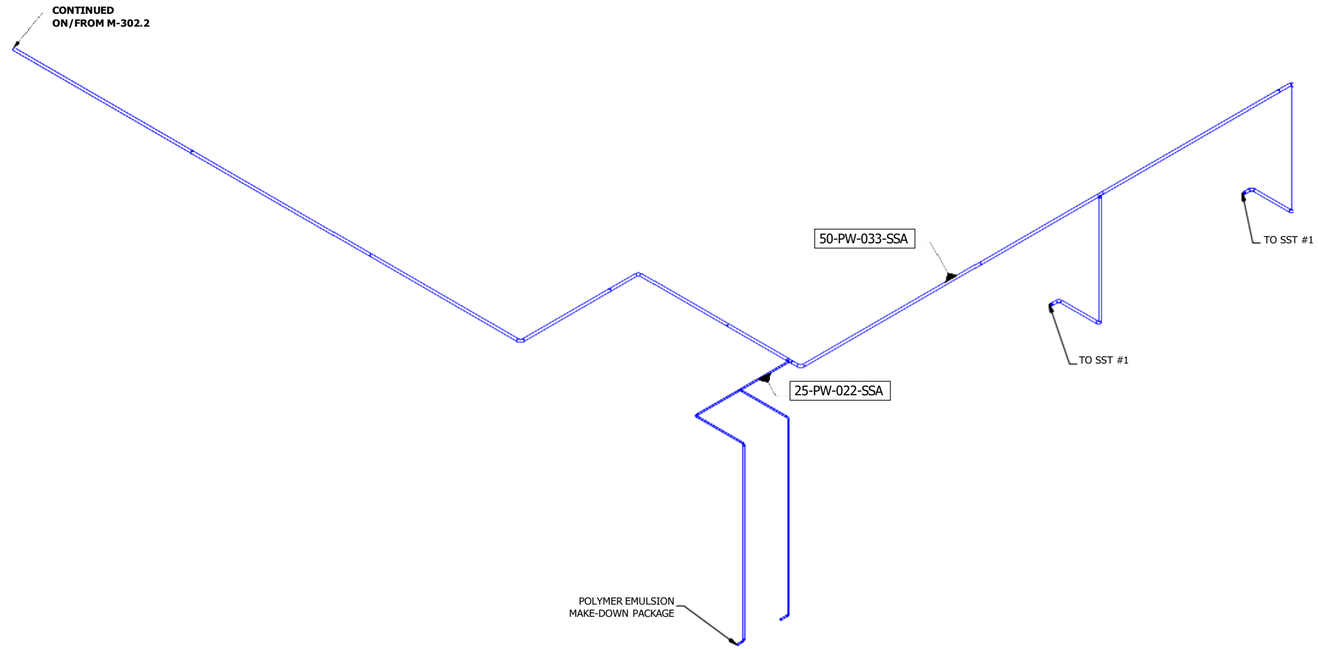
DRAWING NUMBER
M-105.1
REV A



PLAN VIEW
SCALE 1 : 75



EAST ELEVATION
SCALE 1 : 75



PLANT WATER PIPING
SCALE 1 : 60

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-105-ThickeningHW.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

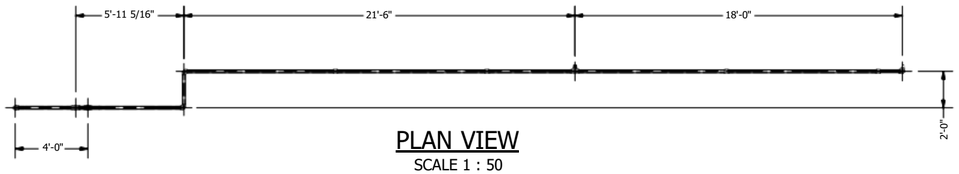
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

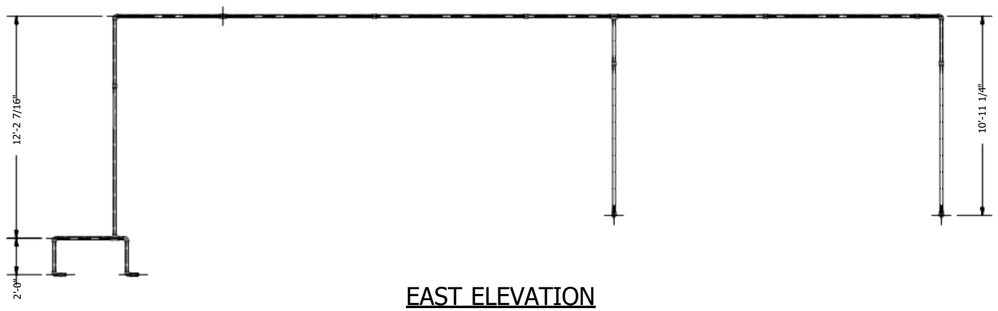
PETAWAWA

THICKENING BUILDING PW

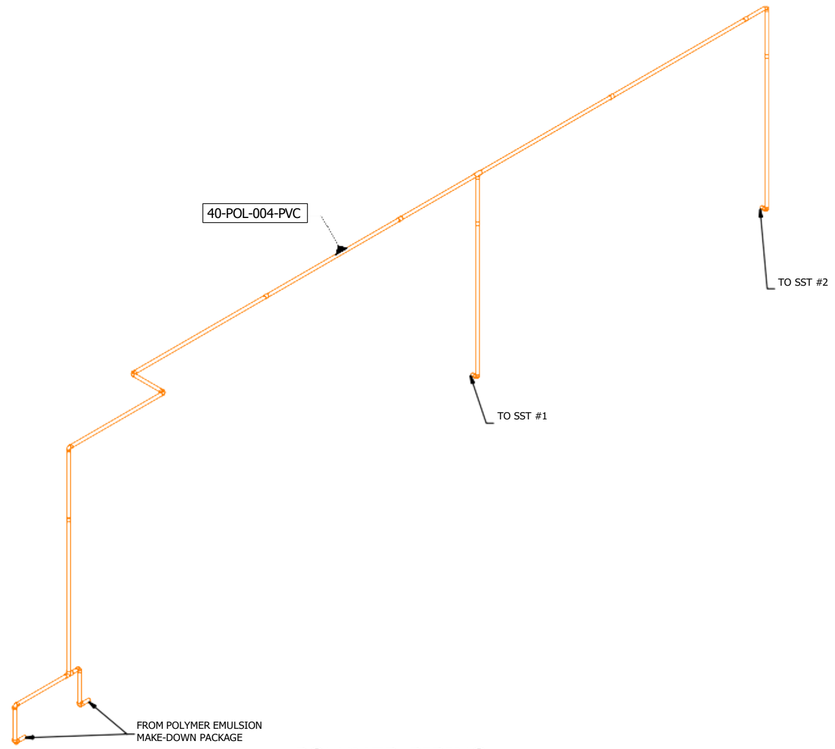
DRAWING NUMBER
M-105.2
REV
A



PLAN VIEW
SCALE 1 : 50



EAST ELEVATION
SCALE 1 : 50



POLYMER PIPING

SST POLYMER SOLUTION REF: D-04, D-06, D-07
SCALE 1 : 40

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-106-ThickeningChemical.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

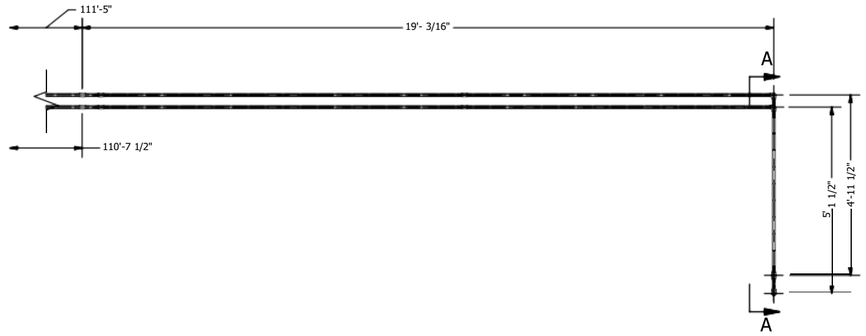
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

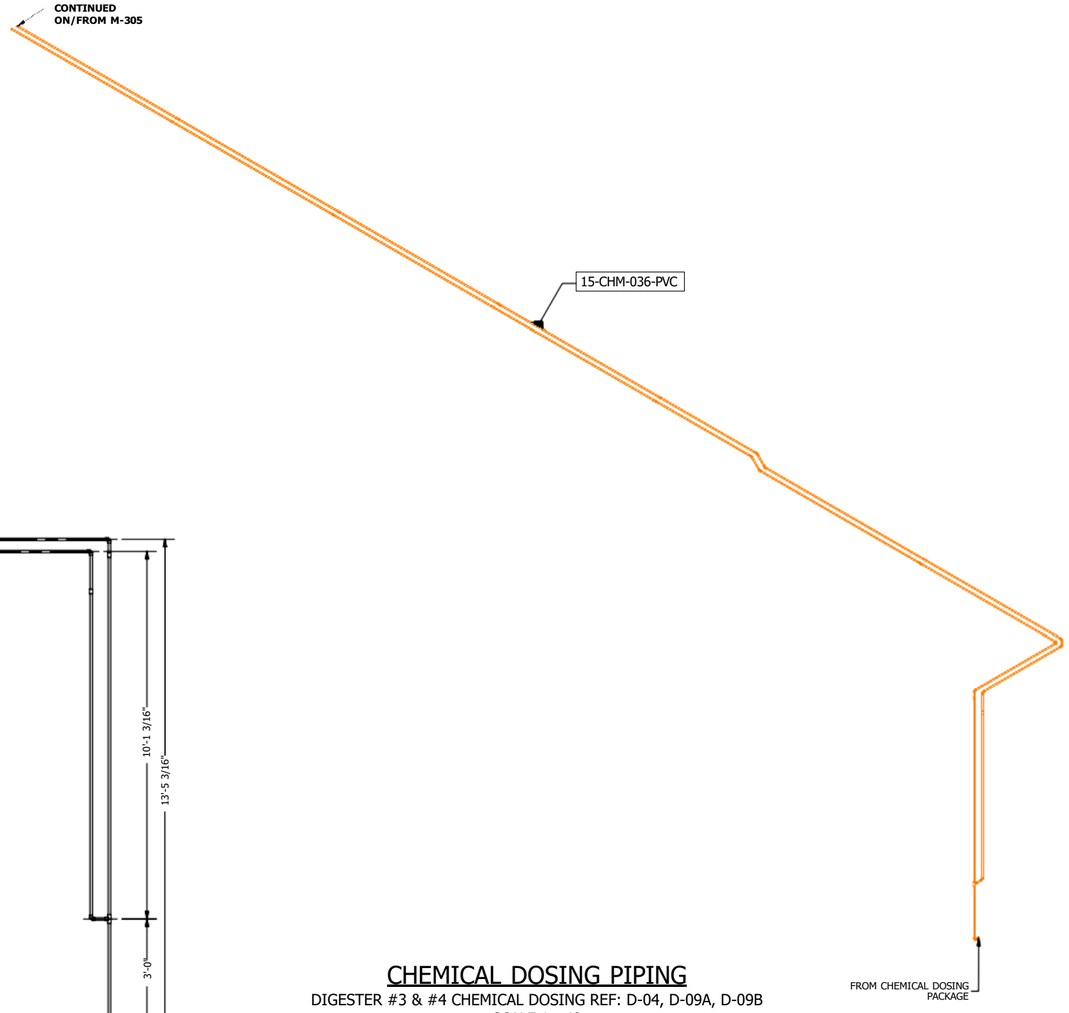
THICKENING BUILDING POLYMER

DRAWING NUMBER
M-106.1
REV
A

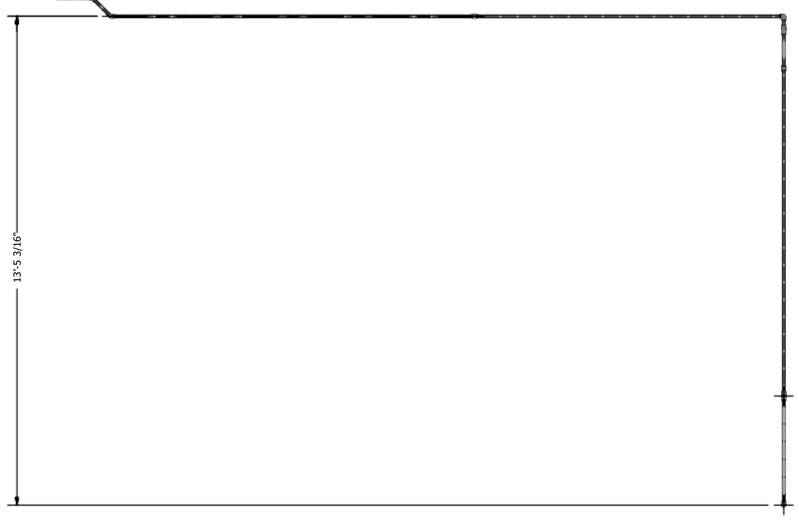
NORTH



PLAN VIEW
SCALE 1 : 25



CHEMICAL DOSING PIPING
DIGESTER #3 & #4 CHEMICAL DOSING REF: D-04, D-09A, D-09B
SCALE 1 : 40



SOUTH ELEVATION
SCALE 1 : 25

SECTION A
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-106-ThickeningChemical.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

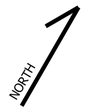
JDM DESIGNWORKS
Rosebush Wilson

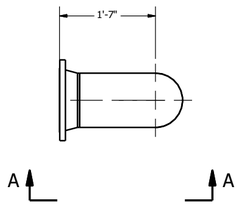
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

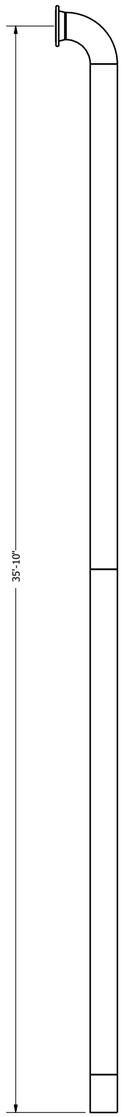
THICKENING BUILDING CHEMICAL DOSING

DRAWING NUMBER
M-106.2
REV A

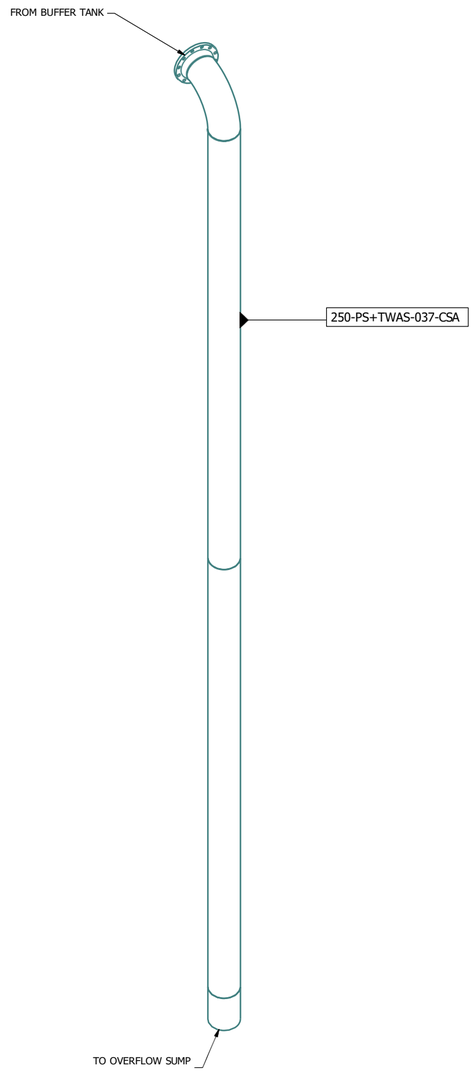




PLANE VIEW
SCALE 1 : 15



SECTION A
SCALE 1 : 30



TANK OVER FLOW PIPING
BUFFER TANK OVERFLOW REF: D-01
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-107-ThickeningOverflow.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

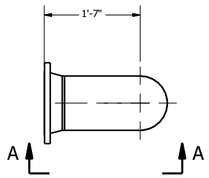
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

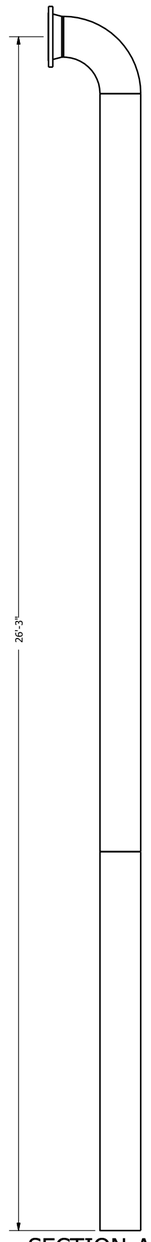
BUFFER TANK OVERFLOW

DRAWING NUMBER
M-107.1
REV
A

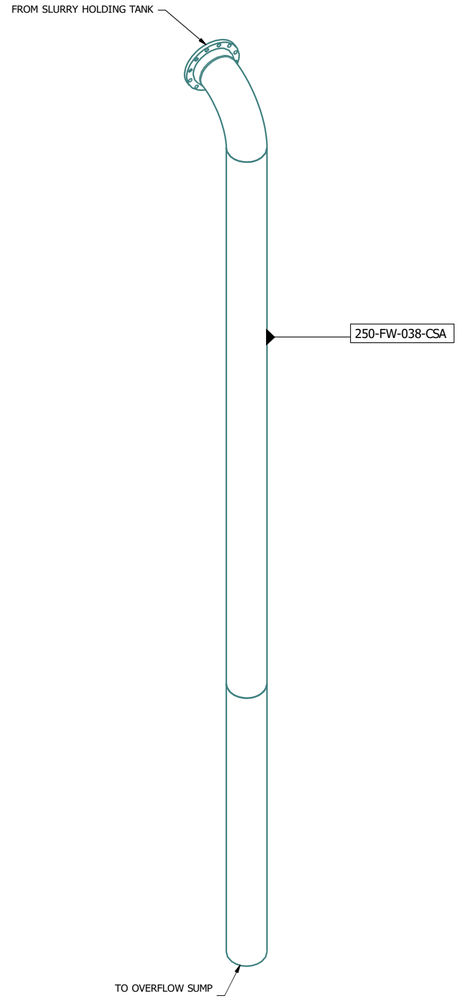
NORTH



PLAN VIEW
SCALE 1 : 15



SECTION A
SCALE 1 : 20



TANK OVER FLOW PIPING
SLURRY HOLDING TANK OVERFLOW REF: D-05
SCALE 1 : 20

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-107-ThickeningOverflow.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-22

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-100
PROJECT NO.:	200902
SCALE:	AS NOTED

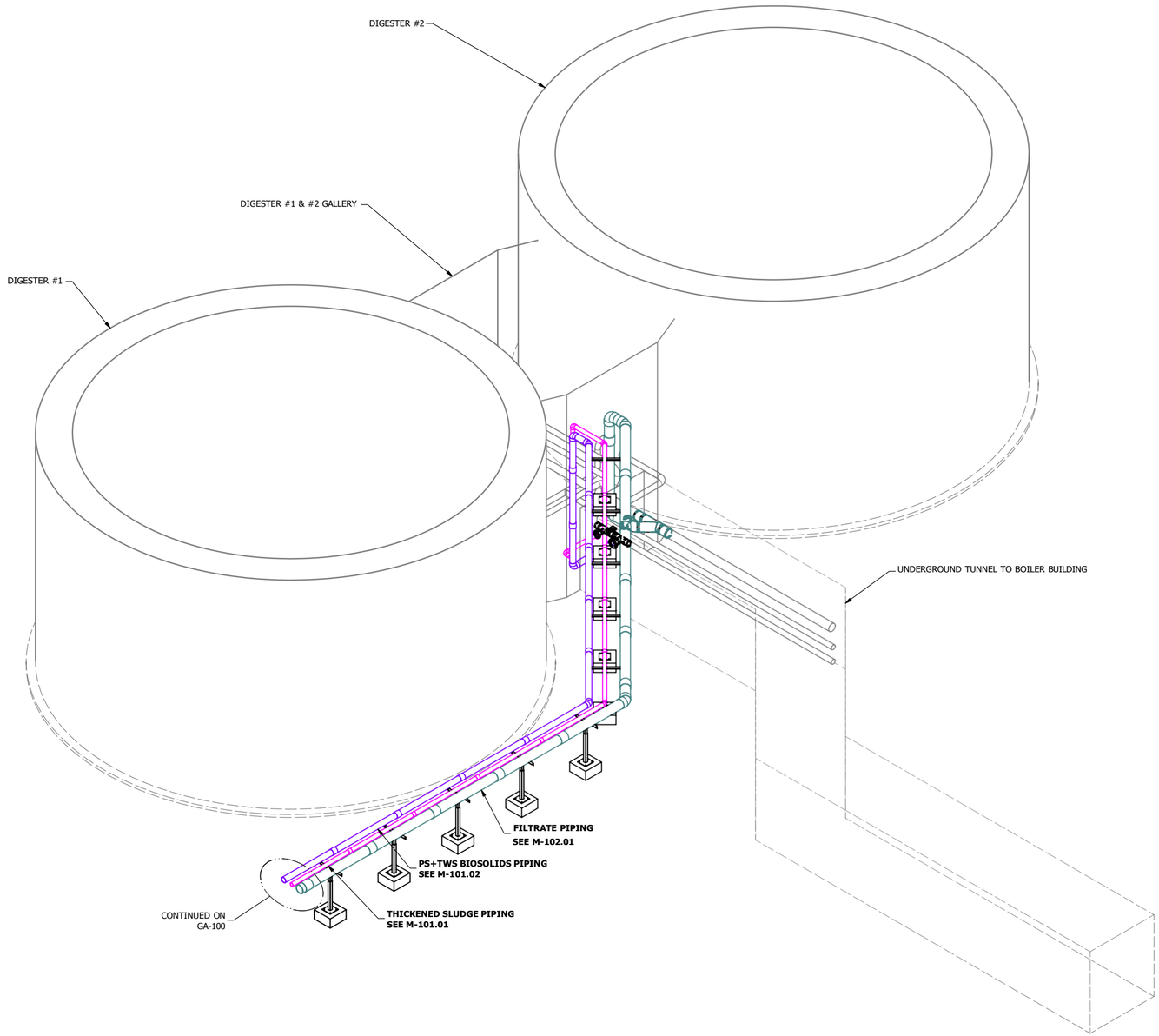
PETAWAWA

SLURRY HOLDING TANK OVERFLOW

DRAWING NUMBER
M-107.2
REV
A

LEGEND

- PS+TWS BIOSOLIDS PIPING
- THICKENED SLUDGE PIPING
- FILTRATE



ISO VIEW

SCALE 1 : 70

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301 - Digester 1&2Gallery.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

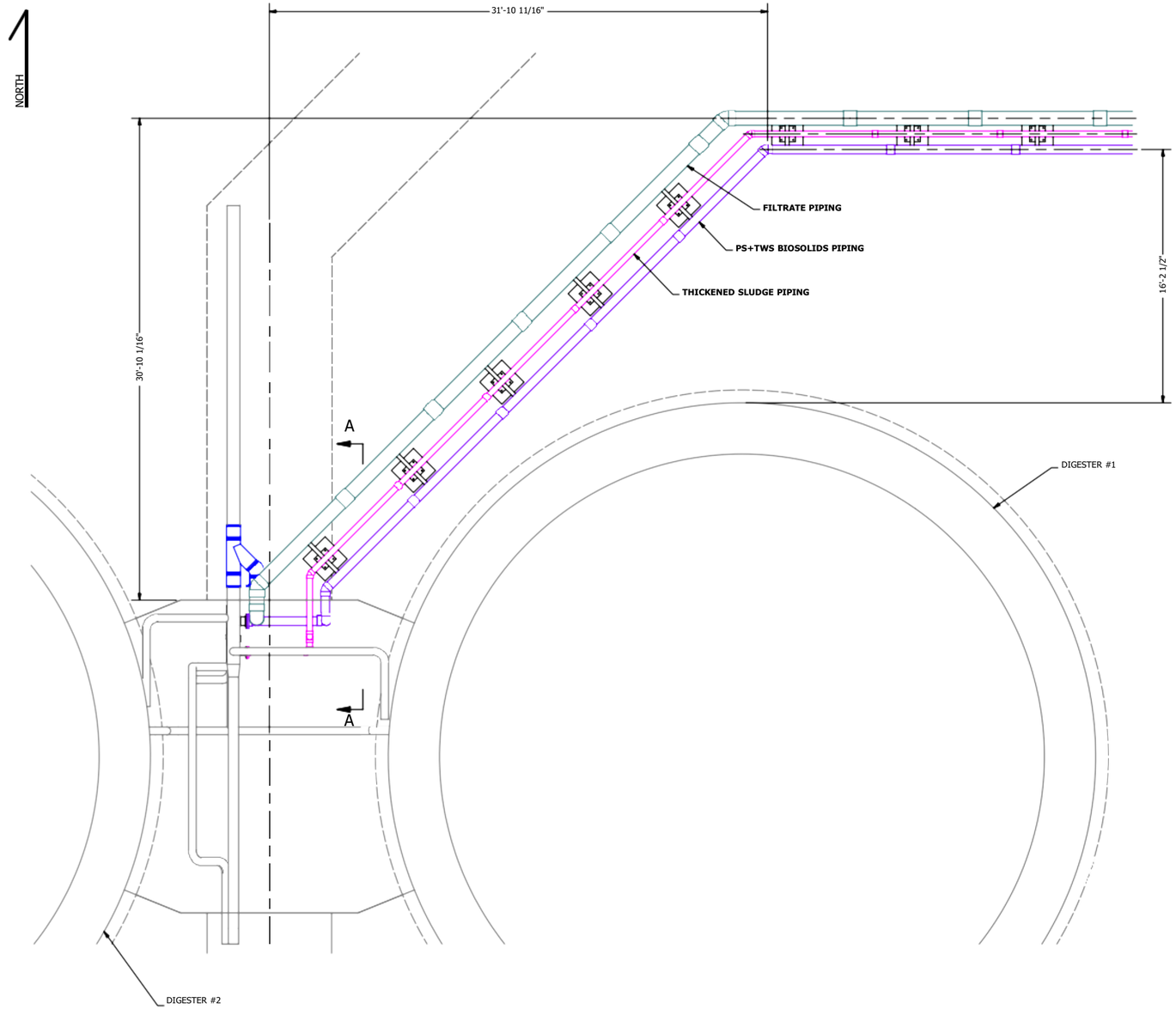
PETAWAWA

DIGESTER 1 & 2 GALLERY

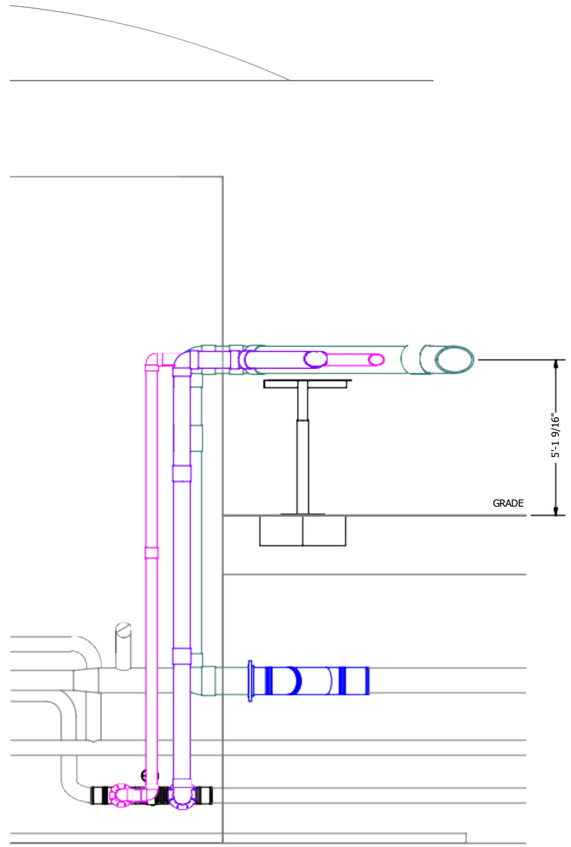
DRAWING NUMBER

GA-300.1

REV A



PLAN VIEW
SCALE 1 : 50



SECTION A
SCALE 1 : 30

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301- Digester 1&2 Gallery.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
~~A~~	~~PRELIMINARY~~	~~WMcE~~		~~2021-01-21~~

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

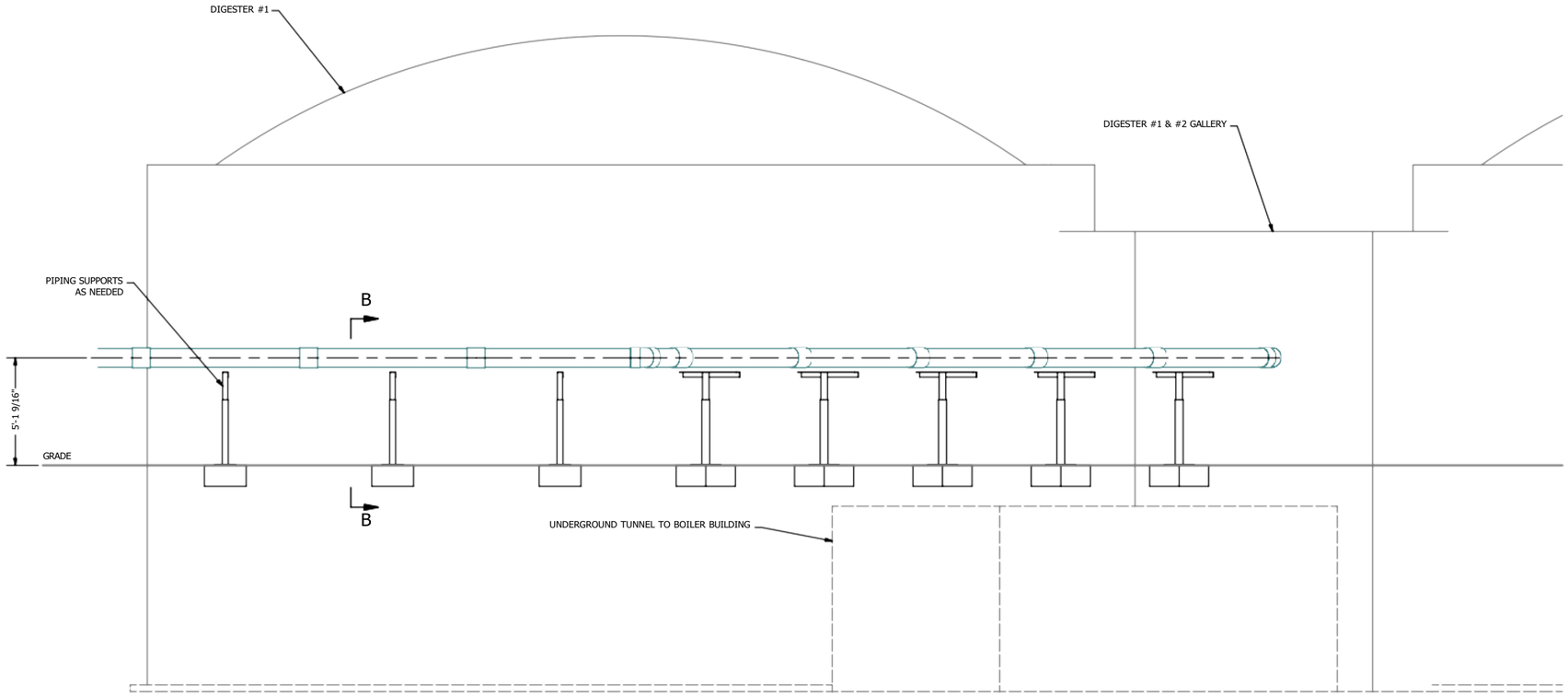
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

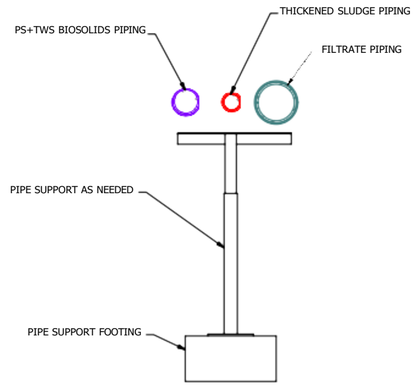
PETAWAWA

DIGESTER 1 & 2 GALLERY

DRAWING NUMBER
GA-300.2
REV A



NORTH ELEVATION
SCALE 1 : 40



SECTION B
SCALE 1 : 20

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301- Digester 1 & 2 Gallery.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

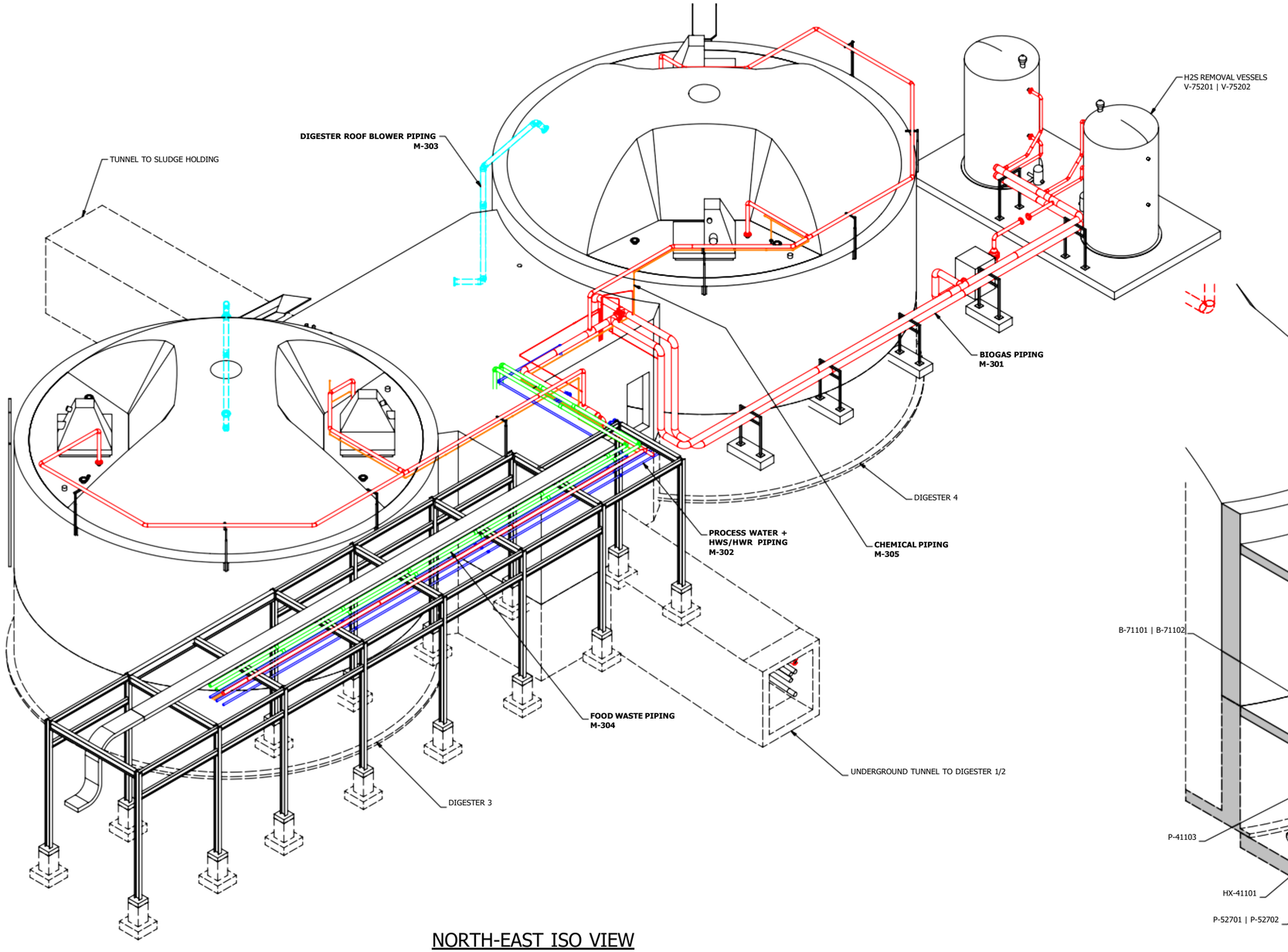
JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

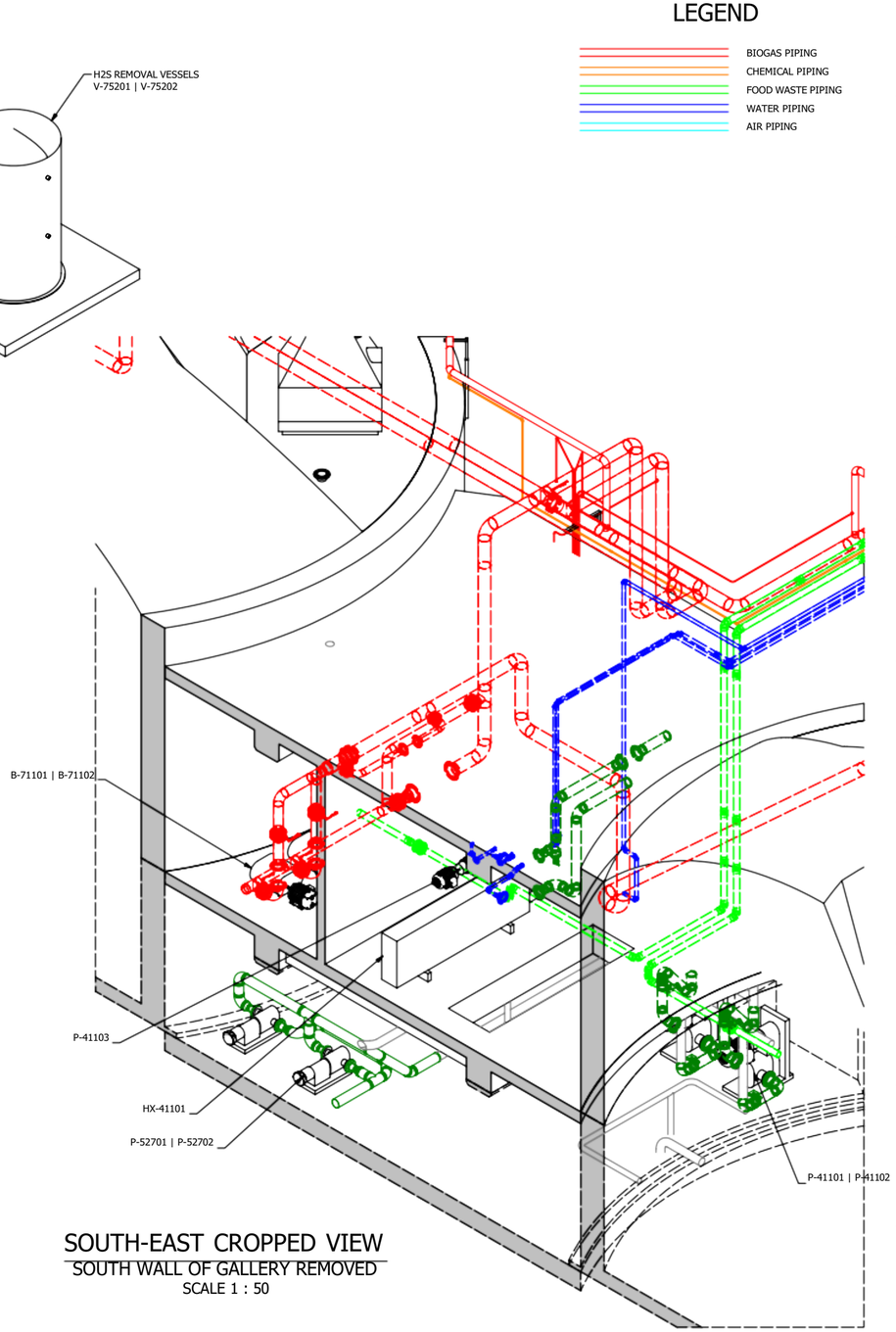
DIGESTER 1 & 2 GALLERY

DRAWING NUMBER
GA-300.3
REV A



NORTH-EAST ISO VIEW

SCALE 1 : 75



SOUTH-EAST CROPPED VIEW

SOUTH WALL OF GALLERY REMOVED

SCALE 1 : 50

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301 - Digester 3 & 4 Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

DESIGNED: SWilson
DRAWN: SWilson
CHECKED:
APPROVED:
REFERENCE#:
PROJECT NO.: 200902
SCALE: AS NOTED

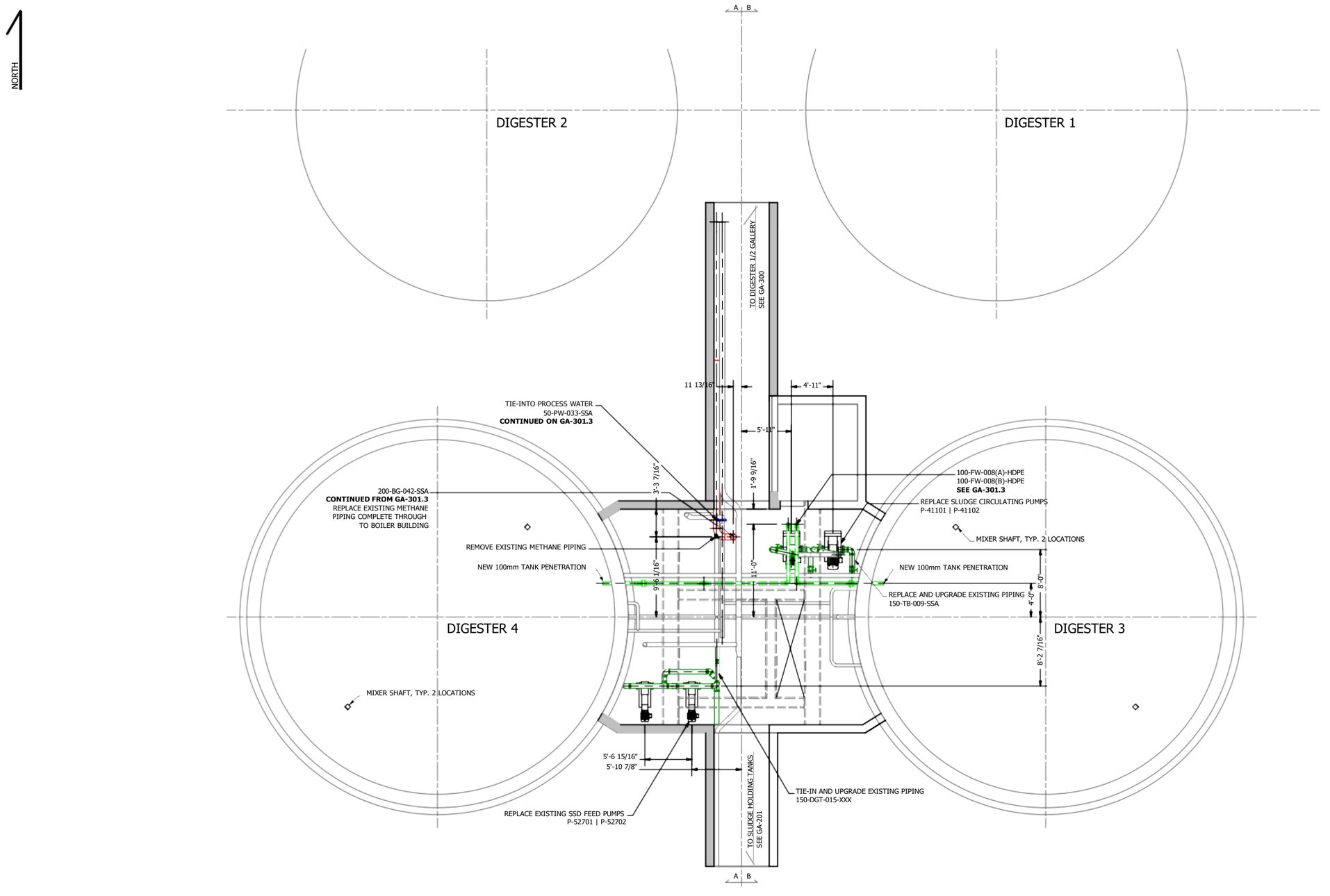
PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

DRAWING NUMBER

GA-301.1

REV A



BASEMENT PLAN

SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301 - Digester 3& 4Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

DRAWING NUMBER
GA-301.2
REV A

NORTH

DIGESTER 2

DIGESTER 1

DIGESTER 4

DIGESTER 3

PIPE BRIDGE TO/FROM THICKENING BUILDING

8'-0" | 16'-0" | 38'-10 15/16" | 27'-1 3/8" | 12'-7"

5'-11 9/16" | 18'- 3/4" | 42'-0"

(5) @ 12'0" = 60'-0" | 82'-3" | 10'-0" | 12'-0"

HS2 REMOVAL VESSEL
V-75201

PHASE 1
PHASE 2

CONDENSATE TRAP
TK-71101

HWS/HWR TO THICKENING BUILDING
60-HW-029-SSA
CONTINUED ON GA-301.4

(GAP FOR VEHICLE ACCESS)

200-BG-016-SSA
CONTINUED ON GA-301.4

50-PW-033-SSA
SEE -GA-301.2 & 301.4

GAS ANALYZER

100-FW-008(A)-HDPE
100-FW-008(B)-HDPE
SEE GA-301.2 & 301.4

BIOGAS FEED FROM HEADER
USE EXISTING ROOF PENETRATION FROM METHANE PIPING
CONTINUED ON GA-301.4

MODIFIED SLUDGE PIPING TO NEW HEAT EXCHANGER
150-TB-009-SSA
RE-WORKED PIPING TO PUMP AND HX
25HW-020-SSA

CONDENSATE TRAP
TK-71102

STAIRWELL TO BASEMENT

REPLACE HOT WATER PUMP
P-41103

REPLACE EXISTING HEAT EXCHANGER
NEW SLUDGE HEAT EXCHANGER
HX-41101

(2) NEW BG BLOWERS
BL-71101 | BL-71102

REMOVE EXISTING METHANE PIPING

NEW LADDER TO DIGESTER ROOF

NEW LADDER TO DIGESTER ROOF

150-AU-053B-PVC

150-AU-053A-PVC

DIGESTER BLOWER PAD
8'x8'x1'
DIGESTER BLOWERS
BL-41101B | BL41102B

DIGESTER BLOWER PAD
8'x8'x1'
DIGESTER BLOWERS
BL-41101B | BL41102B

APPROX. LOCATION OF STAIRS TO ROOF

PHASE 2
[HS2 REMOVAL VESSEL
V-75202]

GROUND FLOOR PLAN

SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301 - Digester 3&4 Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

DRAWING NUMBER
GA-301.3

REV
A

NORTH

DIGESTER 2

DIGESTER 1

DIGESTER 4

DIGESTER 3

27'-10 1/4"

23'-11 9/16"

26'-11 1/16"

26'-5 15/16"

85'-11 3/8"

85'-4"

84'-2"

83'-2"

82'-2"

9'-3 1/8"

26'-9 1/16"

8'-2 9/16"

9'-4 7/8"

16'-1 1/16"

28'-8 3/4"

60-HW-029-SSA
CONTINUED FROM GA-301.3

200-BG-016-SSA
CONTINUED ON GA-301.3

100-FW-008(A)-HDPE
100-FW-008(B)-HDPE
SEE GA-301.3

50-PW-033-SSA
SEE -GA-301.2 & 301.4

SERVICE BOX SB-41101A

CHEM LINE FROM THICKENING BUILDING
15-CHM-036-PVC
(LINE ROUTED UNDER BG LINE)

EDGE OF THICKENING MCC BLDG
SEE-GA-100

24" CABLE TRAY:
MAIN POWER & COMM.
TO THICKENING BUILDING

DEMOLISH EXISTING ROOF
NEW DIGESTER MEMBRANE ROOF

100-BG-026(B)-SSA
ROUTE AROUND DIGESTER

100-BG-026(A)-SSA
ROUTE AROUND DIGESTER

SERVICE BOX SB-41101A

NEW LADDER ACCESS

150-AU-053(B)-PVC
FROM GA-301.3

150-AU-053(A)-PVC
FROM GA-301.3

EXISTING STAIR (OUTLINE)
FROM GRADE TO ROOF

A B

D

ROOF PLAN

SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301- Digester3 & 4 Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

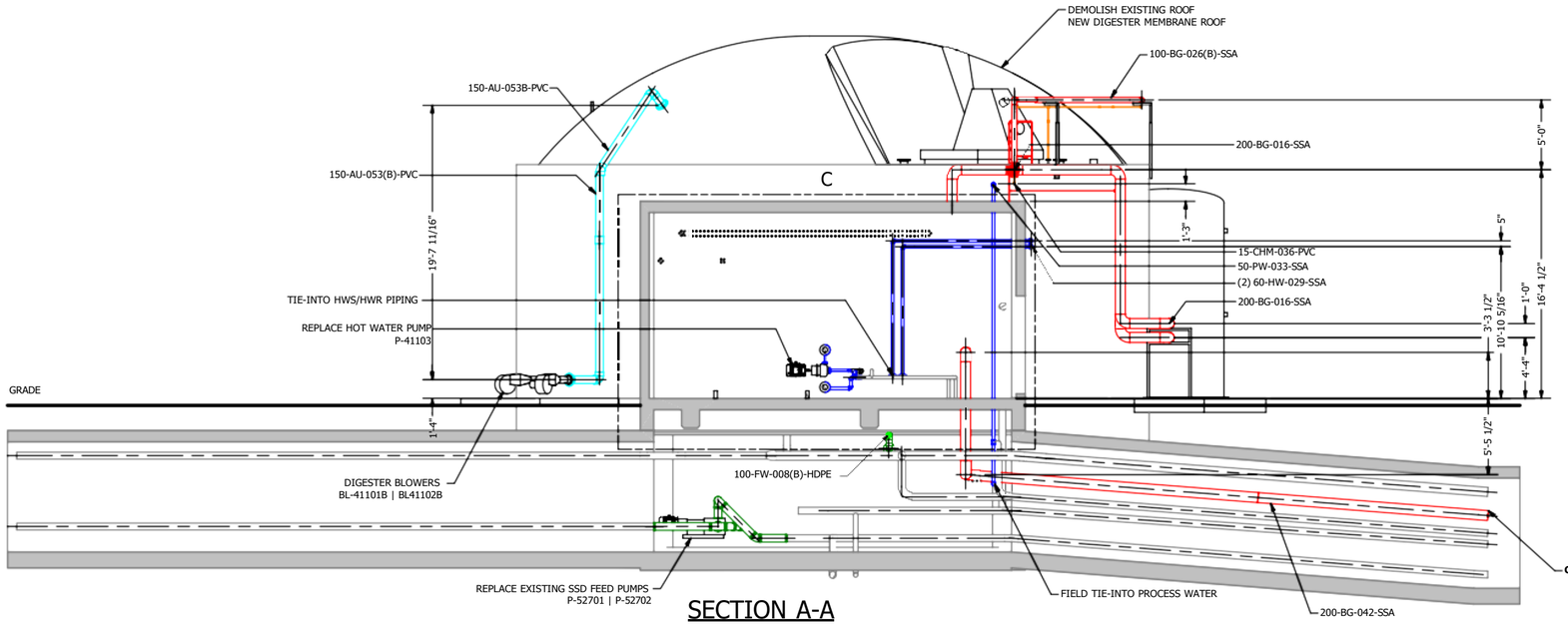
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

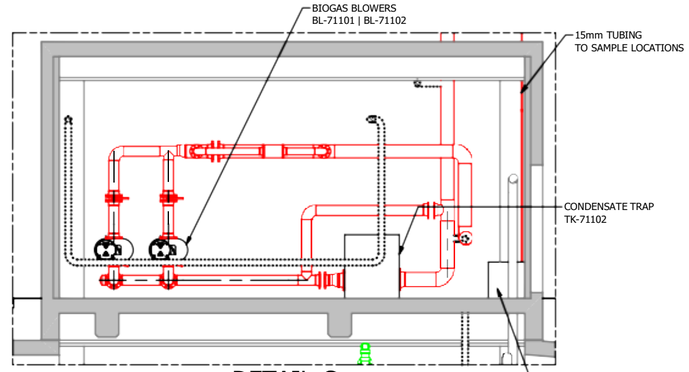
PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

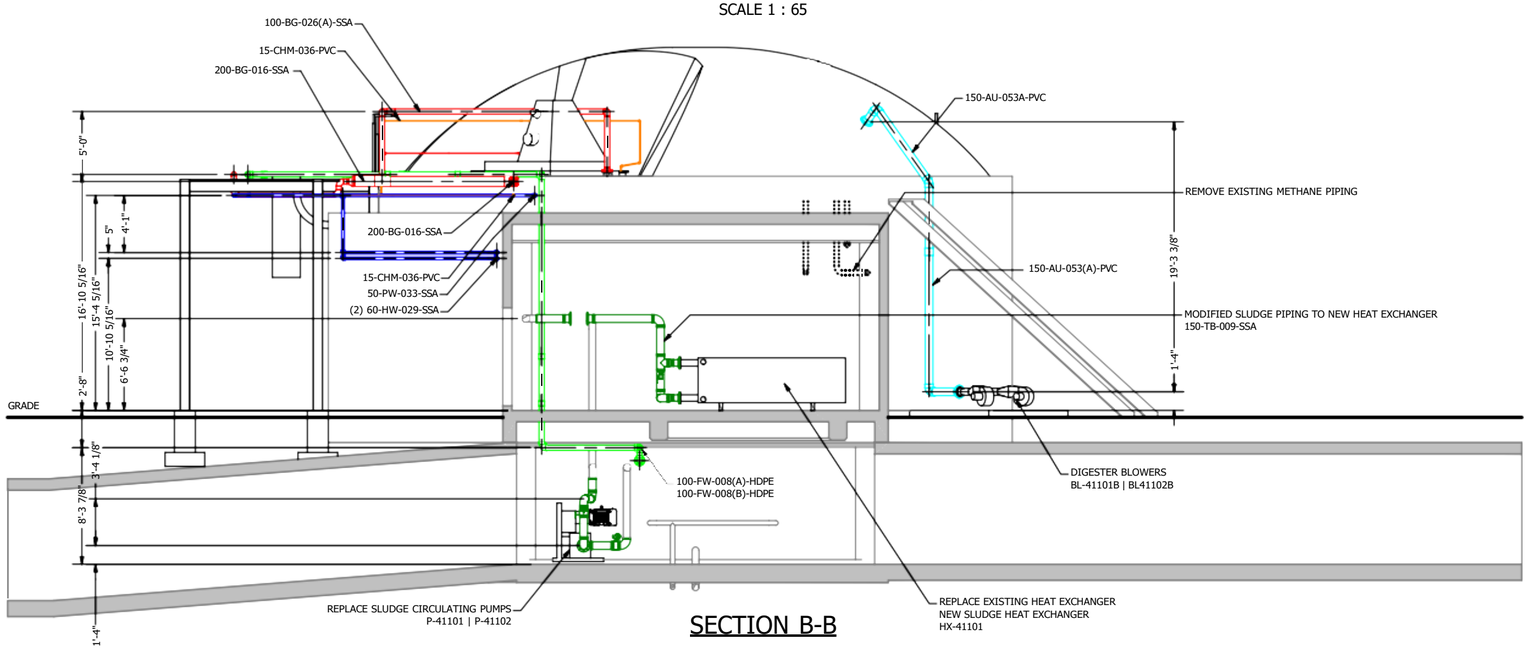
DRAWING NUMBER
GA-301.4
REV A



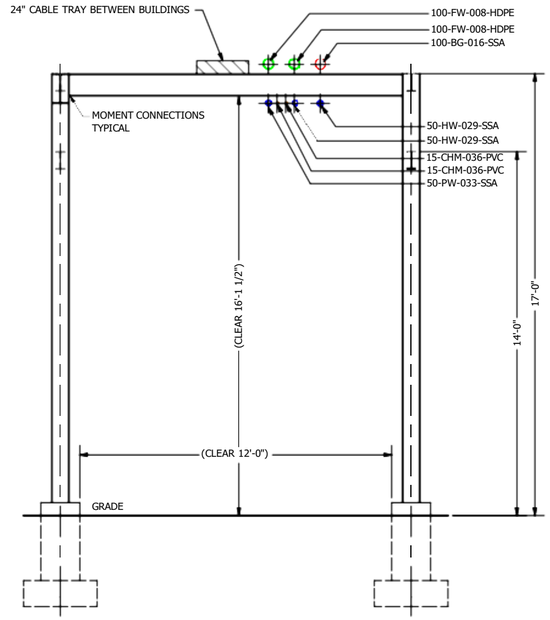
SECTION A-A
INTERIOR ELEVATION (LOOKING WEST)
SCALE 1 : 65



DETAIL C
CUT-OUT VIEW OF GAS BLOWER ROOM
SCALE 1 : 50



SECTION B-B
INTERIOR ELEVATION (LOOKING EAST)
SCALE 1 : 65



SECTION D-D
TYPICAL SECTION THROUGH PIPE BRIDGE
SCALE 1 : 35

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301 - Digester 3&4 Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

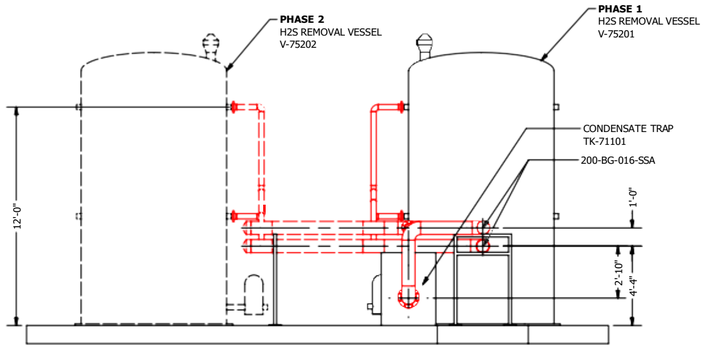
JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

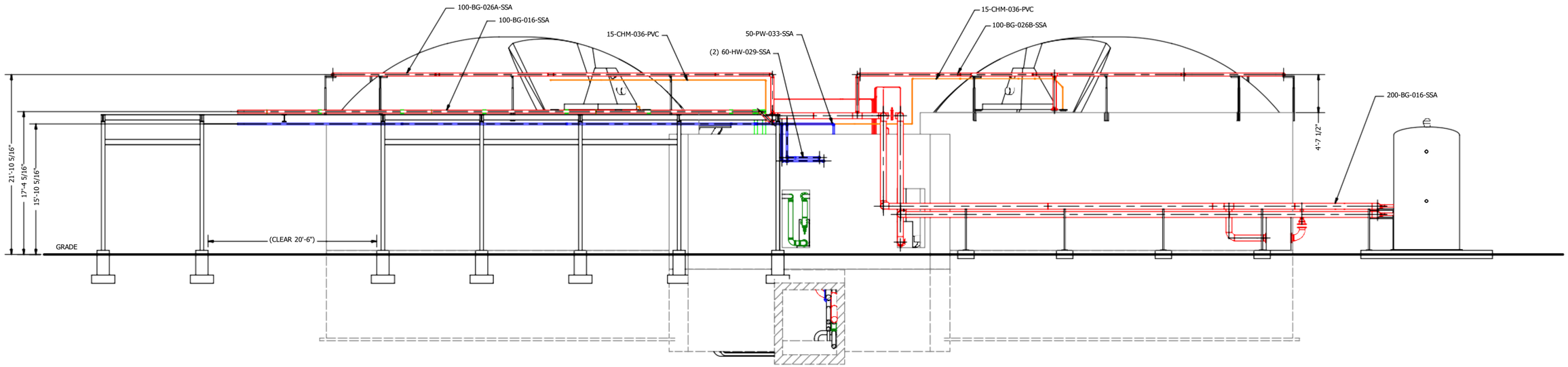
PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

DRAWING NUMBER
GA-301.5
REV A



SECTION E
H2S REMOVAL VESSELS
SCALE 1 : 50



SECTION F
(NORTH ELEVATION)
SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-301- Digester 3 & 4 Gallery Upgrade.idw 2021-01-20

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

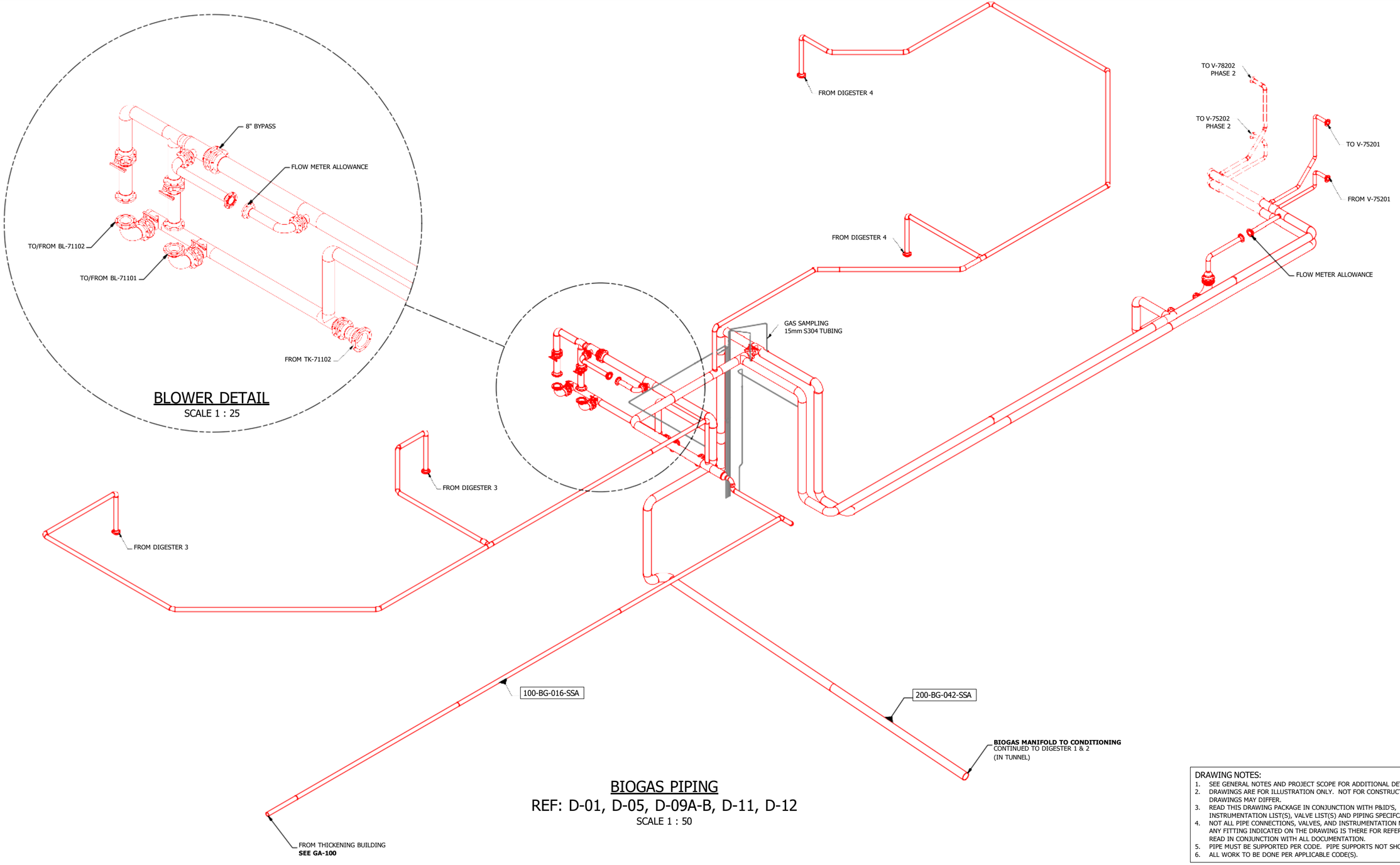
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DIGESTER 3 & 4 GALLERY UPGRADE

DRAWING NUMBER
GA-301.6
REV A



BLOWER DETAIL
SCALE 1 : 25

BIOGAS PIPING
REF: D-01, D-05, D-09A-B, D-11, D-12
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-301- Digester 3&4BiogasPiping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

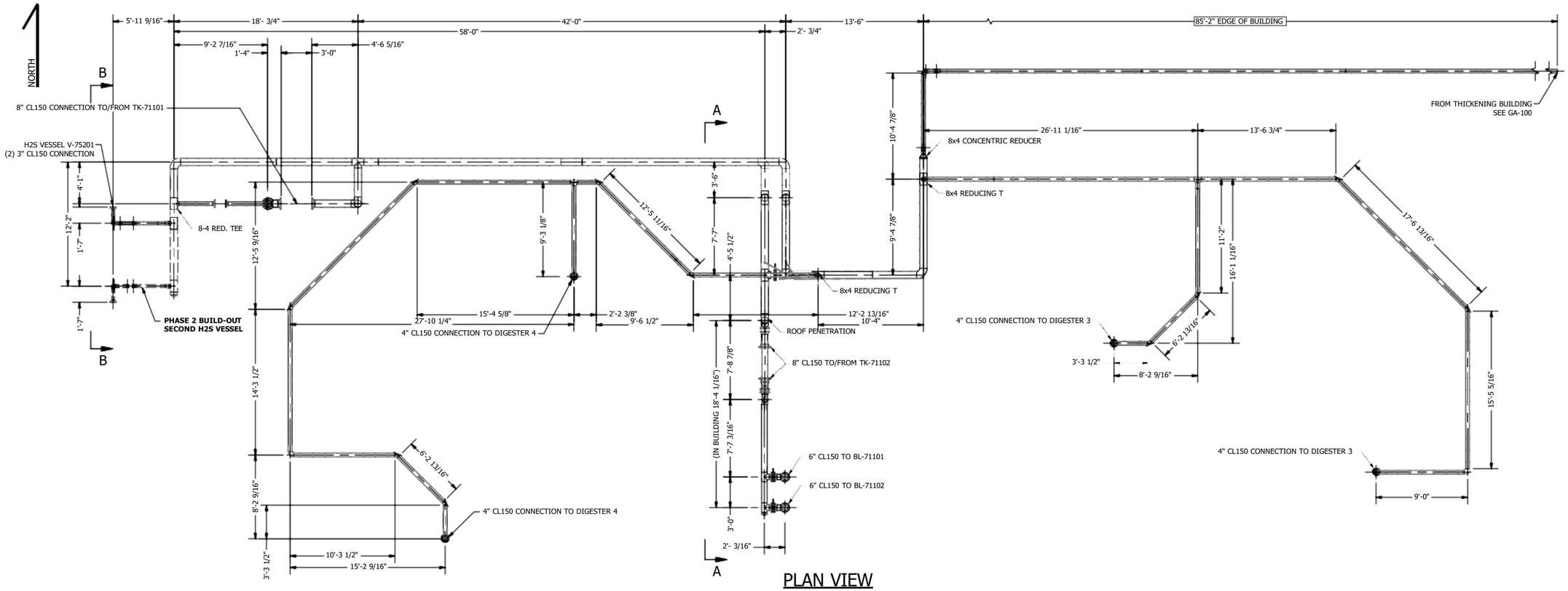
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

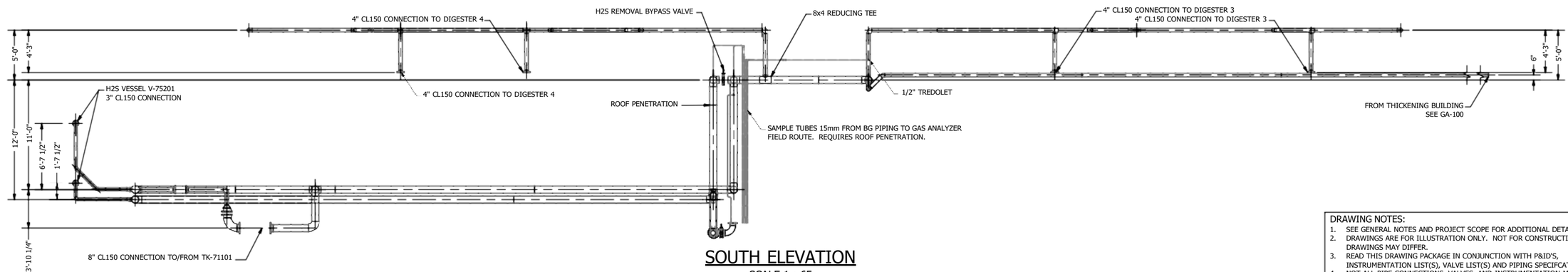
PETAWAWA

DIGESTER 3 & 4 BIOGAS PIPING

DRAWING NUMBER
M-301.1
REV A



PLAN VIEW
BIOGAS COLLECTION
SCALE 1 : 65



SOUTH ELEVATION
SCALE 1 : 65

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-301- Digester 3& 4BiogasPiping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
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Anaergia
Breaking Barriers to Sustainability

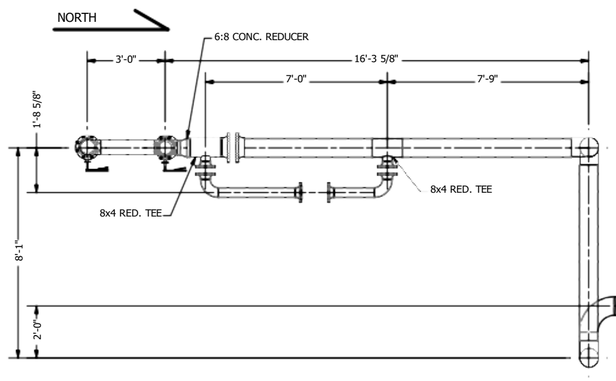
JDM DESIGNWORKS Rosebush Wilson

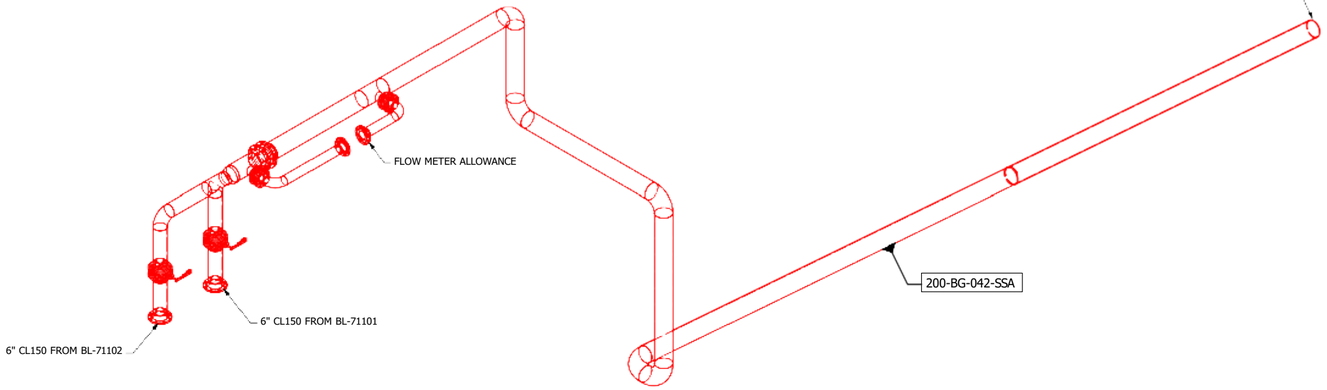
DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DIGESTER 3 & 4 BIOGAS PIPING

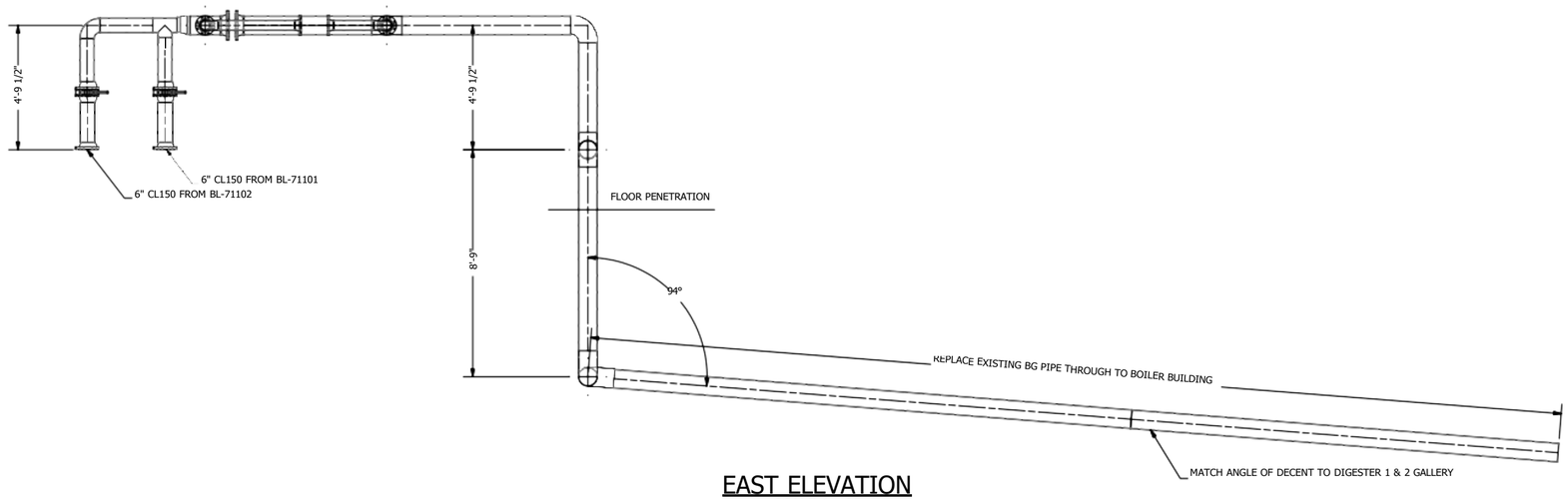
DRAWING NUMBER
M-301.2
REV A





200-BG-042-SSA ISO VIEW
REF: D-11
SCALE 1 : 35

PLAN VIEW
BIOGAS DISTRIBUTION TO CONDITIONING
SCALE 1 : 35



EAST ELEVATION
SCALE 1 : 35

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-301- Digester 3 & 4 Biogas Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

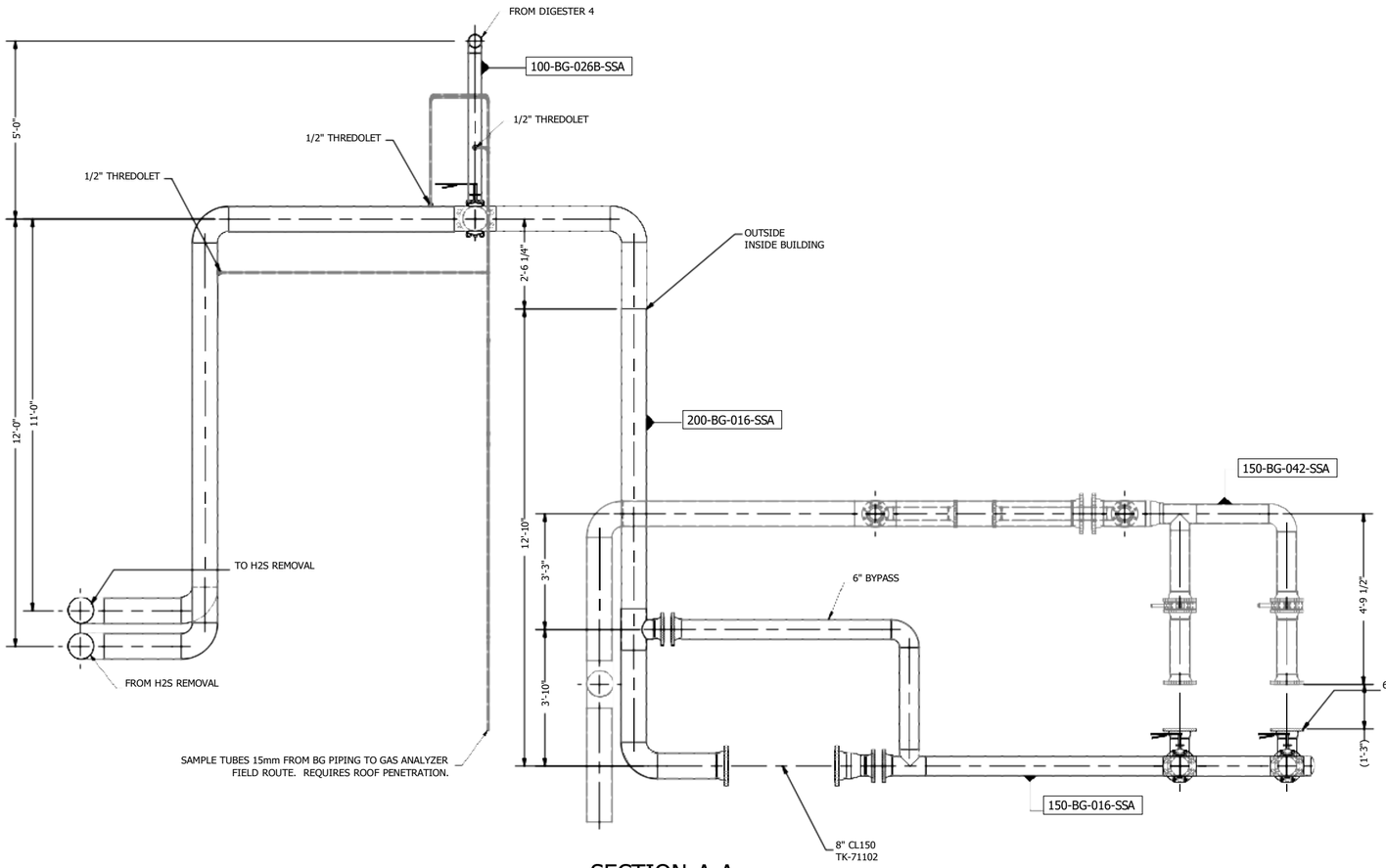
JDM DESIGNWORKS
Rosebush Wilson
LANDSCAPE ARCHITECTURE | PLANNING | URBAN DESIGN

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

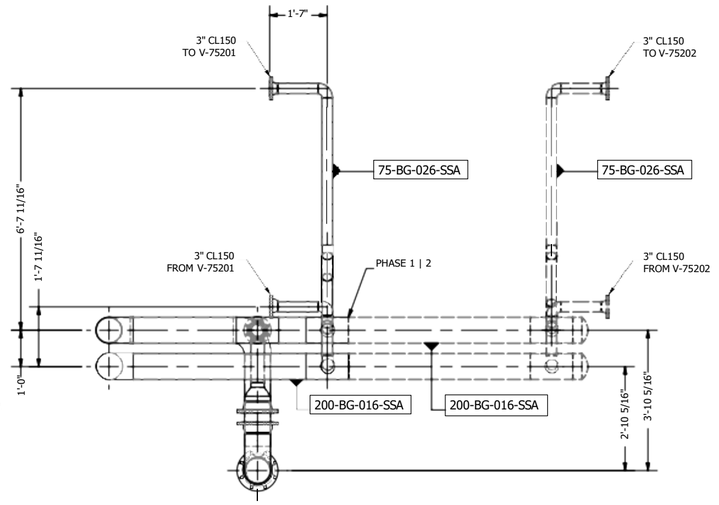
PETAWAWA

DIGESTER 3 & 4 BIOGAS PIPING

DRAWING NUMBER
M-301.3
REV A



SECTION A-A
BLOWER CONNECTION
SCALE 1 : 25



SECTION B-B
H2S REMOVAL CONNECTIONS
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-301 - Digester 3 & 4 Biogas Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

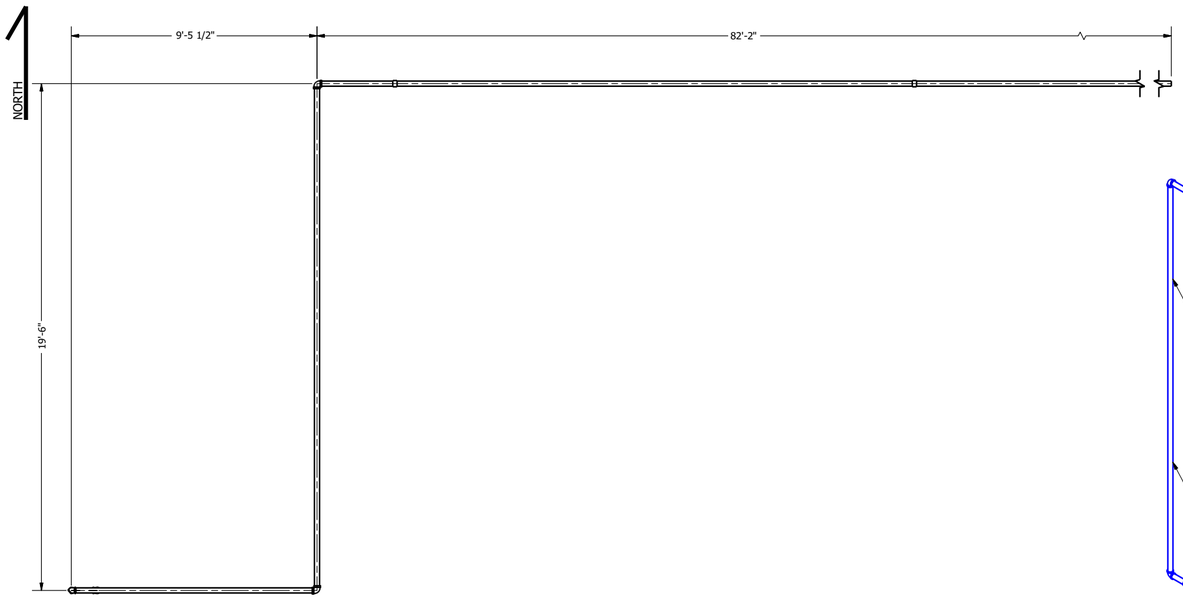
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

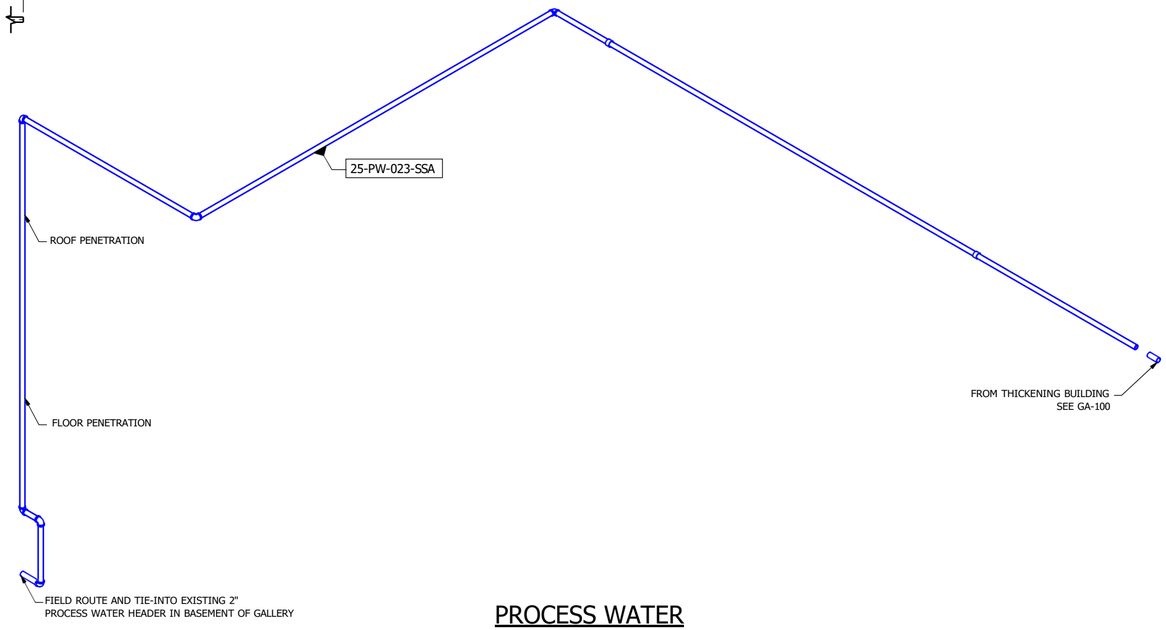
PETAWAWA

DIGESTER 3 & 4 BIOGAS PIPING

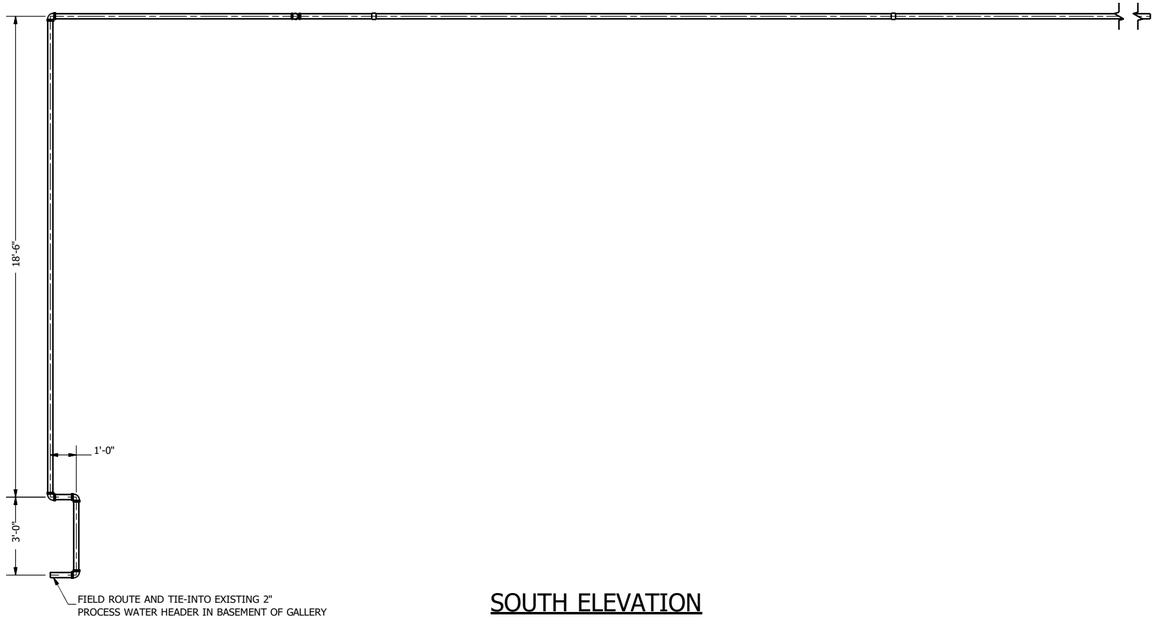
DRAWING NUMBER
M-301.4
REV A



PLAN VIEW
SCALE 1 : 35



PROCESS WATER
REF: D-04
SCALE 1 : 35



SOUTH ELEVATION
SCALE 1 : 35

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-302- Digester 3&4 PW, HWS, HWR Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

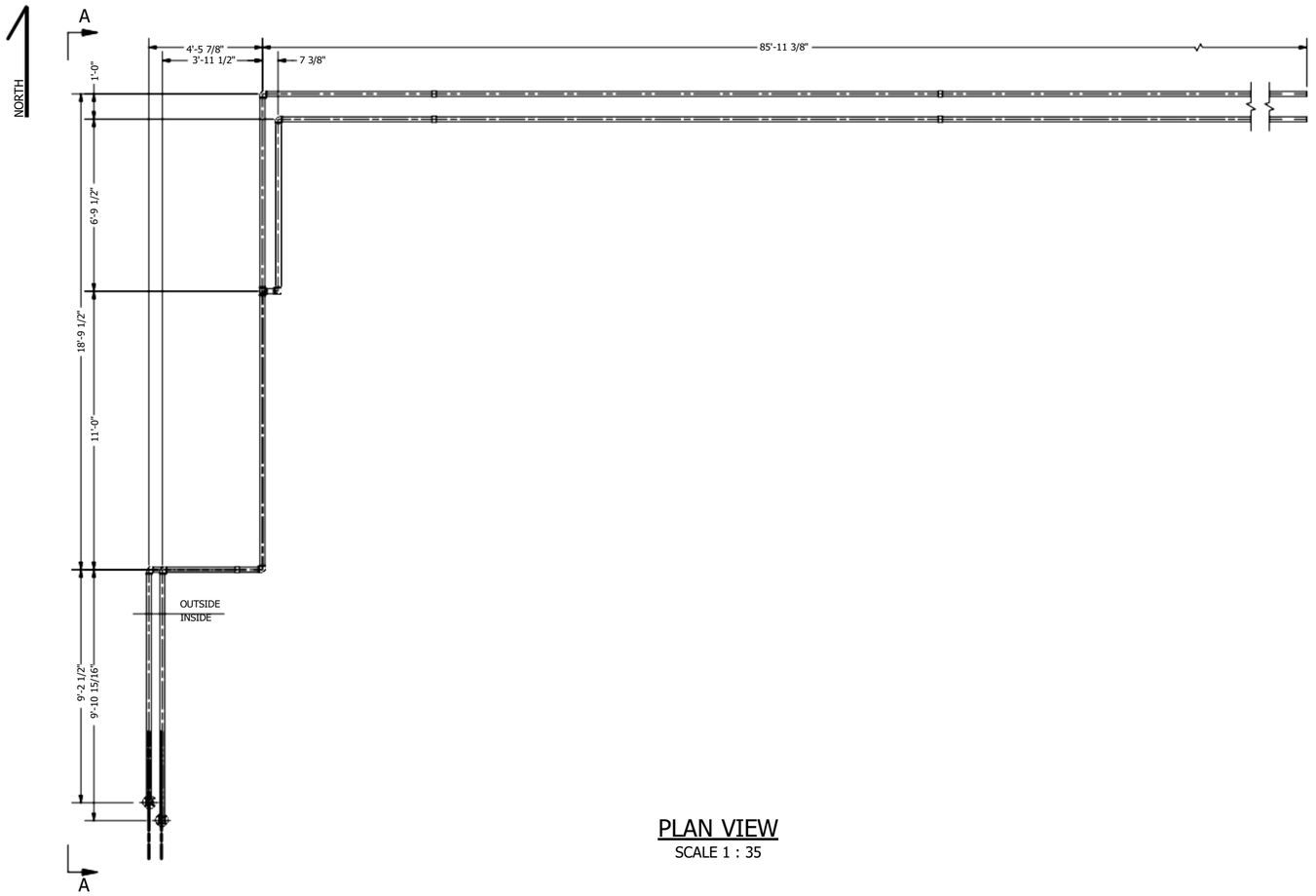
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

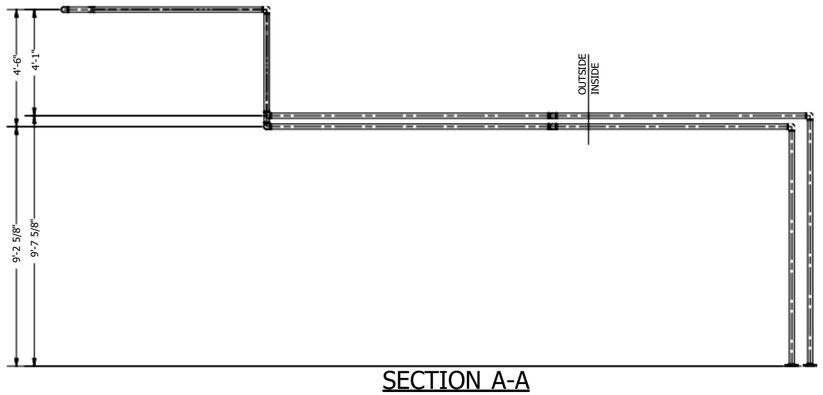
PETAWAWA

DIGESTER 3 & 4 PW, HWS, HWR PIPING

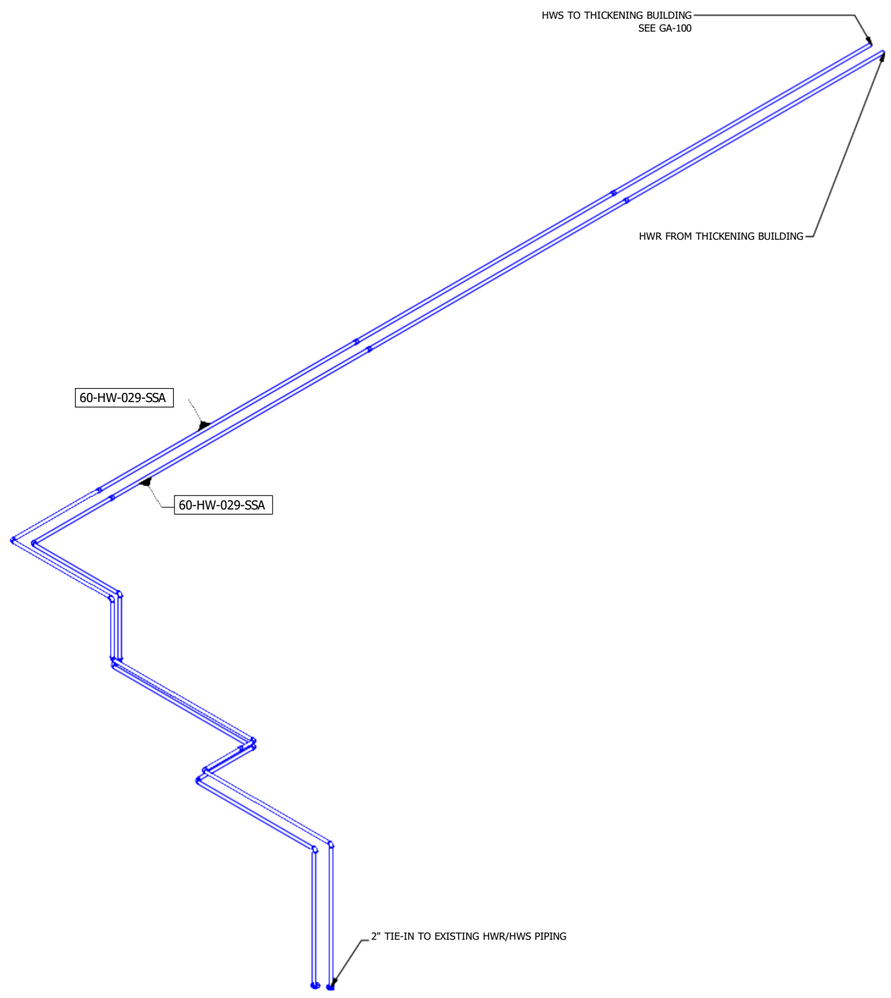
DRAWING NUMBER
M-302.1
REV A



PLAN VIEW
SCALE 1 : 35



SECTION A-A
SCALE 1 : 35



HWS & HWR FOR THICKENING BUILDING
REF: D-01, D-04
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-302 - Digester 3&4 PW, HWS, HWR Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

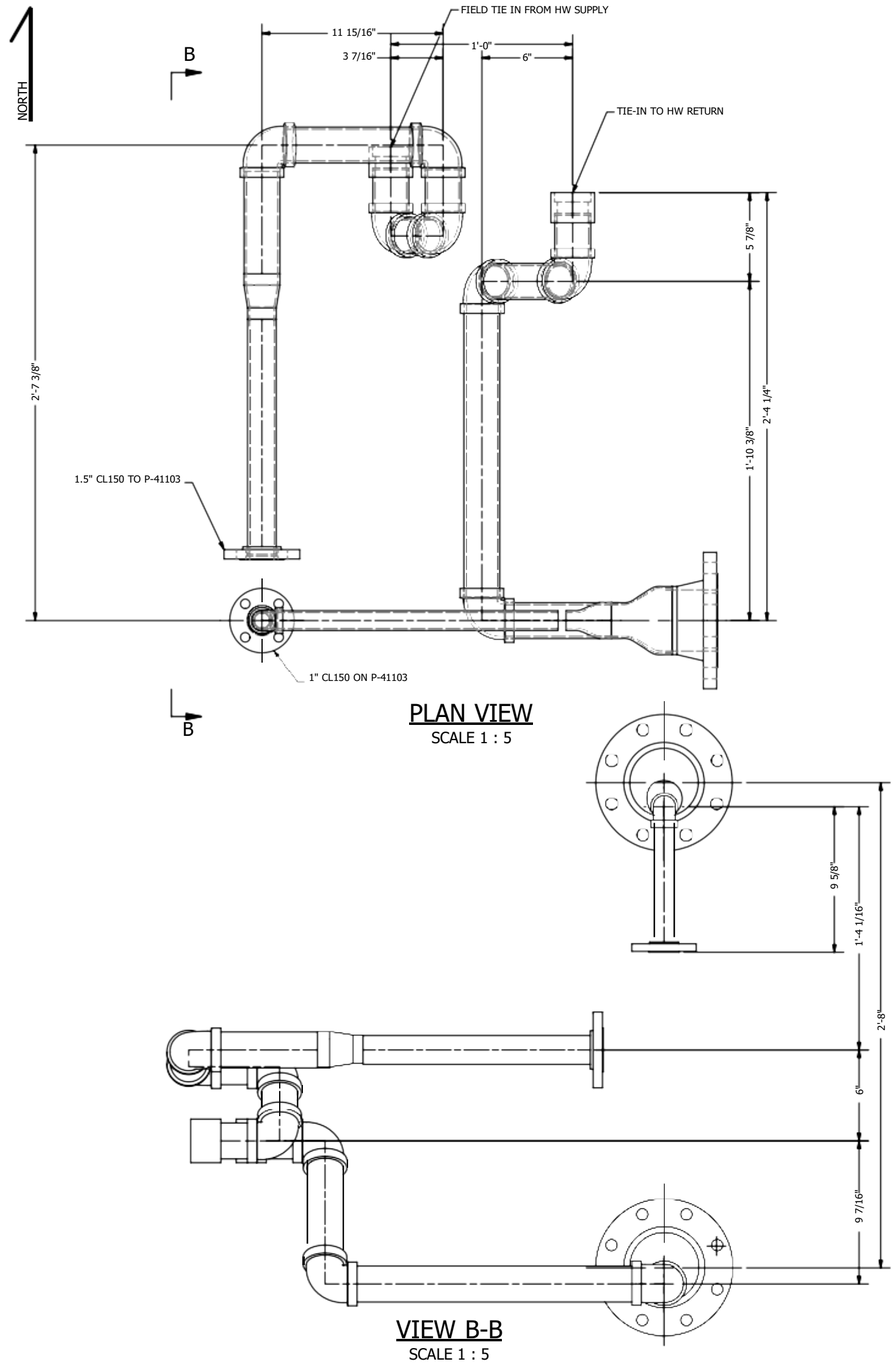
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

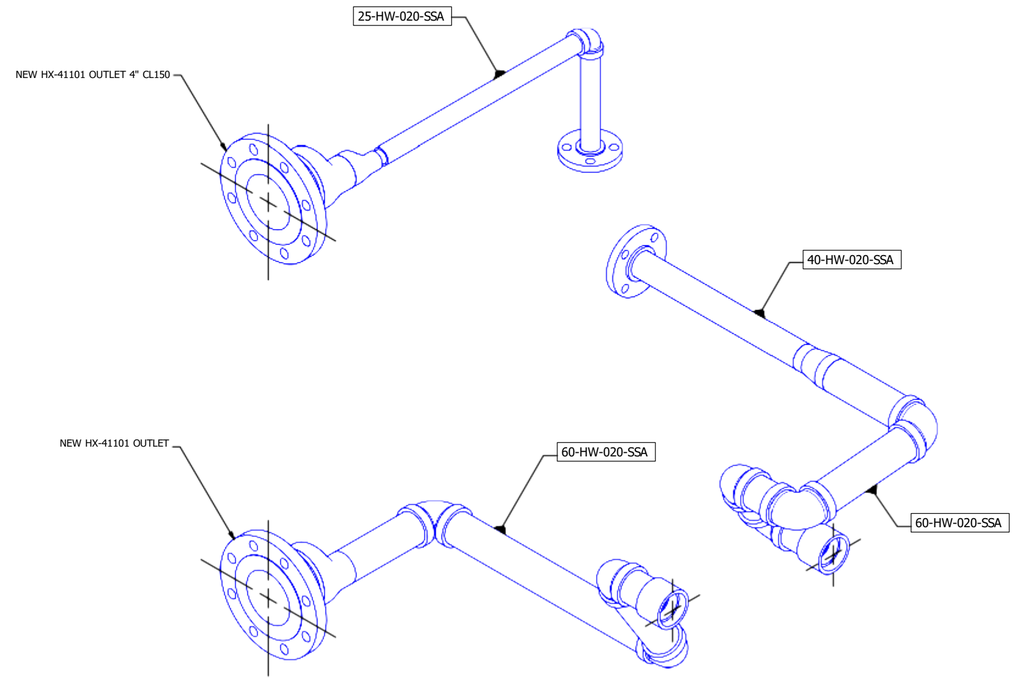
DIGESTER 3 & 4 PW, HWS, HWR PIPING

DRAWING NUMBER
M-302.2
REV A



PLAN VIEW
SCALE 1 : 5

VIEW B-B
SCALE 1 : 5



HWS & HWR NEW EXCHANGER & PUMP TIE-IN
REF: D-10
SCALE 1 : 5

DRAWING NOTES:
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-302- Digester 3&4 PW, HWS, HWR Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DIGESTER 3 & 4 PW, HWS, HWR PIPING

DRAWING NUMBER
M-302.3
REV A

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
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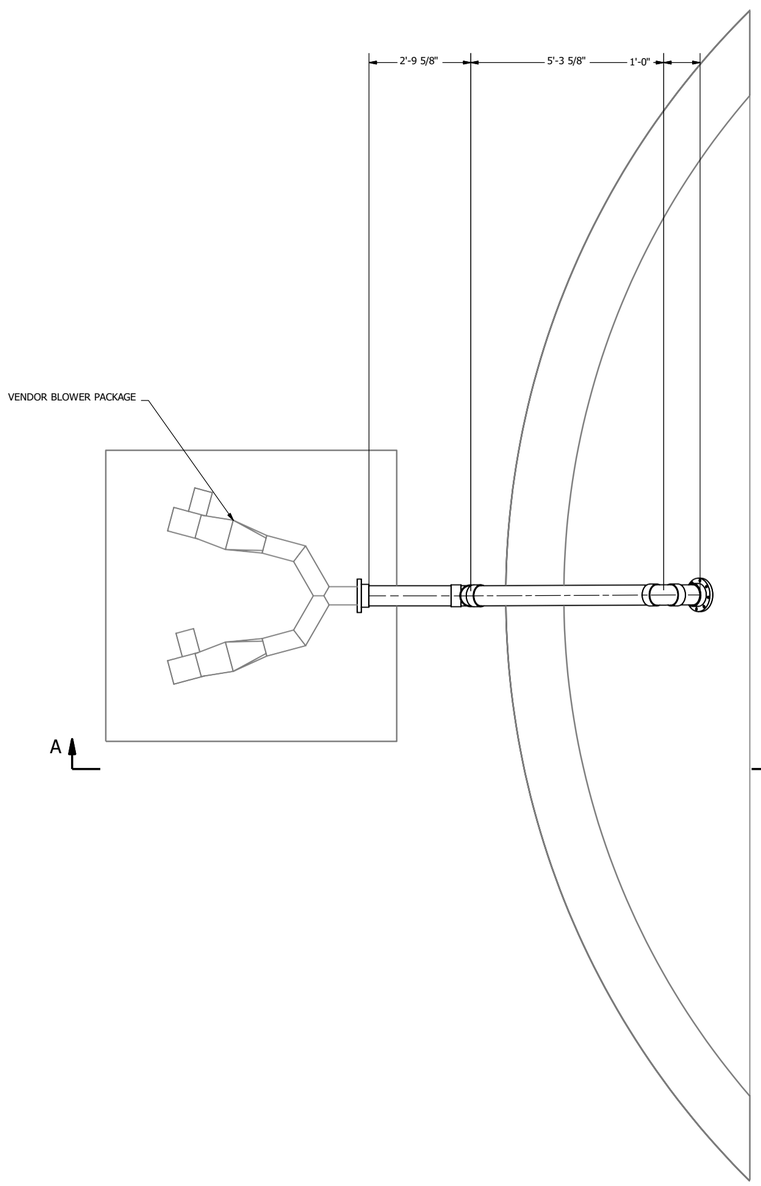
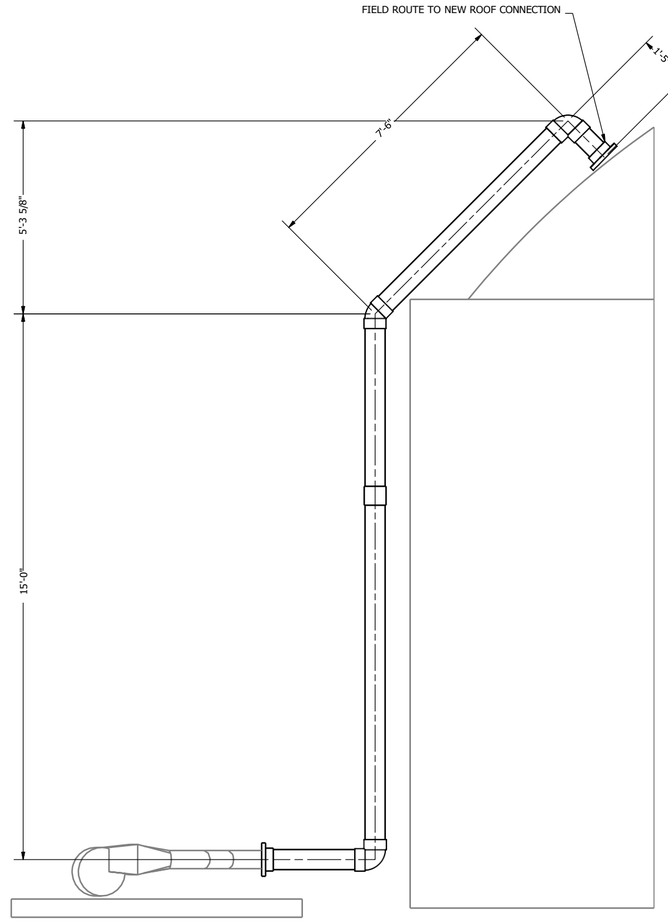
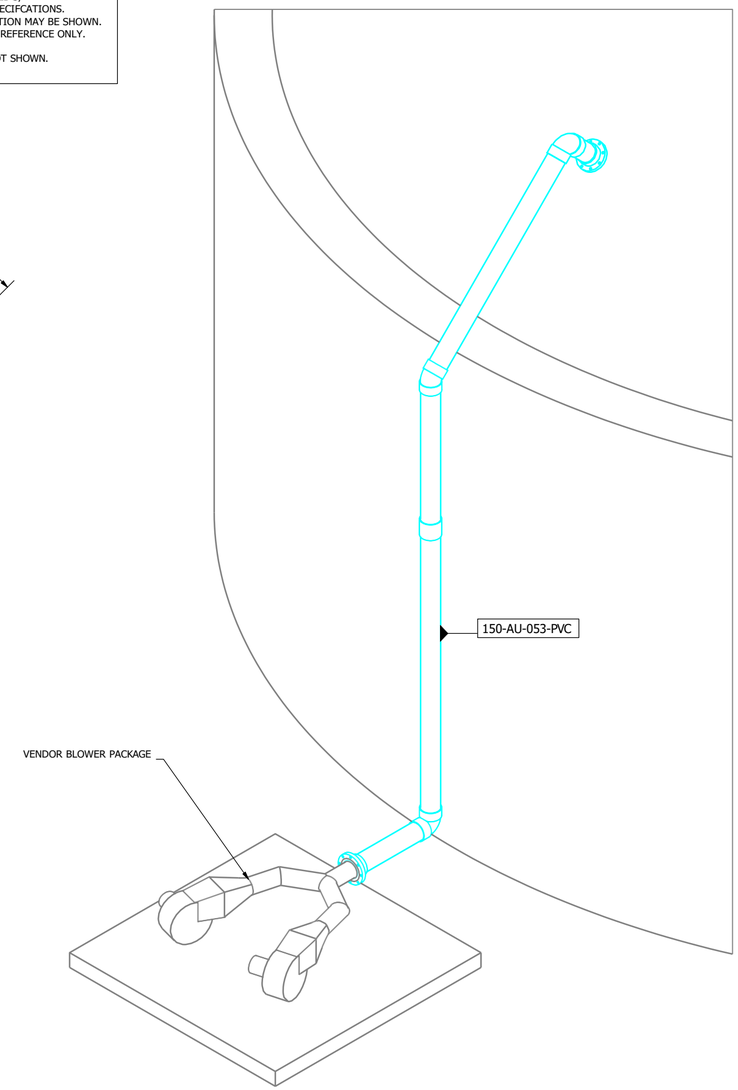


PLAN VIEW
SCALE 1 : 25



SECTION A
SCALE 1 : 25



NOTE:
1. SEE GA-301 FOR NORTH DIRECTION & ORIENTATION.
2. A TOTAL OF **TWO** LINES ARE REQUIRED. ONE FOR EACH DIGESTER 3 AND DIGESTER 4.

TYPICAL DIGESTER BLOWER ARRANGEMENT
REF: D-09A & D-09B
SCALE 1 : 25

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-303 - Digester 3&4 Blower Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
~~A~~	~~PRELIMINARY~~	~~SW~~		~~2021-01-25~~

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

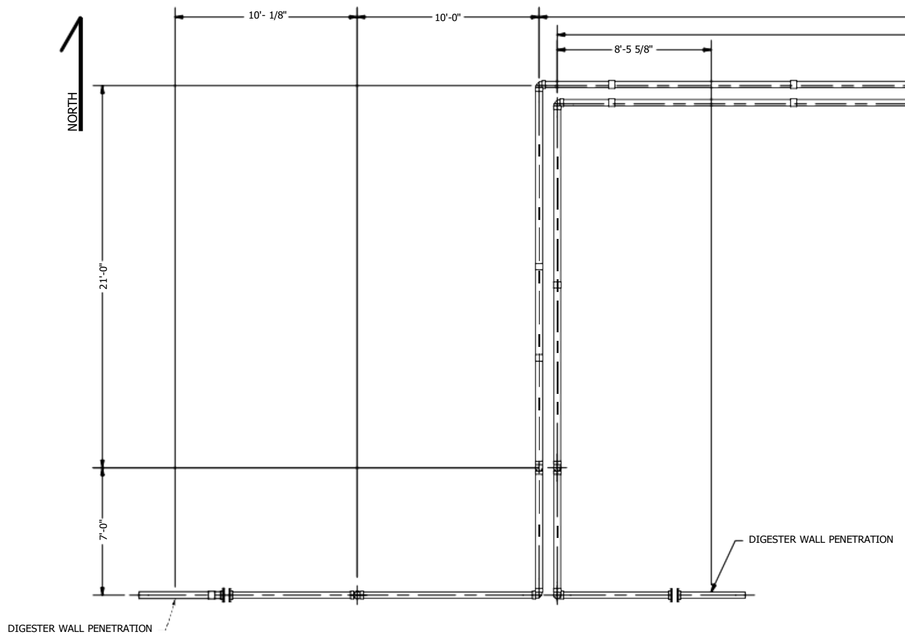
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

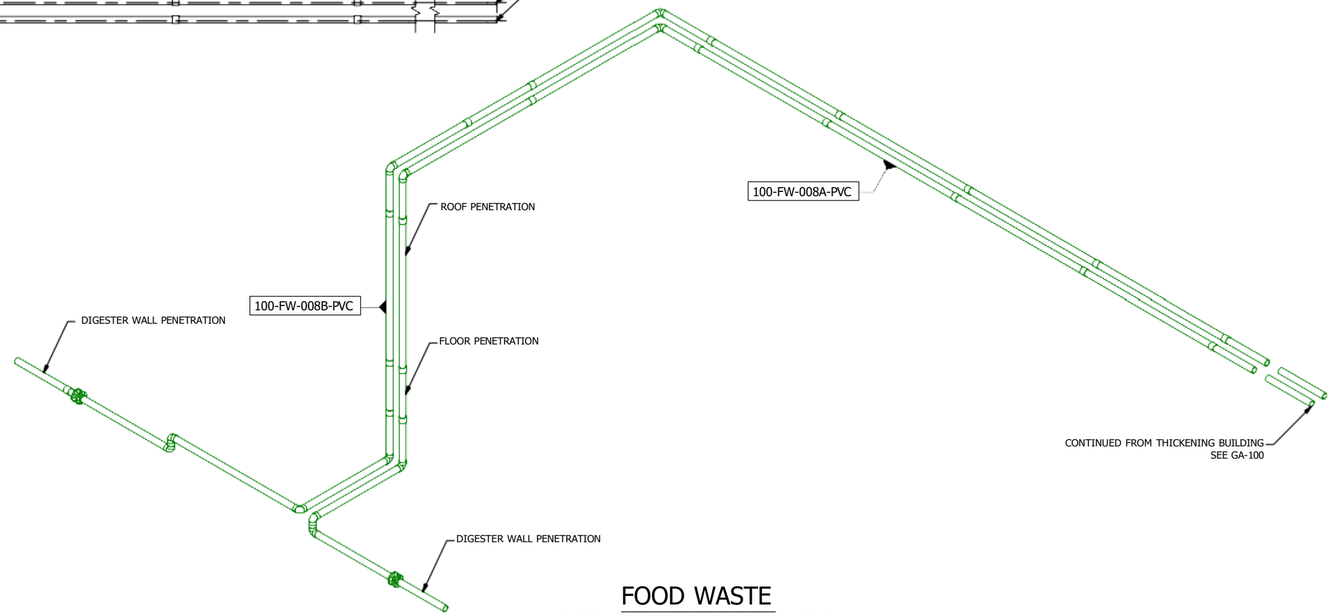
DIGESTER 3 & 4 BLOWER PIPING

DRAWING NUMBER
M-303
REV
A



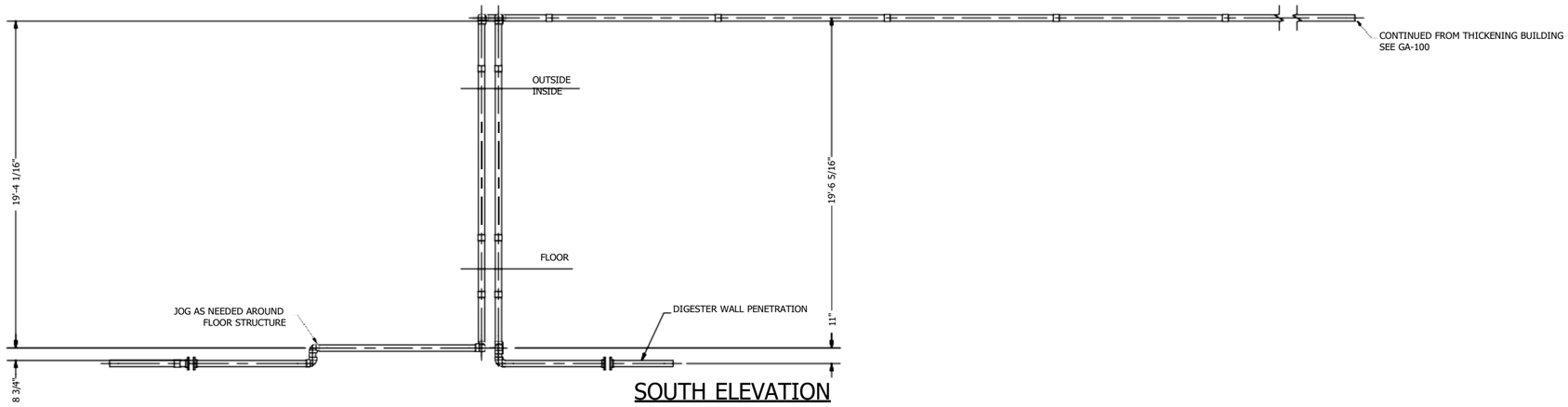
PLAN VIEW

SCALE 1 : 50



FOOD WASTE
REF: D-05, D-09A, D-09B

SCALE 1 : 50



SOUTH ELEVATION

SCALE 1 : 50

DRAWING NOTES:

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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-304- Digester 3 & 4 Food Waste Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

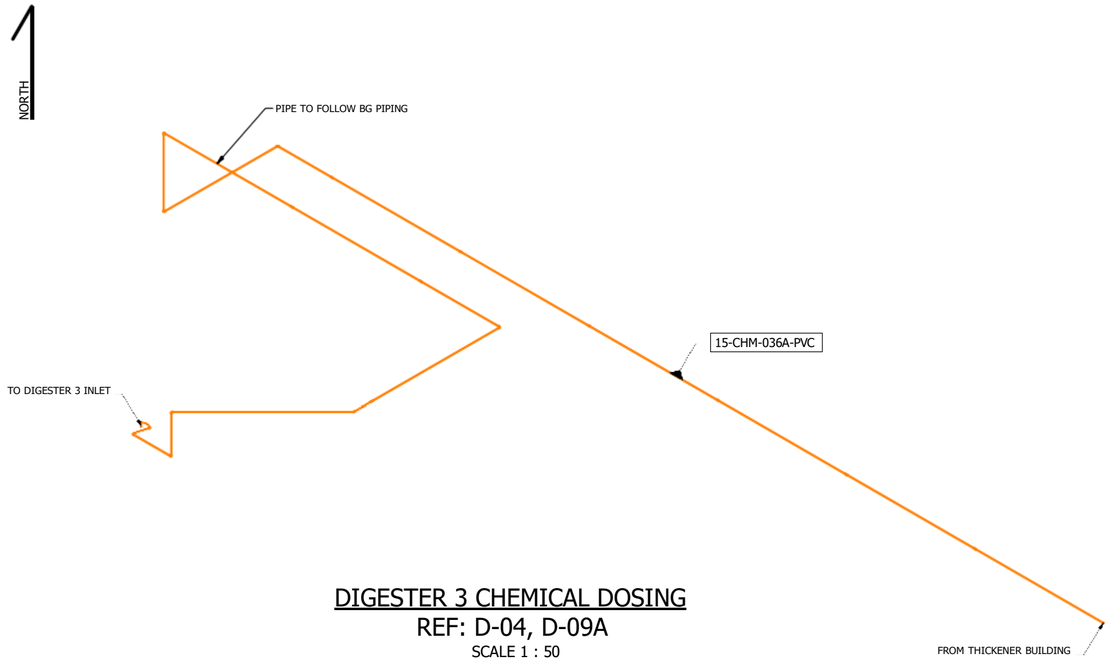
PETAWAWA

DIGESTER 3 & 4 FOOD WASTE PIPING

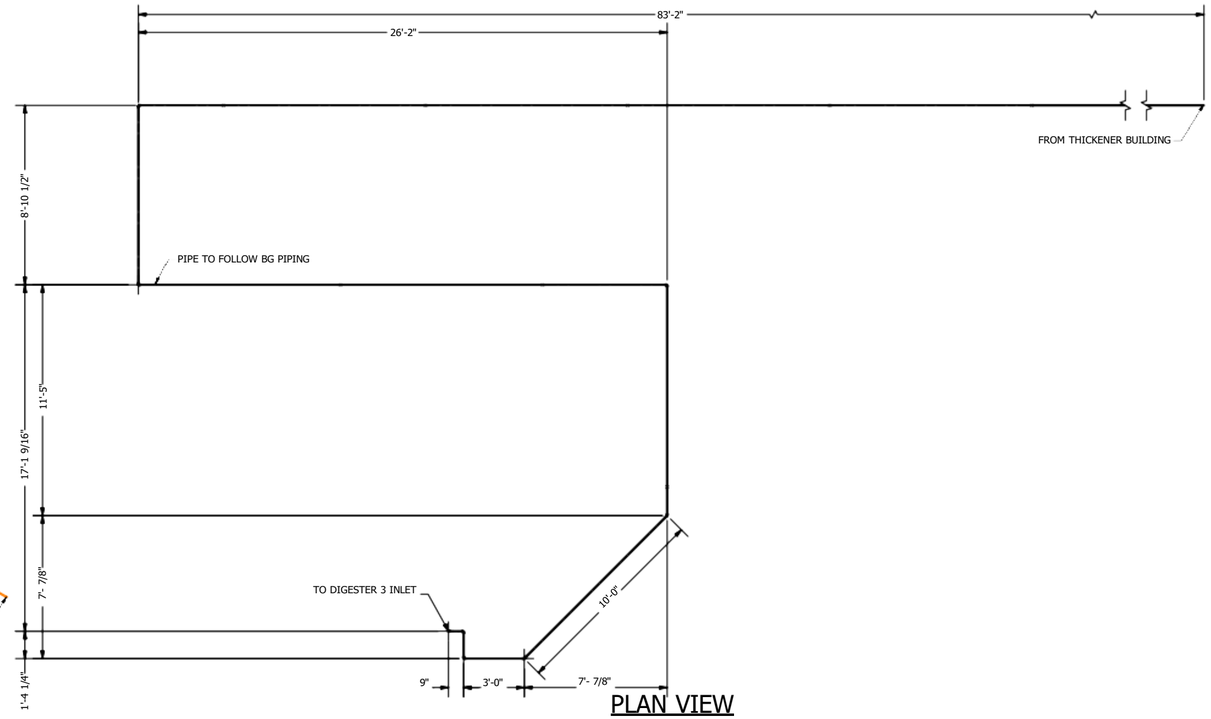
DRAWING NUMBER

M-304

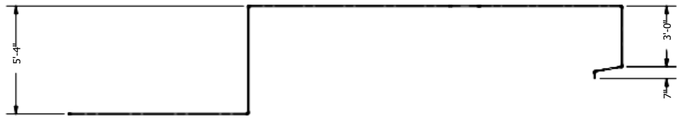
REV A



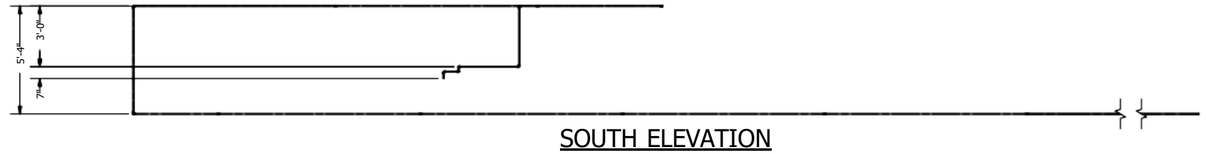
DIGESTER 3 CHEMICAL DOSING
REF: D-04, D-09A
SCALE 1 : 50



PLAN VIEW
SCALE 1 : 45



WEST ELEVATION
SCALE 1 : 45



SOUTH ELEVATION
SCALE 1 : 45

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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-305- Digester 3 & 4 Chemical Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

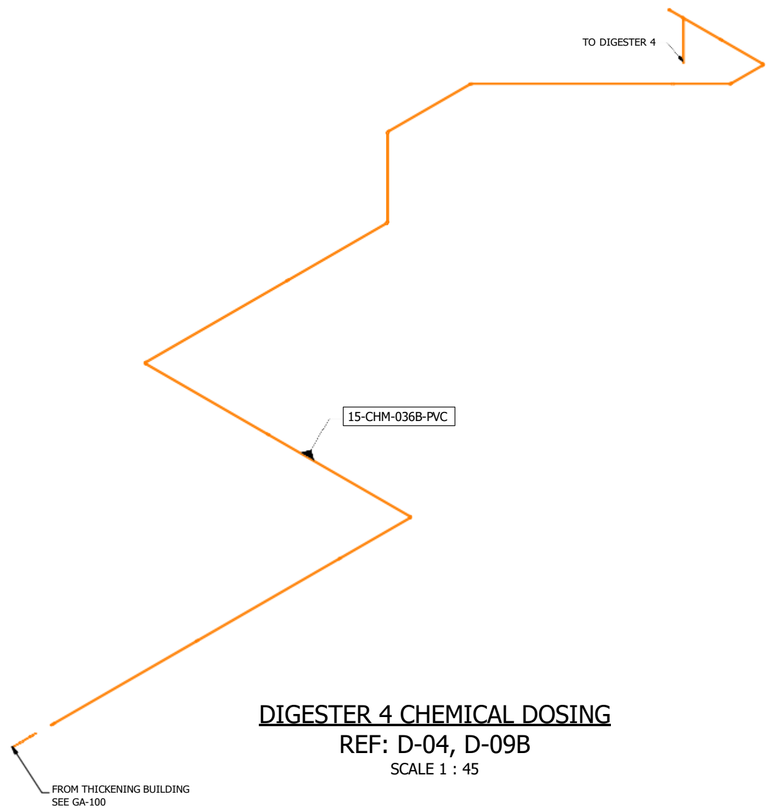
JDM DESIGNWORKS
Rosebush Wilson
LANDSCAPE ARCHITECTURE | PLANNING | URBAN DESIGN

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

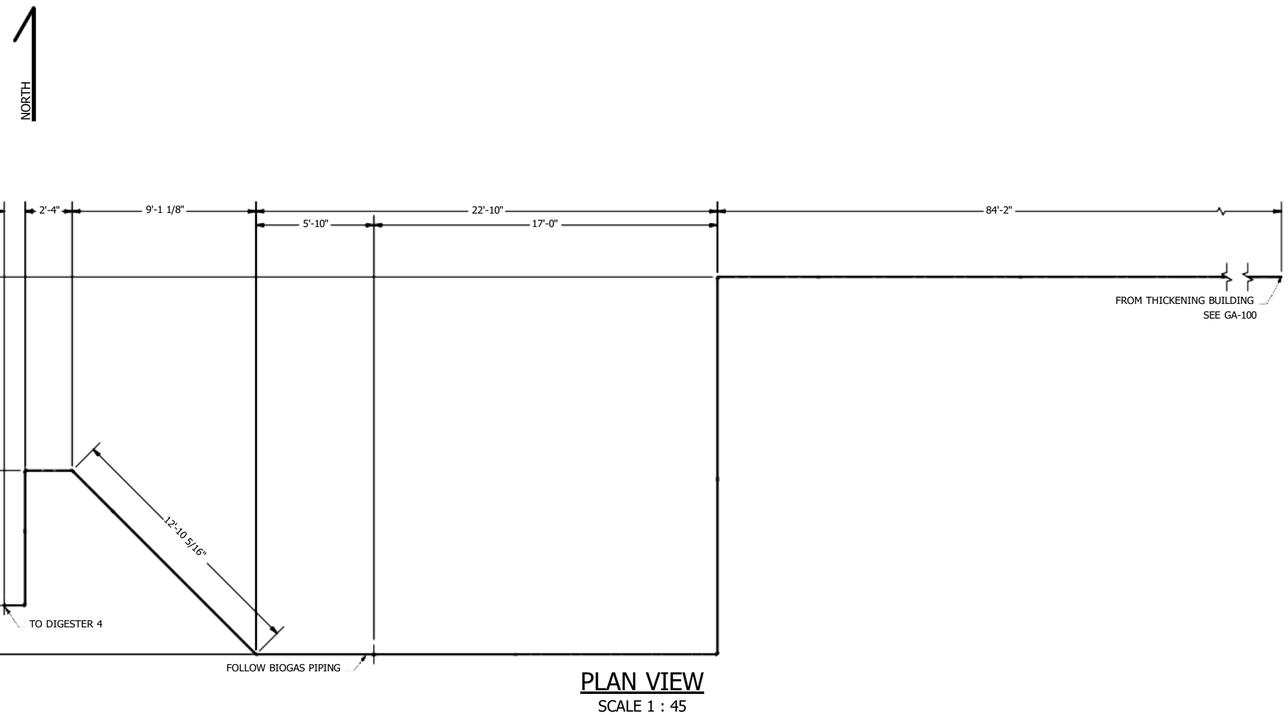
PETAWAWA

DIGESTER 3 & 4 CHEMICAL PIPING

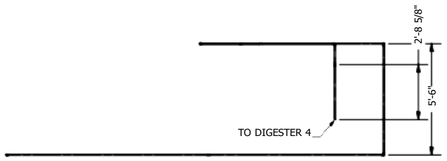
DRAWING NUMBER
M-305.1
REV A



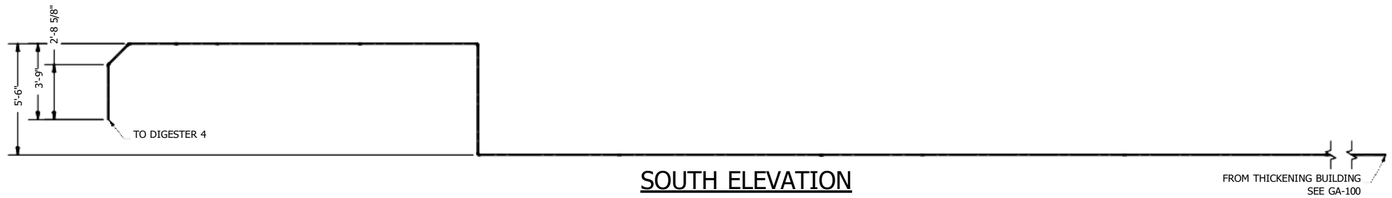
DIGESTER 4 CHEMICAL DOSING
REF: D-04, D-09B
SCALE 1 : 45



PLAN VIEW
SCALE 1 : 45



WEST ELEVATION
SCALE 1 : 45



SOUTH ELEVATION
SCALE 1 : 45

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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-305- Digester 3 & 4 Chemical Piping .idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-25

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

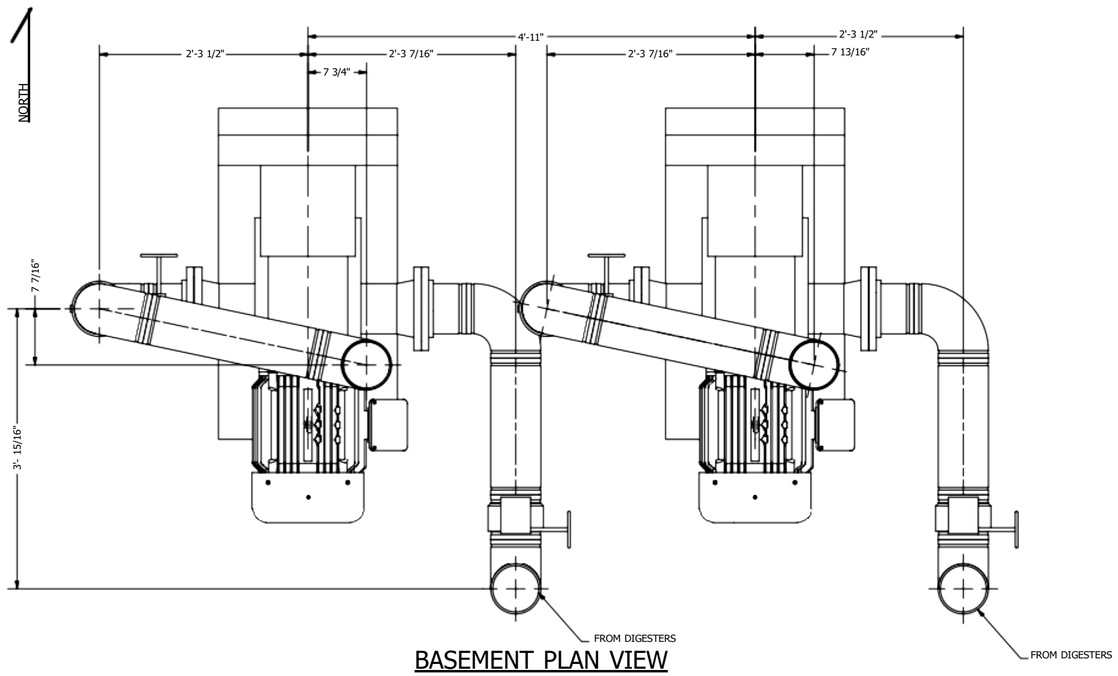
JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

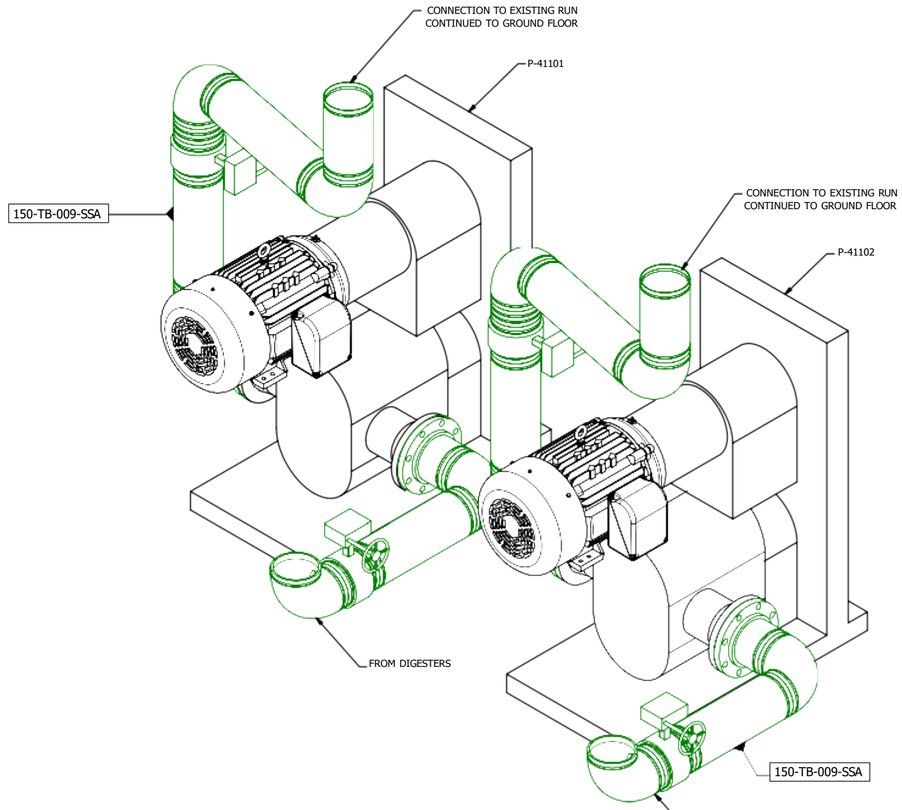
DIGESTER 3 & 4 CHEMICAL PIPING

DRAWING NUMBER
M-305.2
REV A



BASEMENT PLAN VIEW

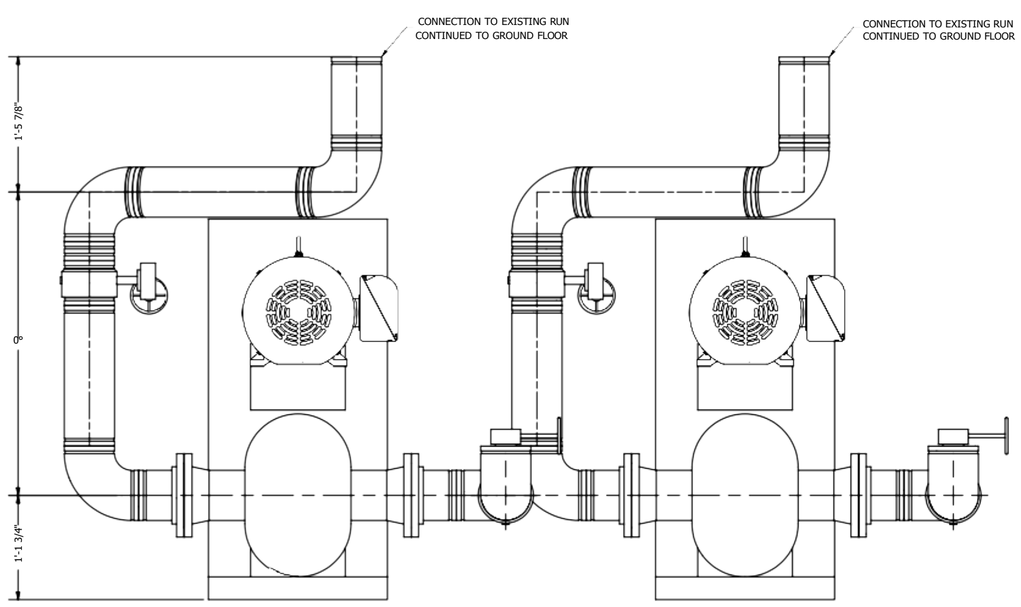
SCALE 1 : 10



SLUDGE CIRCULATING PUMPS

REF: D-10

SCALE 1 : 10



SOUTH ELEVATION

SCALE 1 : 10

GROOVED VIC. PIPE & FITTINGS SHOWN ONLY. MECHANICAL FASTENERS HIDDEN FOR CLARITY.

DRAWING NOTES:

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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-306- Digester 3 & 4 Sludge Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

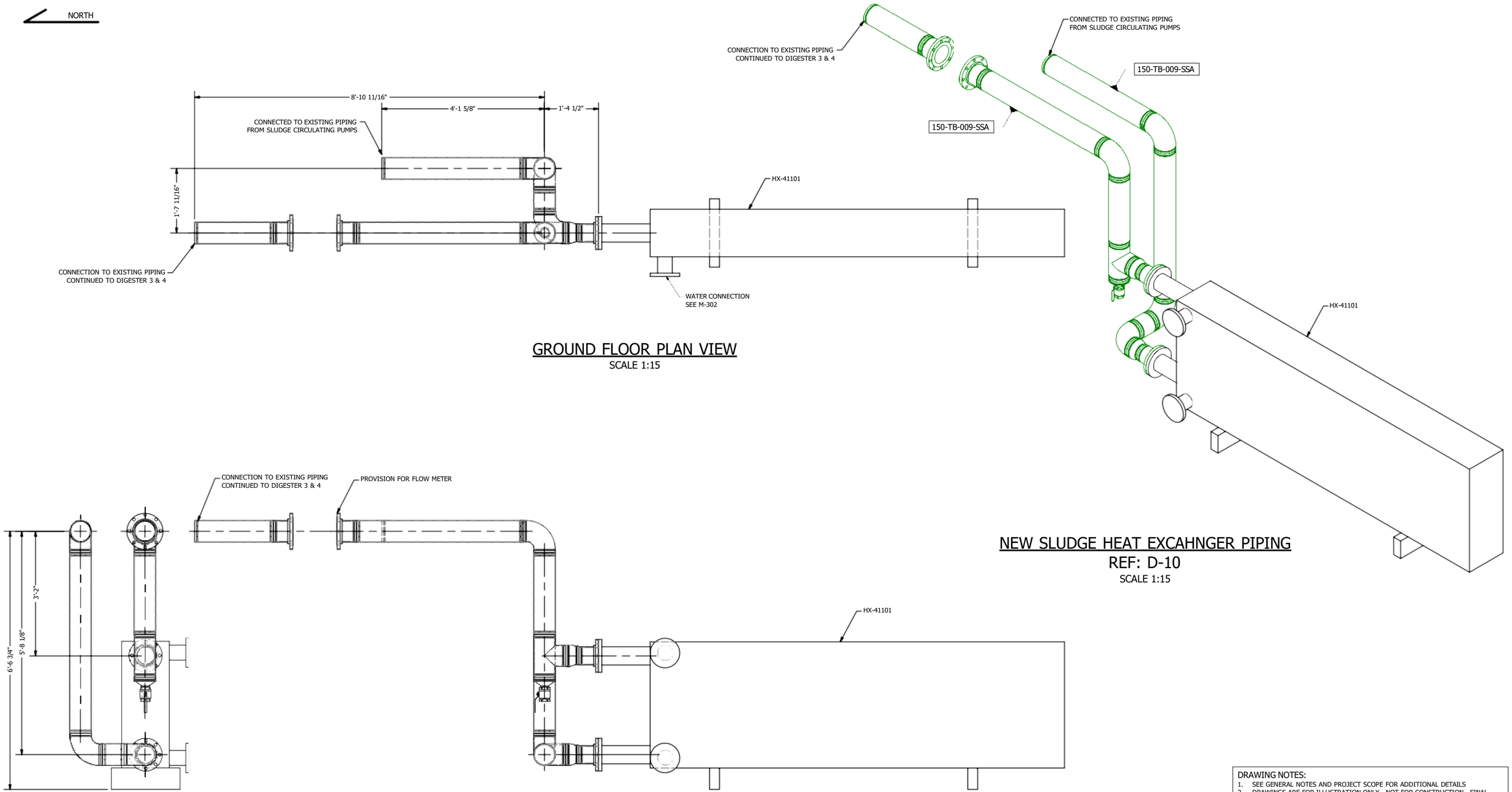
PETAWAWA

DIGESTER 3 & 4 SLUDGE PIPING

DRAWING NUMBER

M-306.1

REV A



GROUND FLOOR PLAN VIEW
SCALE 1:15

NEW SLUDGE HEAT EXCAHNGER PIPING
REF: D-10
SCALE 1:15

NORTH ELEVATION
SCALE 1:15

WEST ELEVATION
SCALE 1:15

GROOVED VIC. PIPE & FITTINGS SHOWN ONLY. MECHANICAL FASTENERS HIDDEN FOR CLARITY.

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-306- Digester 3 & 4 Sludge Piping.idw 2021-01-25

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

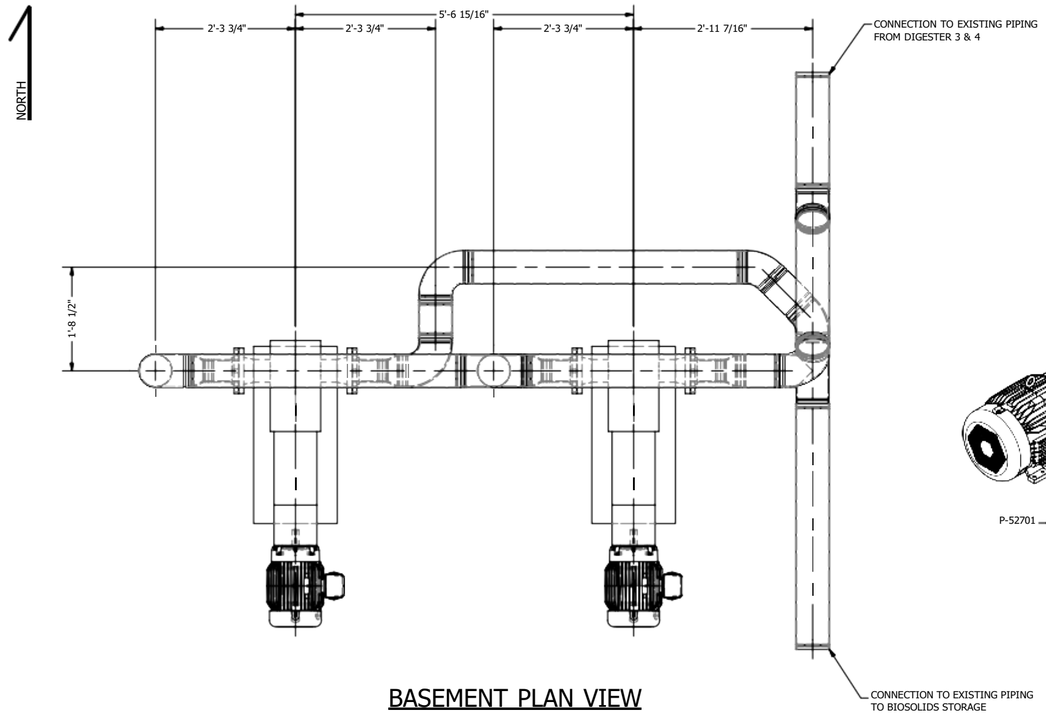
JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

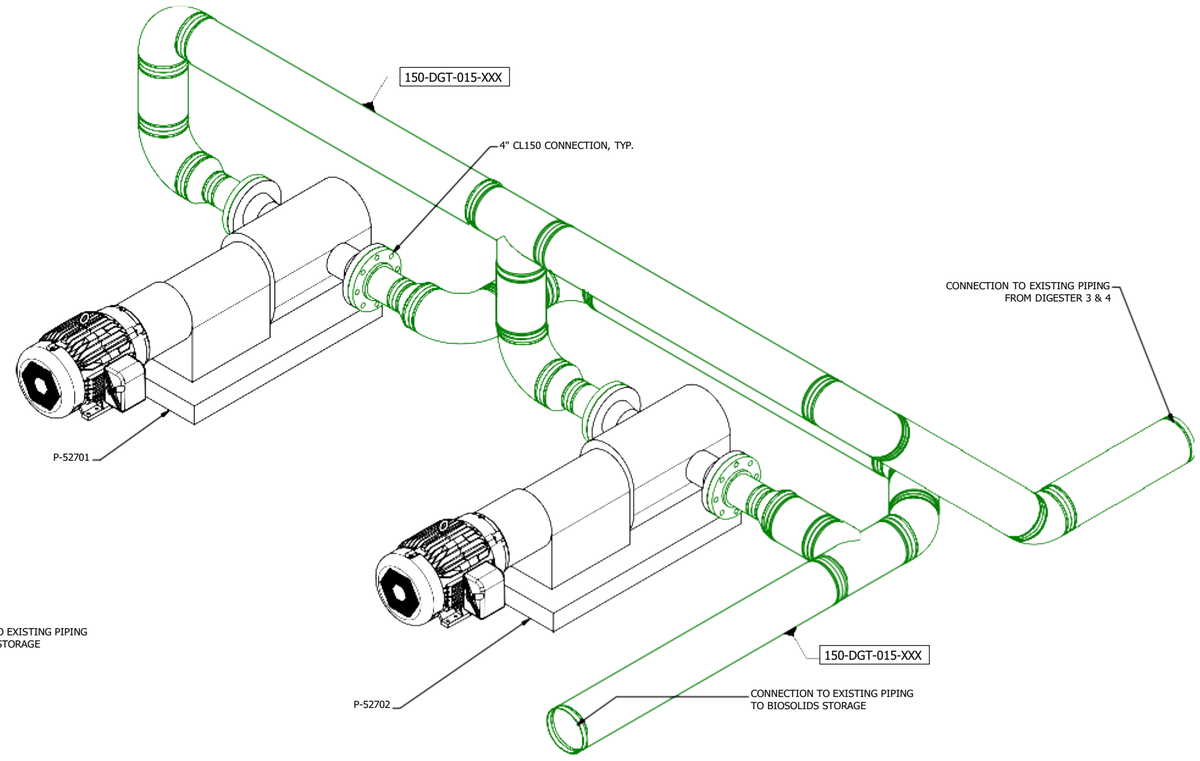
DIGESTER 3 & 4 SLUDGE PIPING

DRAWING NUMBER
M-306.2
REV A



BASEMENT PLAN VIEW

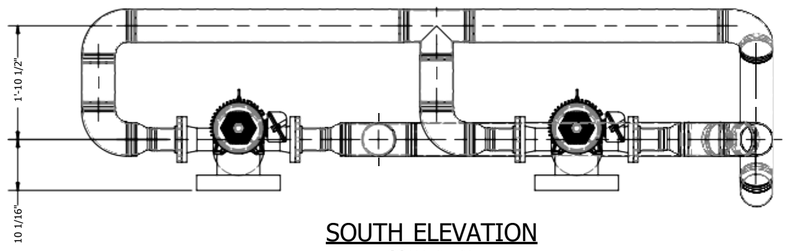
SCALE 1 : 15



SSD FEED PUMPS

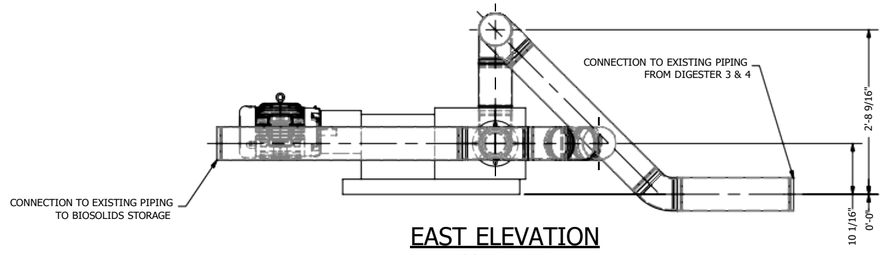
REF: D-19

SCALE 1 : 10



SOUTH ELEVATION

SCALE 1 : 15



EAST ELEVATION

SCALE 1 : 15

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GROOVED VIC. PIPE & FITTINGS SHOWN ONLY. MECHANICAL FASTENERS HIDDEN FOR CLARITY.

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-307- Digester 3&4 Digestate Piping.idw 2021-01-26

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-26

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	
REFERENCE#:	GA-301
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

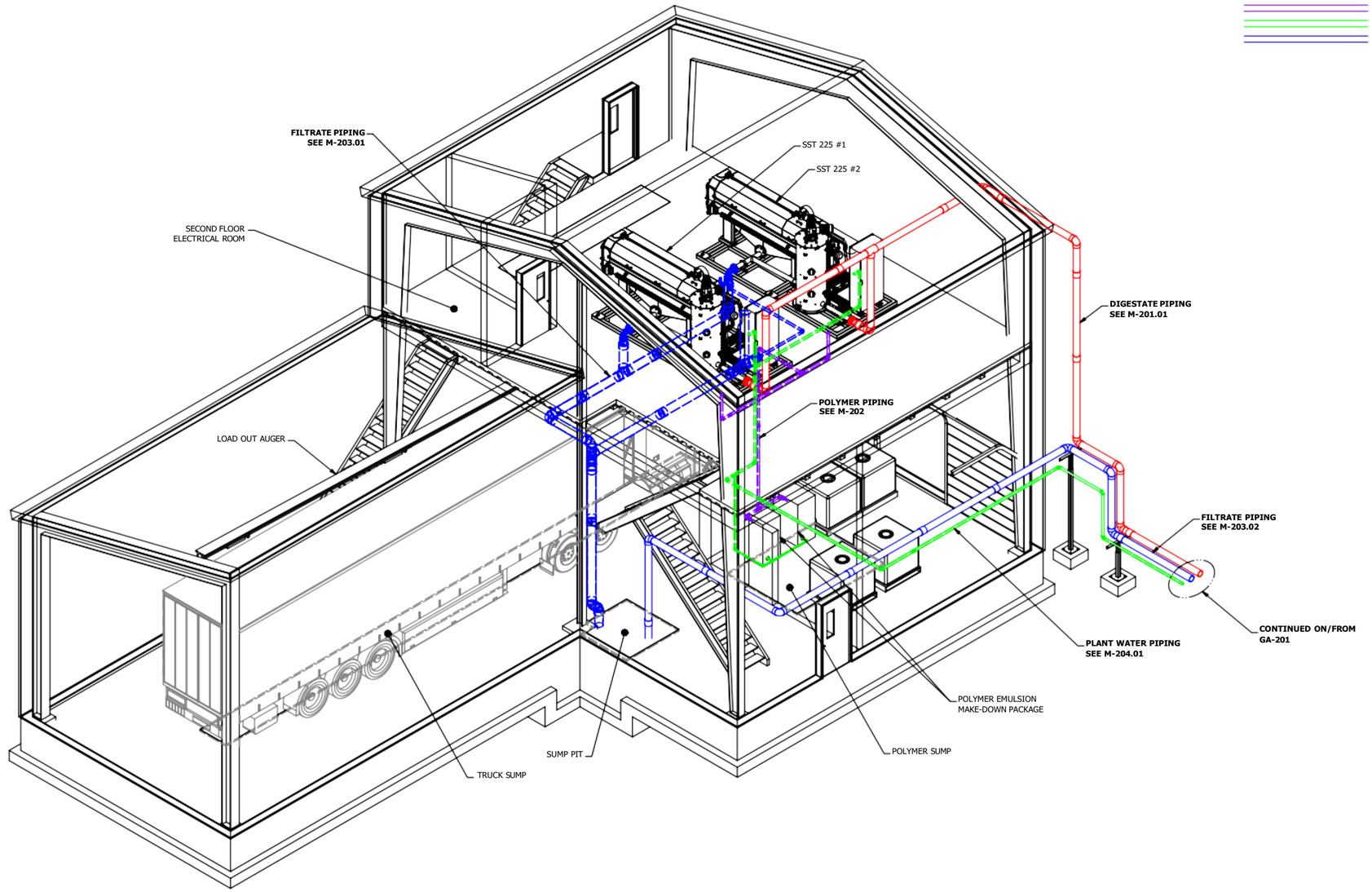
DIGESTER 3 & 4 DIGESTATE PIPING

DRAWING NUMBER: M-307

REV: A

LEGEND

- DIGESTATE PIPING
- POLYMER PIPING
- PLANT WATER
- FILTRATE



ISO VIEW
SCALE 1 : 60

NOTE:
ALL WORK IN THE DEWATERING BUILDING IS PHASE 2

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-200-DewateringArea.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

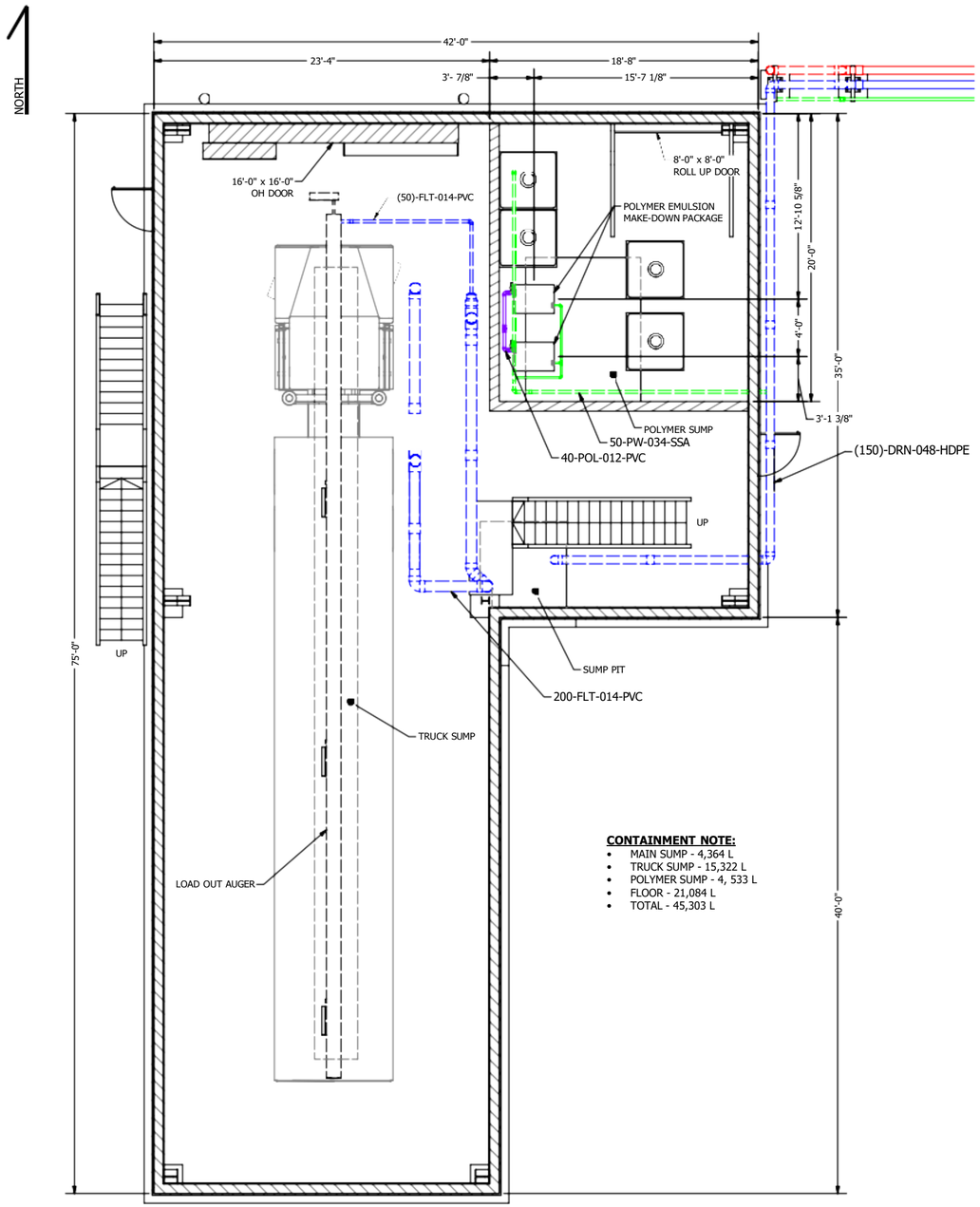
DESIGNWORKS JDM Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

DEWATERING BUILDING

DRAWING NUMBER
GA-200.01
REV A

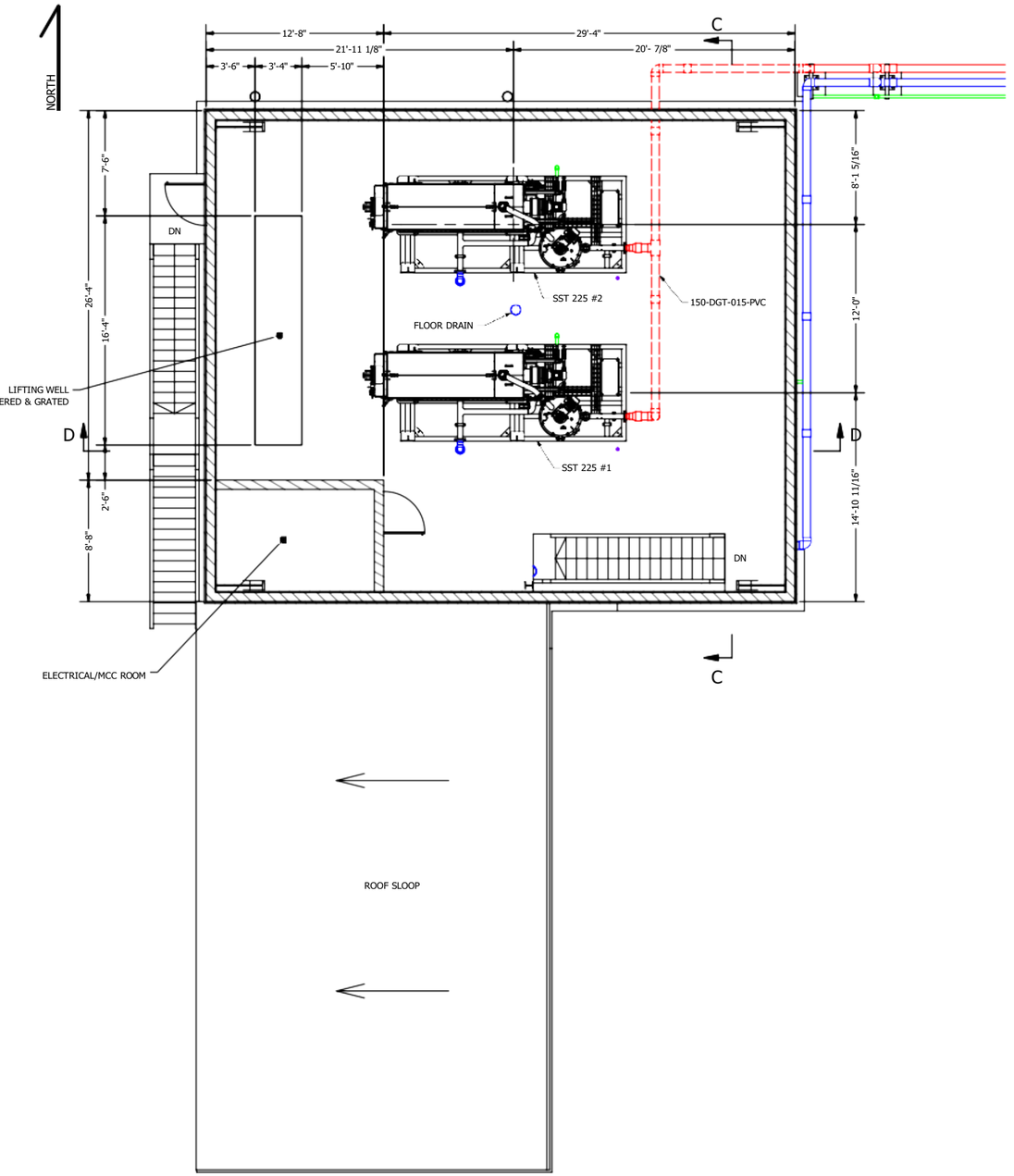


CONTAINMENT NOTE:

- MAIN SUMP - 4,364 L
- TRUCK SUMP - 15,322 L
- POLYMER SUMP - 4, 533 L
- FLOOR - 21,084 L
- TOTAL - 45,303 L

GROUND FLOOR PLAN

SCALE 1 : 60



SECOND FLOOR PLAN

SCALE 1 : 60

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-200-DewateringArea.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

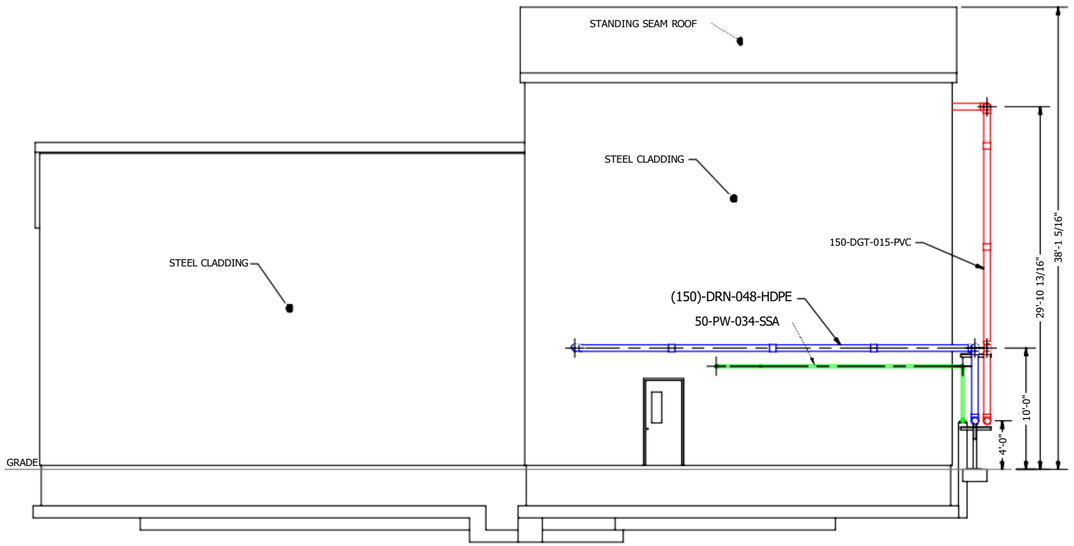
PETAWAWA

DEWATERING BUILDING

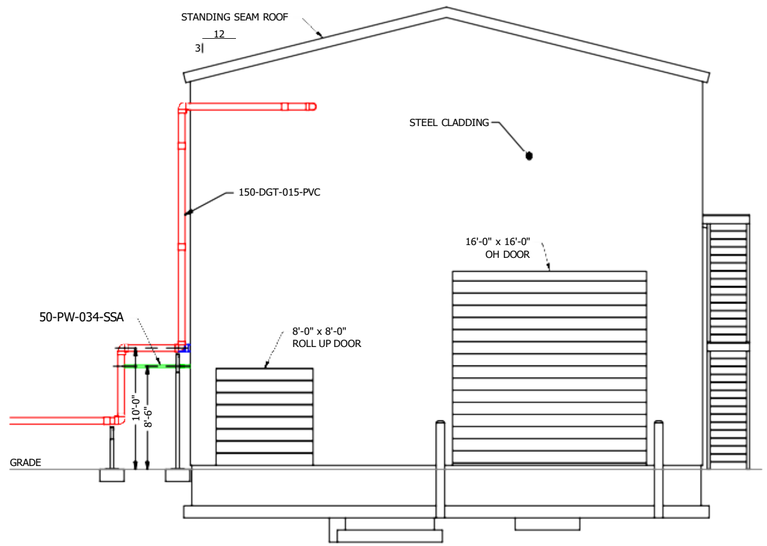
DRAWING NUMBER

GA-200.02

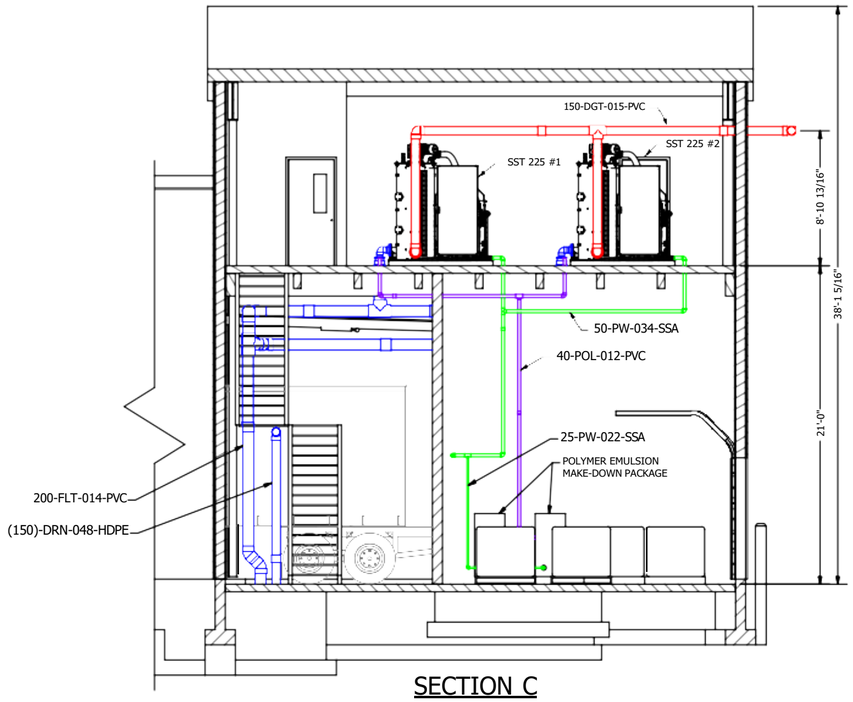
REV A



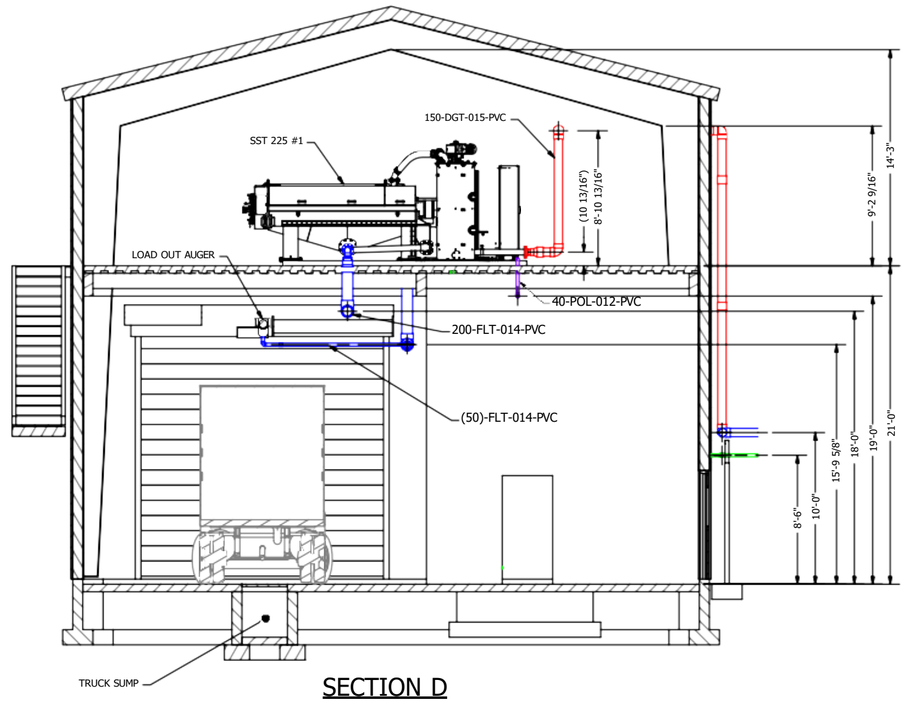
WEST ELEVATION
SCALE 1 : 75



NORTH ELEVATION
SCALE 1 : 75



SECTION C
SCALE 1 : 60



SECTION D
SCALE 1 : 60

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-200-DewateringArea.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

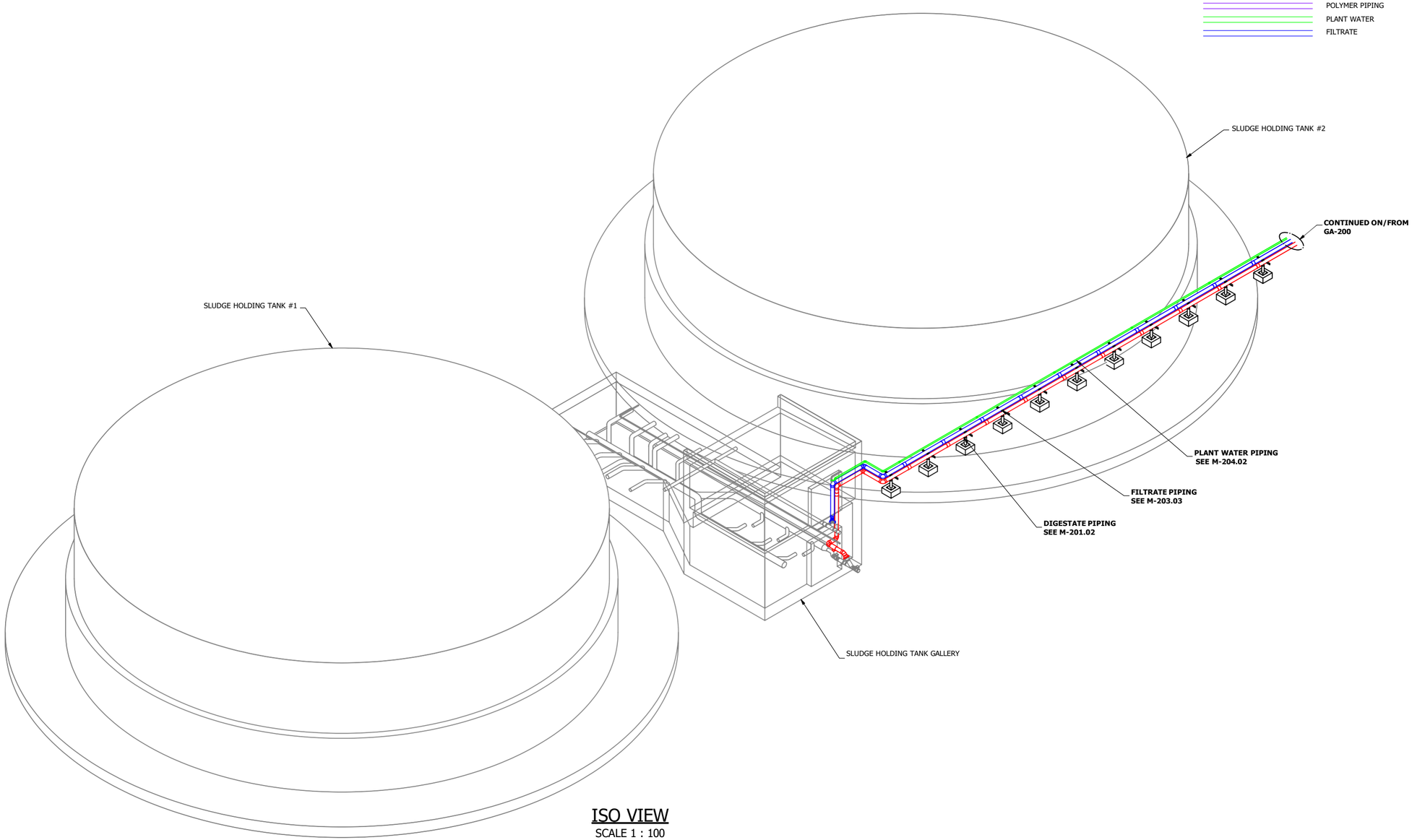
PETAWAWA

DEWATERING BUILDING

DRAWING NUMBER
GA-200.03
REV
A

LEGEND

- DIGESTATE PIPING
- POLYMER PIPING
- PLANT WATER
- FILTRATE



ISO VIEW
SCALE 1 : 100

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-201-SludgeArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

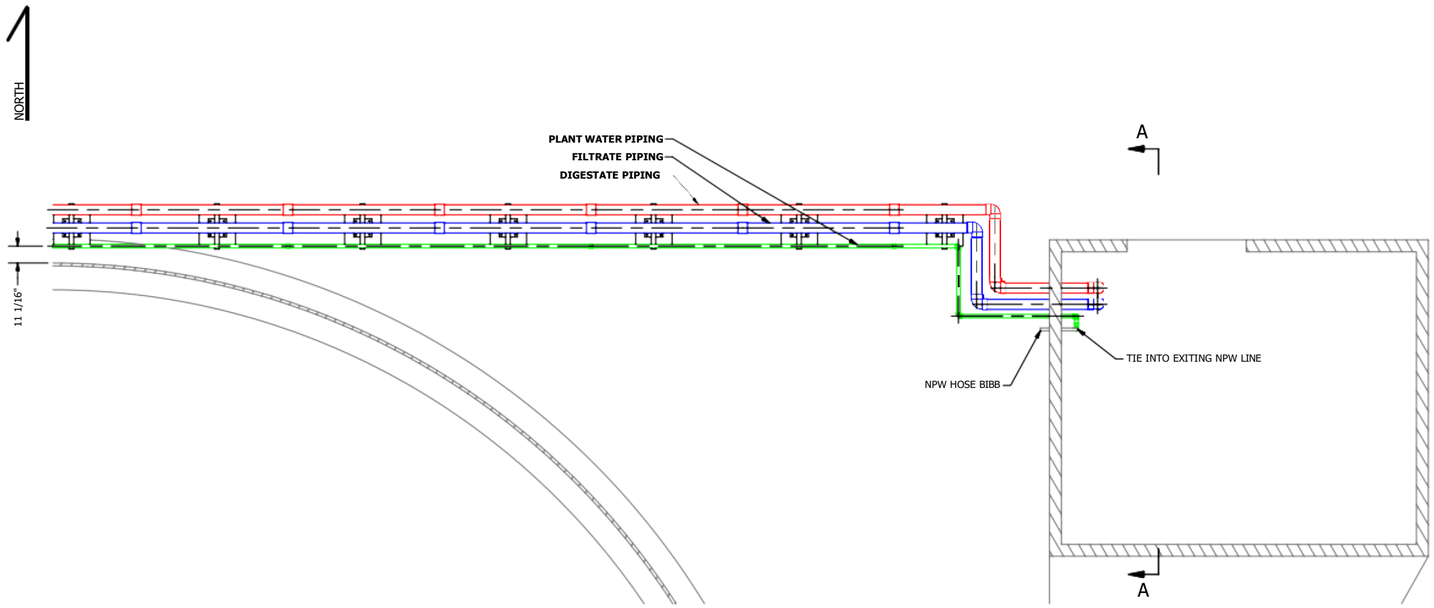
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED: WMcEwan
DRAWN: WMcEwan
CHECKED:
APPROVED:
REFERENCE#:
PROJECT NO.: 200902
SCALE: AS NOTED

PETAWAWA

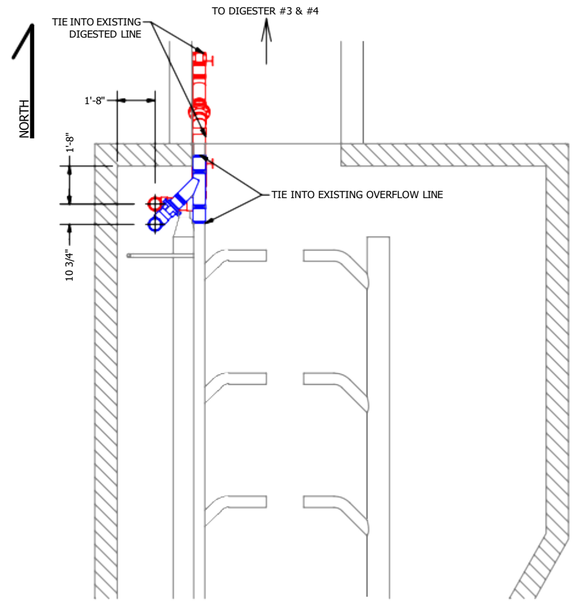
SLUDGE HOLDING TANK GALLERY

DRAWING NUMBER
GA-201.01
REV
A



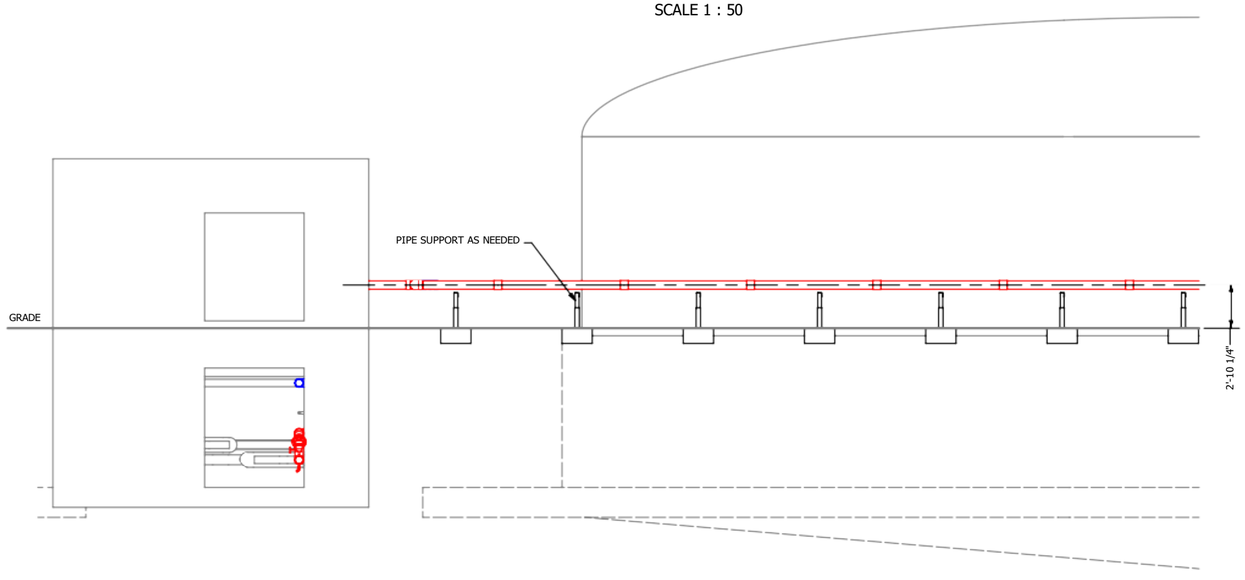
GROUND LEVEL PLANE VIEW

SCALE 1 : 50



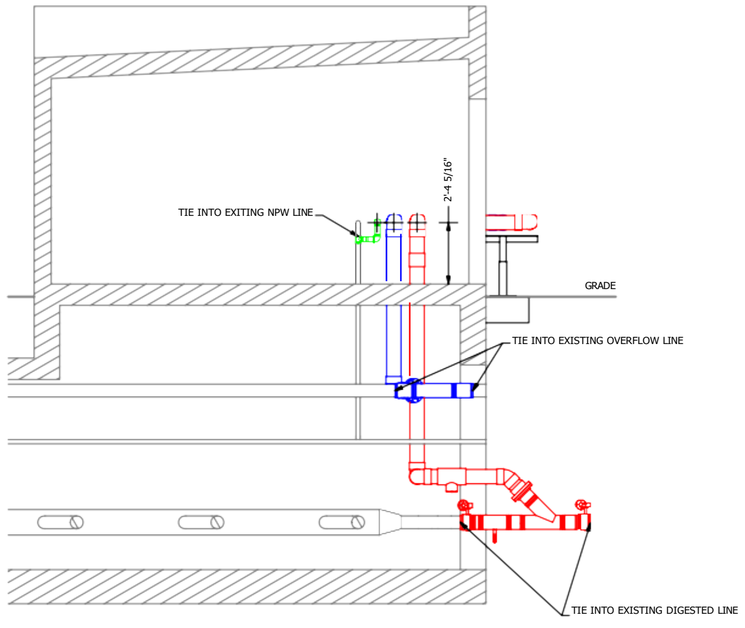
BASEMENT FLOOR PLAN

SCALE 1 : 40



NORTH ELEVATION

SCALE 1 : 60



SECTION A

SCALE 1 : 35

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-201-SludgeArea.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

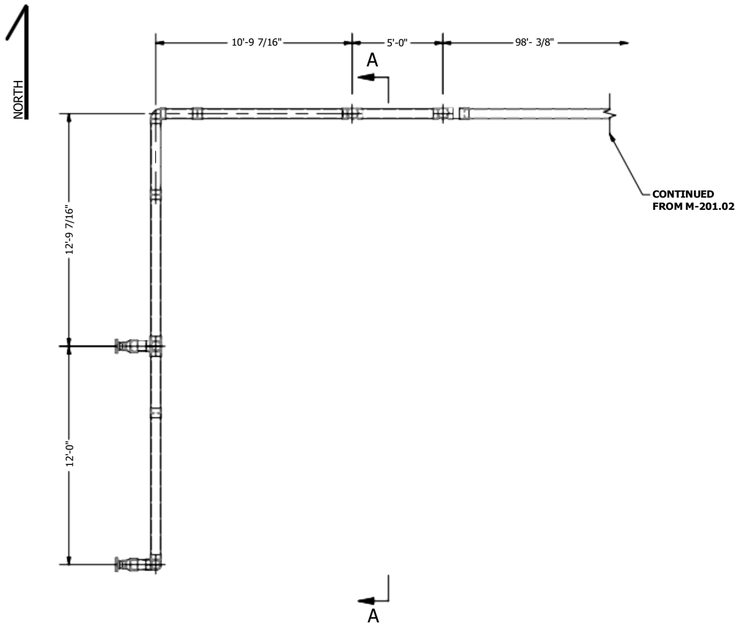
PETAWAWA

SLUDGE HOLDING TANK GALLERY

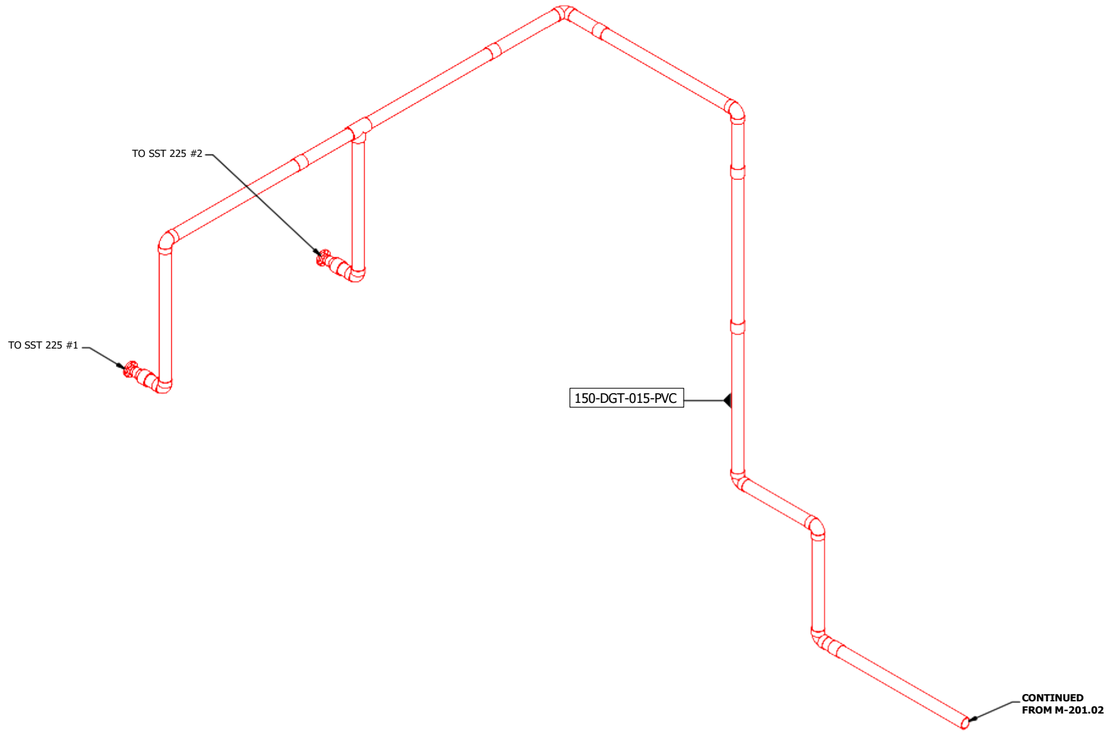
DRAWING NUMBER

GA-201.02

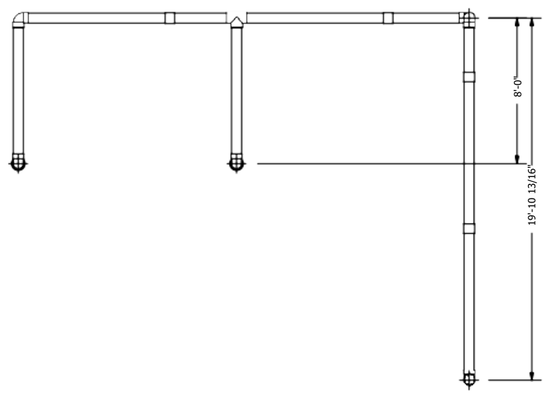
REV A



PLAN VIEW
SCALE 1 : 50



DIGESTATE PIPING
DIGESTATE FROM SSD FEED PUMPS REF: D-19, D-20, D-21
SCALE 1 : 40



SECTION A
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-201-Dewatering&Digestate.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

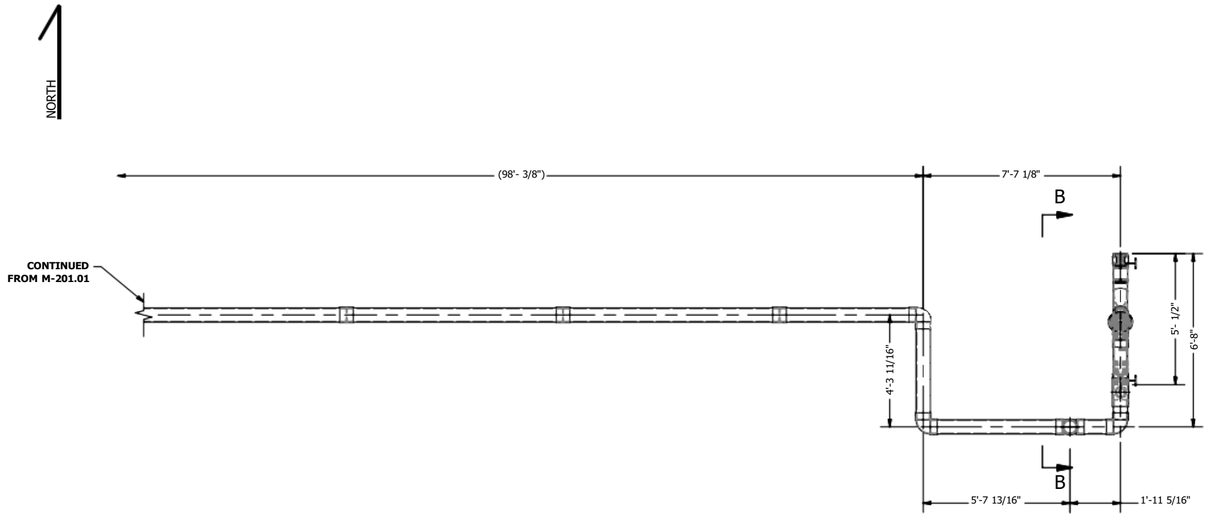
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-200
PROJECT NO.:	200902
SCALE:	AS NOTED

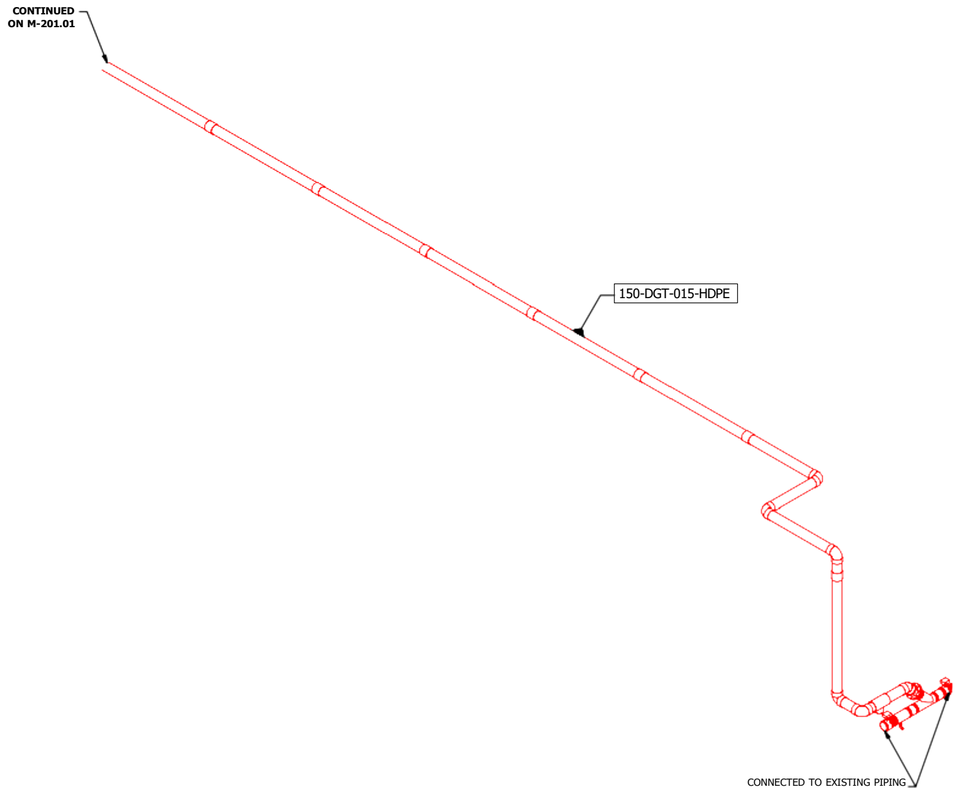
PETAWAWA

DEWATERING BUILDING DIGESTATE

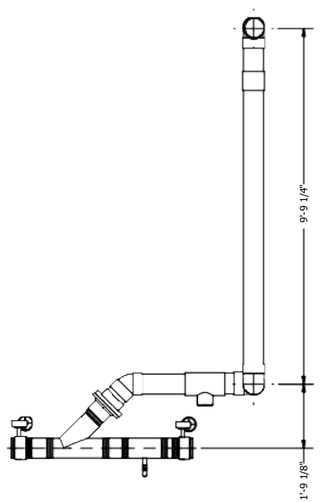
DRAWING NUMBER
M-201.01
REV
A



PLAN VIEW
SCALE 1 : 35



DIGESTATE PIPING
DIGESTATE FROM SSD FEED PUMPS REF: D-19, D-20, D-21
SCALE 1 : 50



SECTION B
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-201- Dewatering&Digestate.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

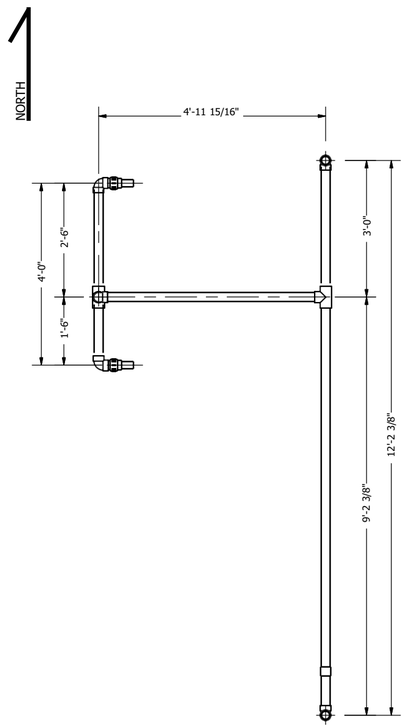
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	
REFERENCE#:	GA-201
PROJECT NO.:	200902
SCALE:	

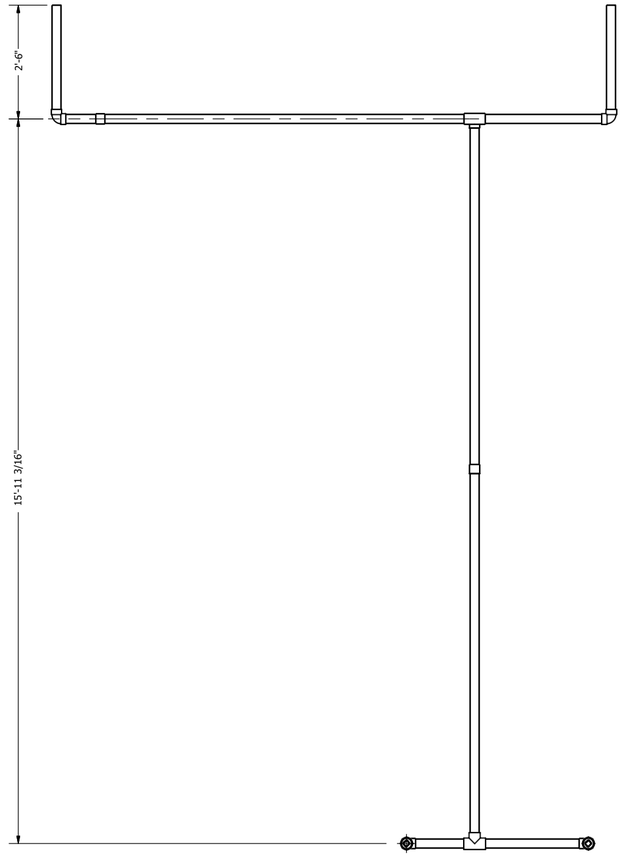
PETAWAWA

SLUDGE HOLDING TANK GALLERY DIGESTATE

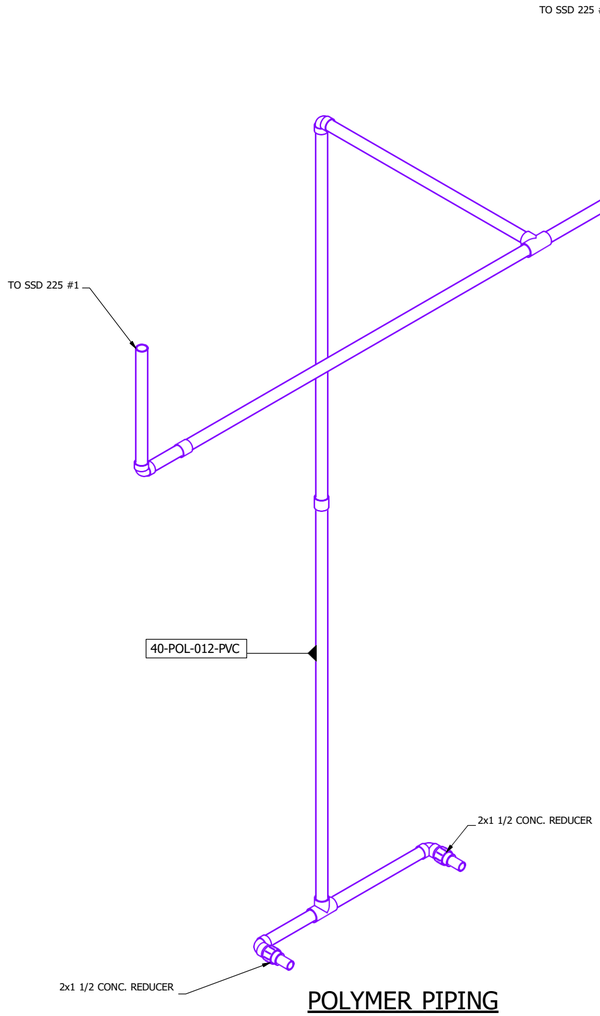
DRAWING NUMBER
M-201.02
REV
A



PLAN VIEW
SCALE 1 : 20



ELEVATION
SCALE 1 : 20



POLYMER PIPING
SSD POLYMER SOLUTION REF: D-04, D-20, D-21
SCALE 1 : 15

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-202-Dewatering&Polymer.dwg 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-15

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

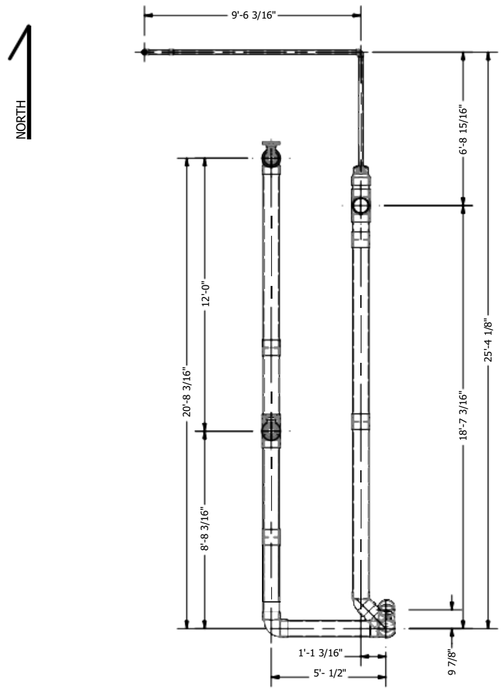
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-200
PROJECT NO.:	200902
SCALE:	AS NOTED

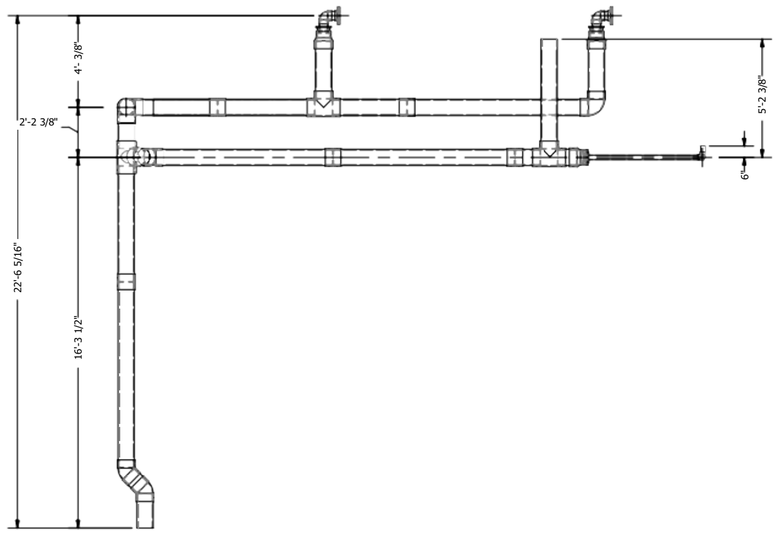
PETAWAWA

DEWATERING BUILDING POLYMER

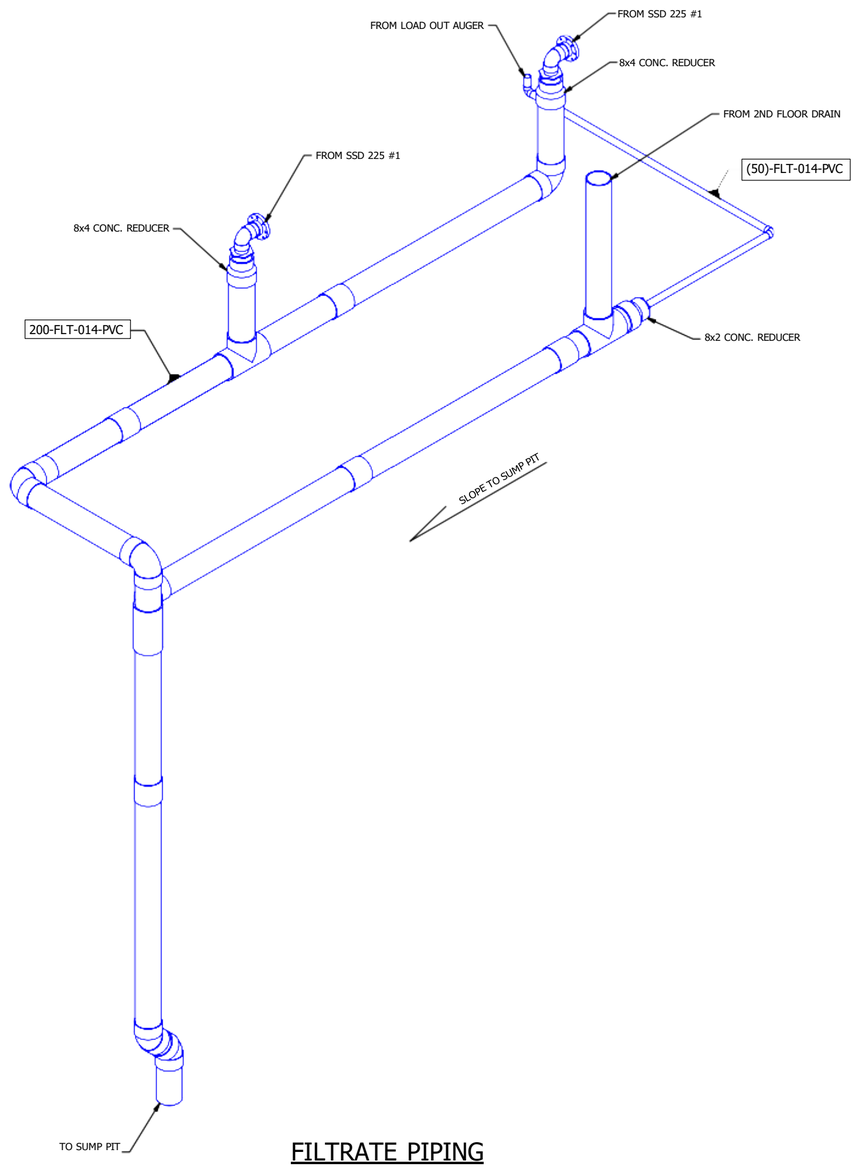
DRAWING NUMBER
M-202
REV A



PLAN VIEW
SCALE 1 : 40



EAST ELEVATION VIEW
SCALE 1 : 40



FILTRATE PIPING
FILTRATE FROM SSDS REF: D-20, D-21, D23
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-203-Dewatering&Filtrate.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

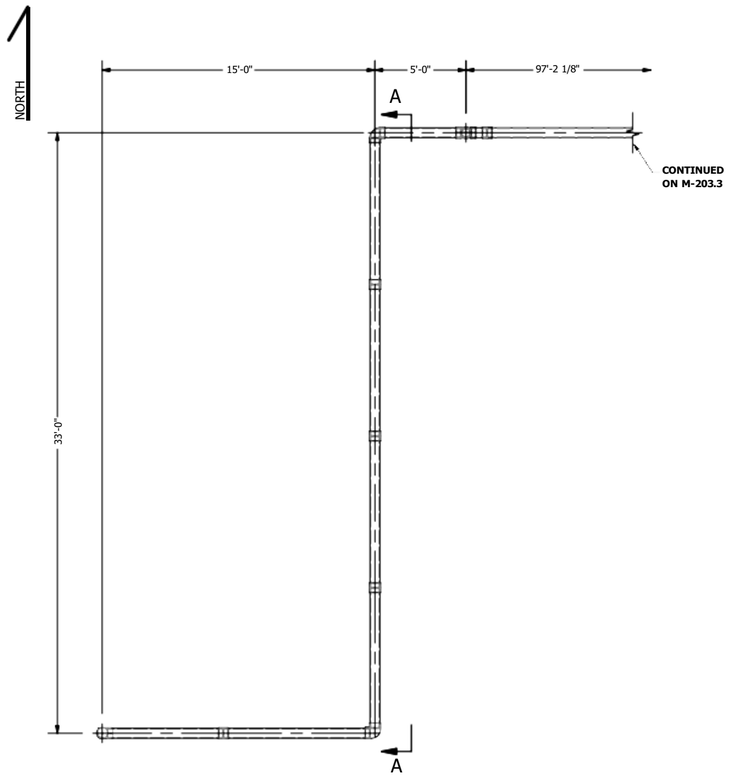
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-200
PROJECT NO.:	200902
SCALE:	AS NOTED

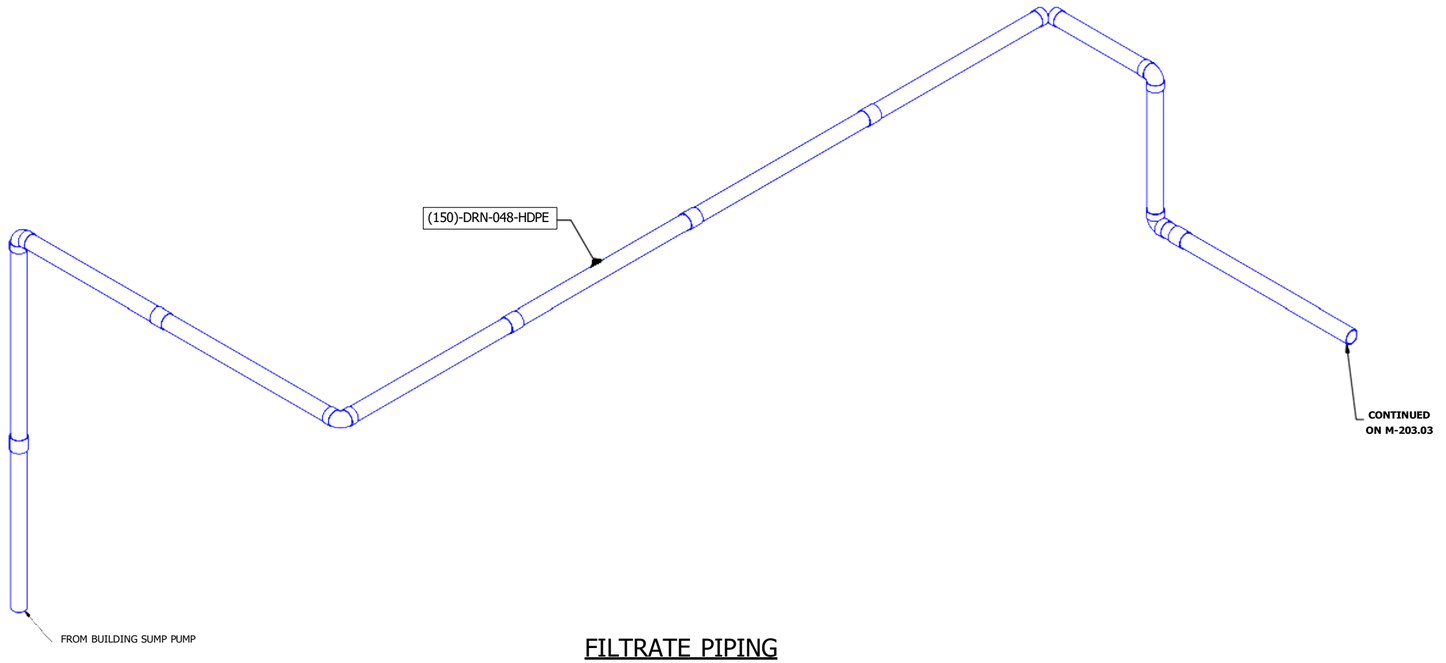
PETAWAWA

DEWATERING BUILDING FILTRATE

DRAWING NUMBER
M-203.01
REV A



PLAN VIEW
SCALE 1 : 50



FILTRATE PIPING
FILTRATE FROM DEWATERING BUILDING SUMP PIT REF: D-23
SCALE 1 : 30

SECTION A
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-203-Dewatering&Filtrate.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

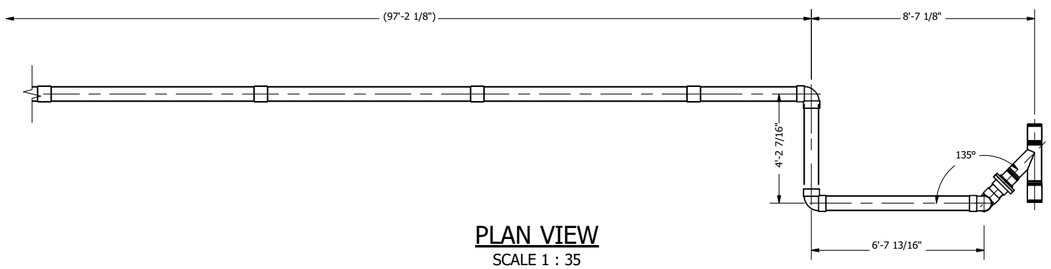
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-200
PROJECT NO.:	200902
SCALE:	AS NOTED

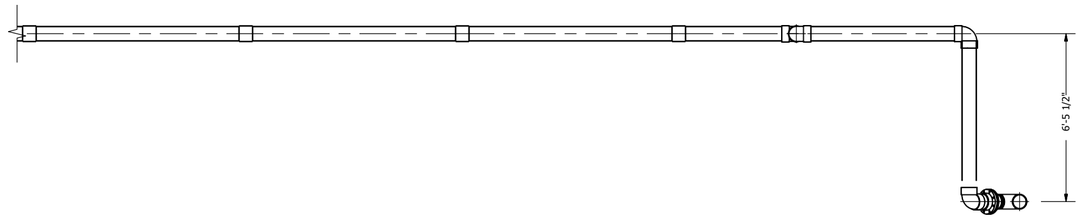
PETAWAWA

DEWATERING BUILDING FILTRATE

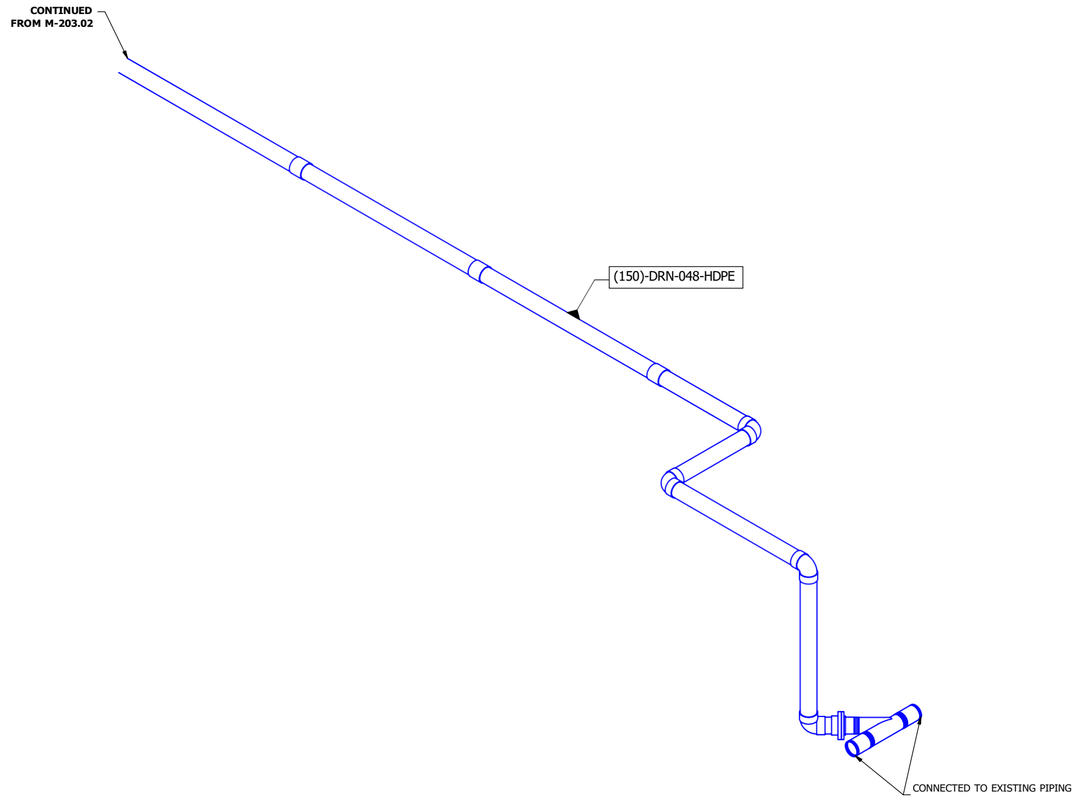
DRAWING NUMBER
M-203.02
REV A



PLAN VIEW
SCALE 1 : 35



ELEVATION
SCALE 1 : 35



FILTRATE PIPING
FILTRATE FROM DEWATERING BUILDING SUMP PIT REF: D-23
SCALE 1 : 30

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-203-Dewatering&Filtrate.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

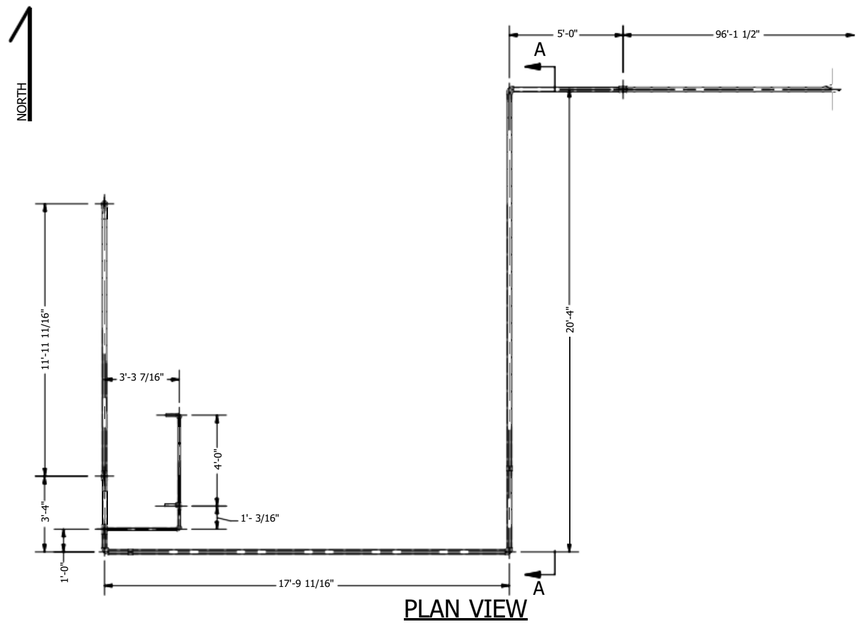
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-201
PROJECT NO.:	200902
SCALE:	AS NOTED

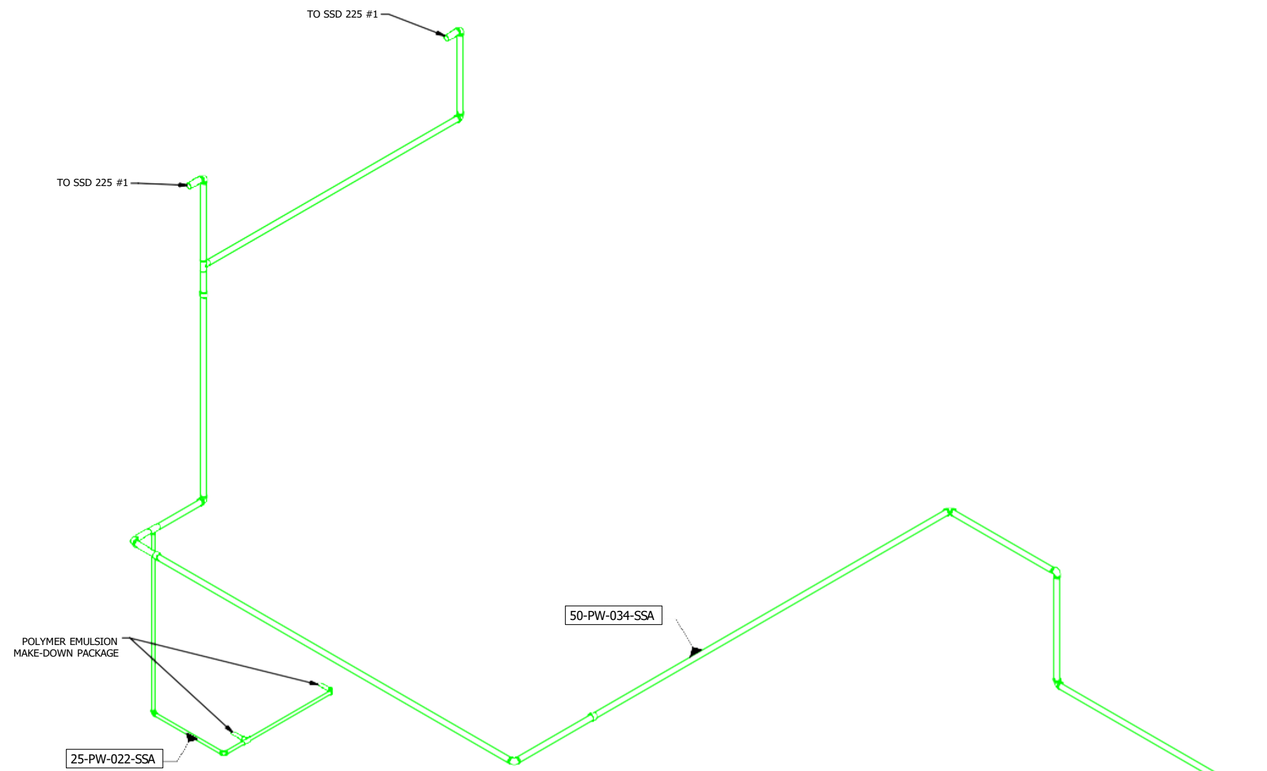
PETAWAWA

SLUDGE HOLDING TANK GALLERY FILTRATE

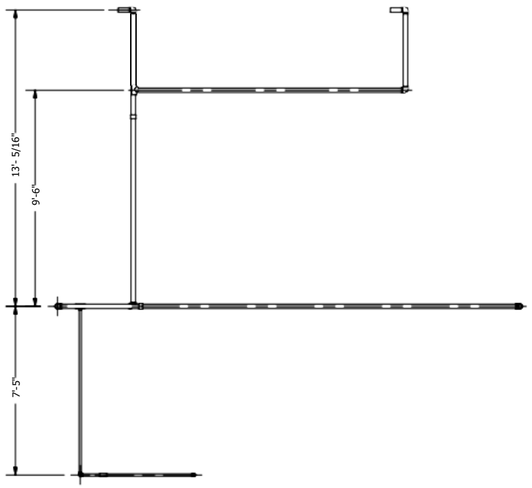
DRAWING NUMBER
M-203.03
REV
A



PLAN VIEW
SCALE 1 : 40



PLANT WATER PIPING
SCALE 1 : 30



SECTION A
SCALE 1 : 40

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-204-Dewatering&PlantWater.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	WMcE		2021-01-21

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

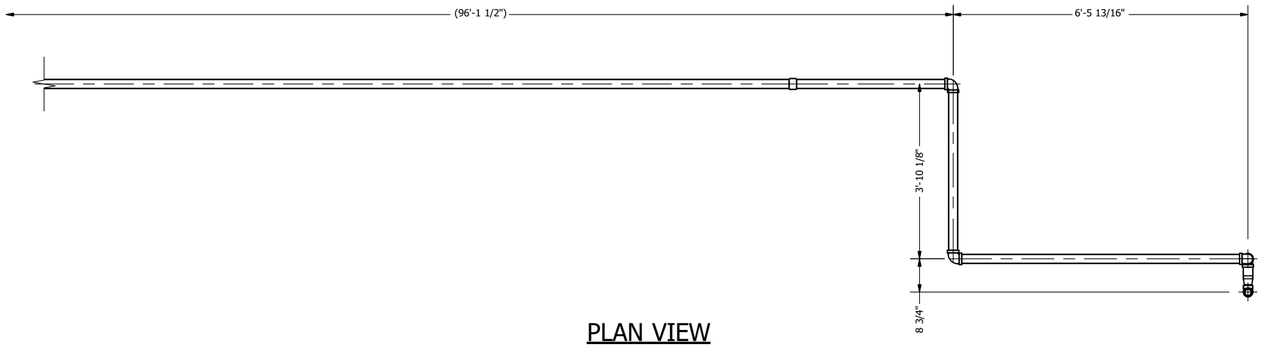
DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-200
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

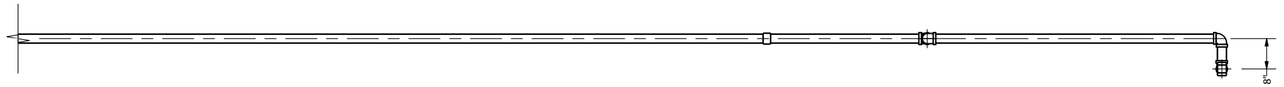
DEWATERING BUILDING PW

DRAWING NUMBER
M-204.01
REV
A

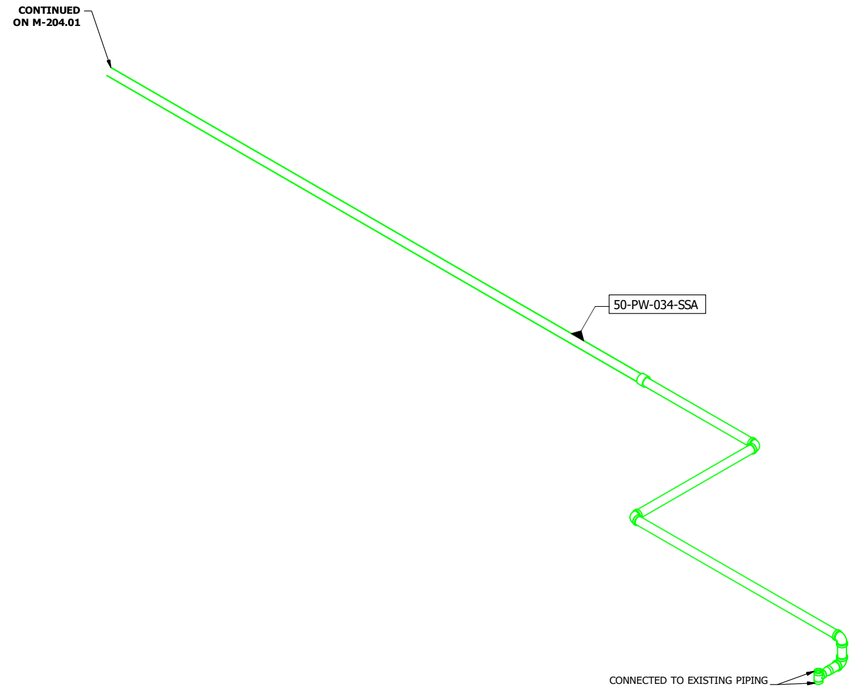
NORTH



PLAN VIEW
SCALE 1 : 20



ELEVATION
SCALE 1 : 20



PLANT WATER PIPING
SCALE 1 : 20

DRAWING NOTES:
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2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-204- Dewatering& PlantWater.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	~~PRELIMINARY~~	~~WMcE~~		~~2021-01-21~~

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	WMcEwan
DRAWN:	WMcEwan
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-201
PROJECT NO.:	200902
SCALE:	AS NOTED

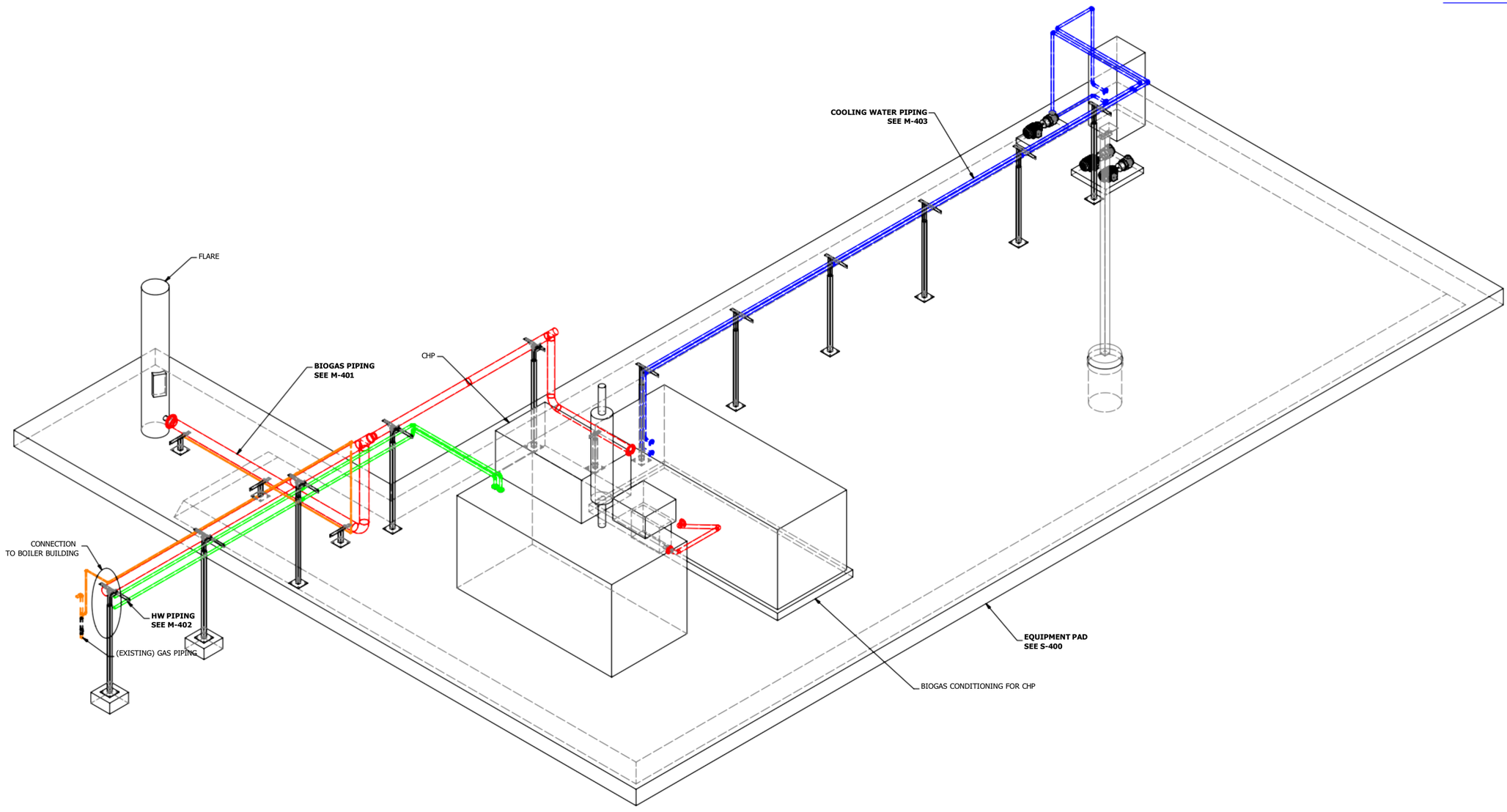
PETAWAWA

SLUDGE HOLDING TANK GALLERY PW

DRAWING NUMBER
M-204.02
REV
A

LEGEND

- BIOGAS PIPING
- NATURAL GAS PIPING
- HOT WATER (SECONDARY CIRCUT)
- COOLING WATER



PHASE 1 BUILD - ISO VIEW

SOUTH EAST CORNER

SCALE 1 : 50

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-400 - Gas Conditioning&CHP Area.idw 2021-01-11

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS Rosebush Wilson

DESIGNED: SWilson
DRAWN: SWilson
CHECKED:
APPROVED: Approved By
REFERENCE#:
PROJECT NO.: 200902
SCALE: AS NOTED

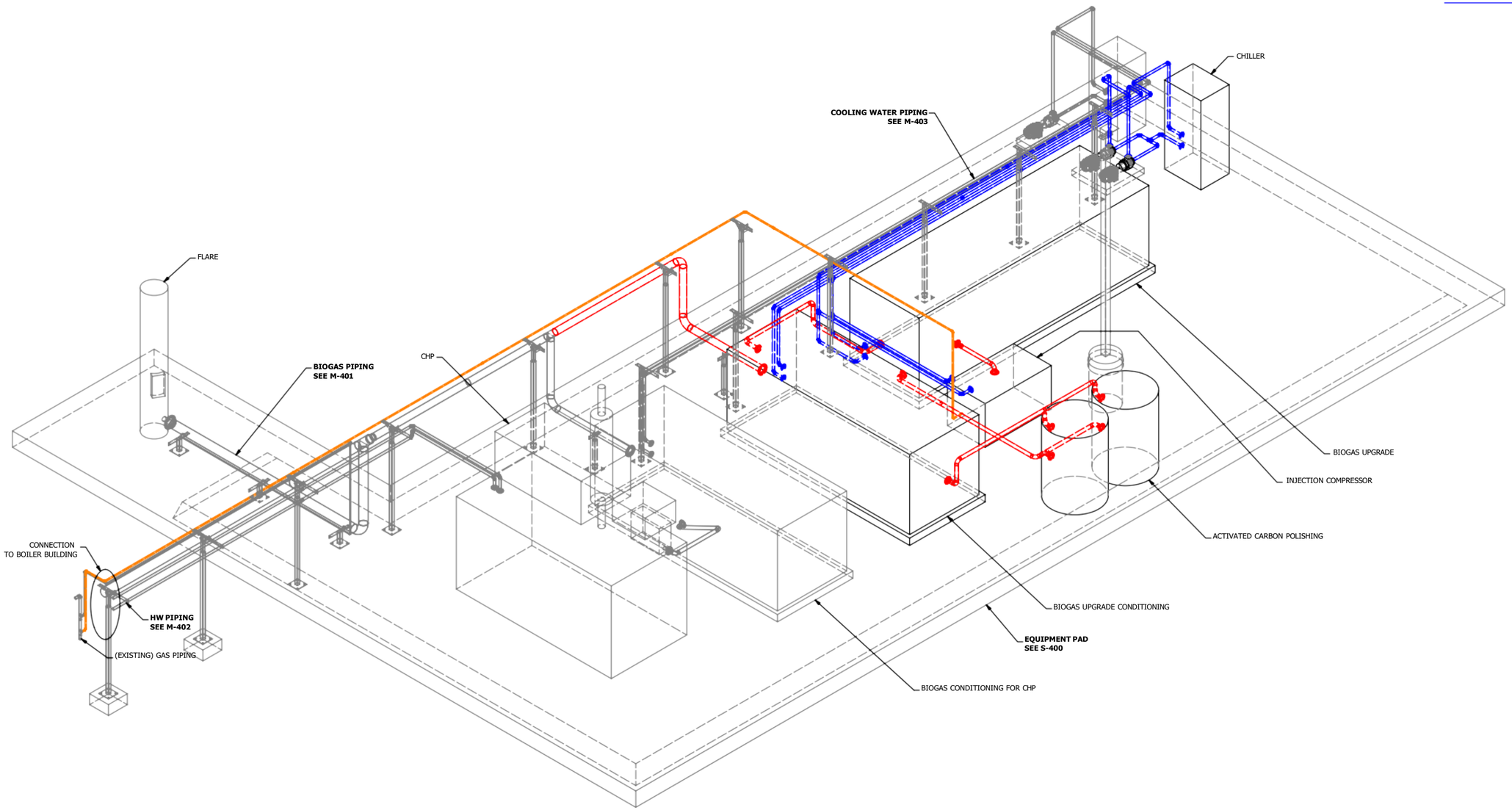
PETAWAWA

GAS CONDITIONING & CHP AREA

DRAWING NUMBER
GA-400.1
REV
A

LEGEND

- BIOGAS PIPING
- NATURAL GAS PIPING
- HOT WATER (SECONDARY CIRCUT)
- COOLING WATER



PHASE 2 BUILD-OUT - ISO VIEW

SOUTH EAST CORNER

SCALE 1 : 50

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-400 - Gas Conditioning& CHP Area.idw 2021-01-11

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

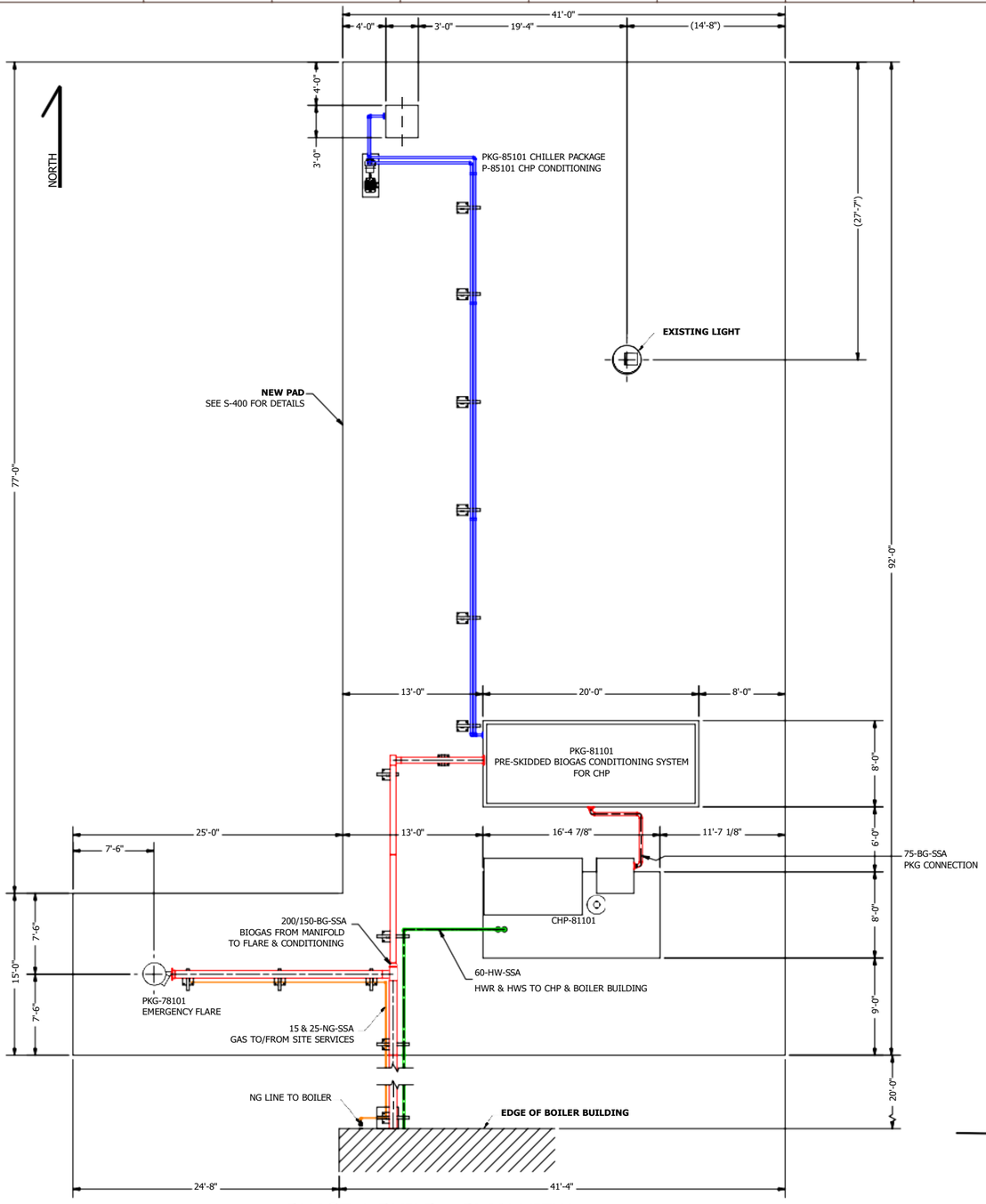
PETAWAWA

GAS CONDITIONING & CHP AREA

DRAWING NUMBER

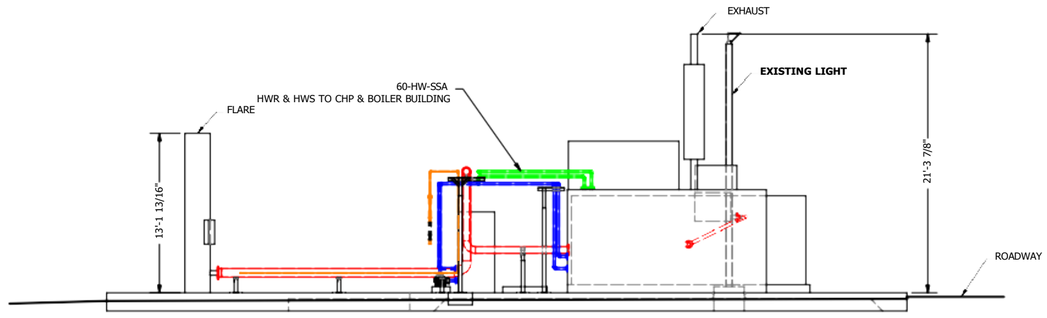
GA-400.2

REV A



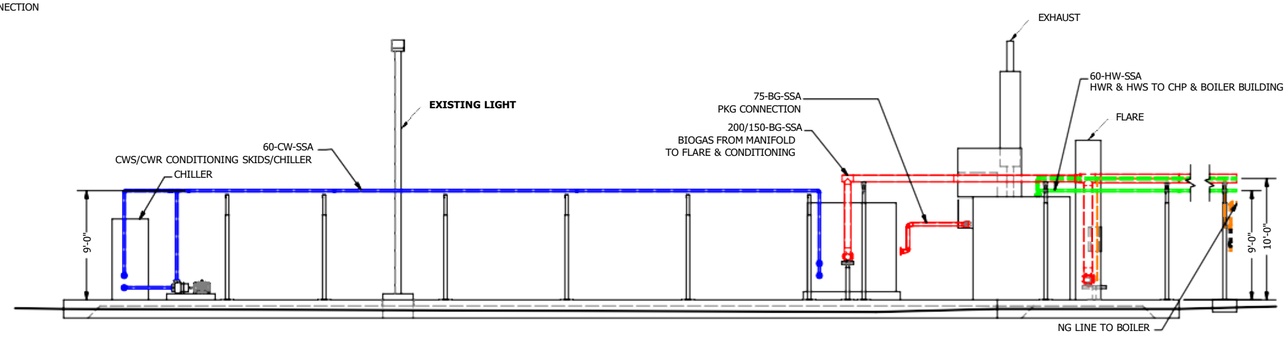
PHASE 1 BUILD - PLAN VIEW

SCALE 1 : 75



SOUTH ELEVATION

SCALE 1 : 75



WEST ELEVATION

SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-400 - Gas Conditioning & CHP Area.idw 2021-01-11

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia

Breaking Barriers to Sustainability

JDM DESIGNWORKS

Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

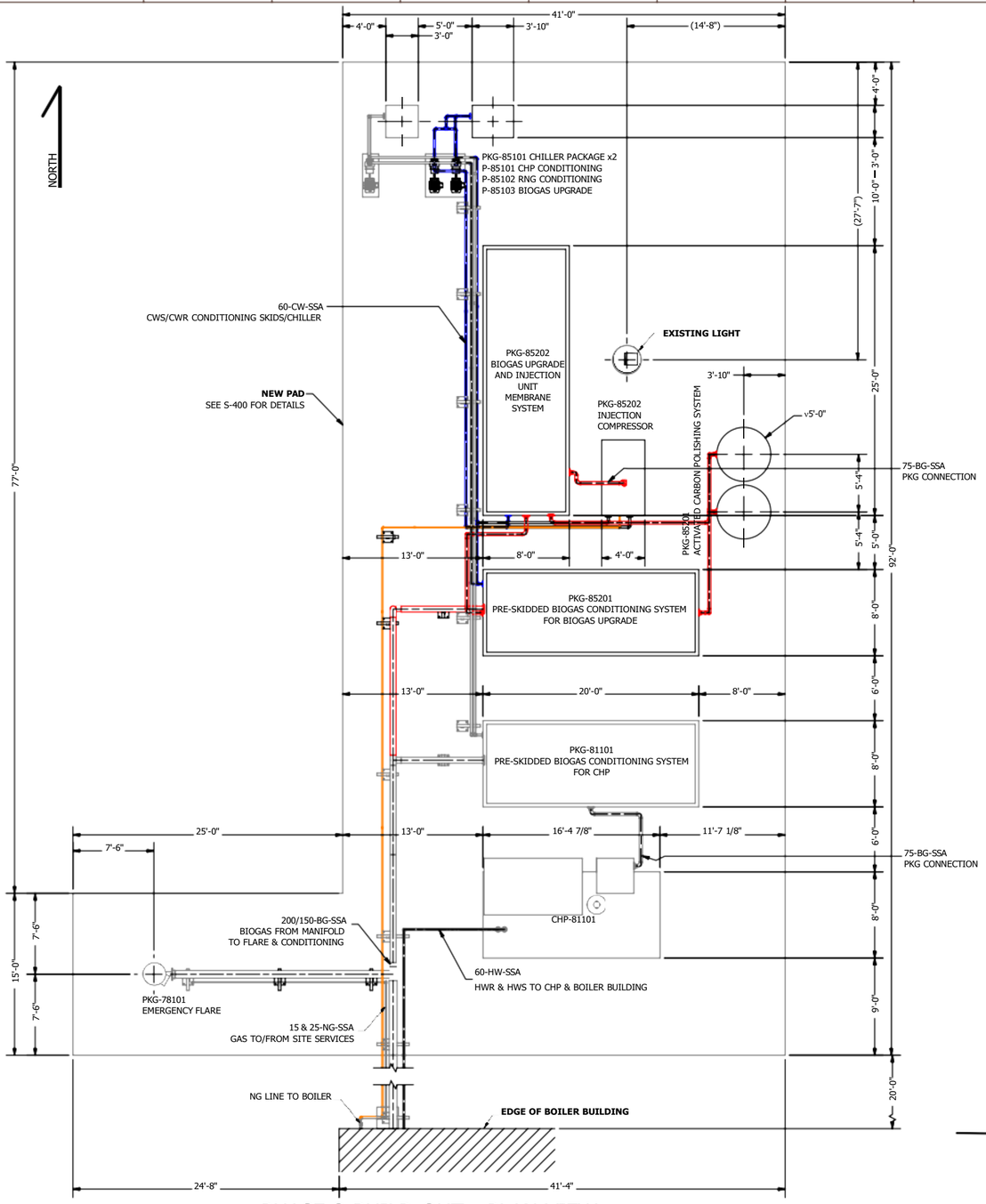
PETAWAWA

GAS CONDITIONING & CHP AREA

DRAWING NUMBER

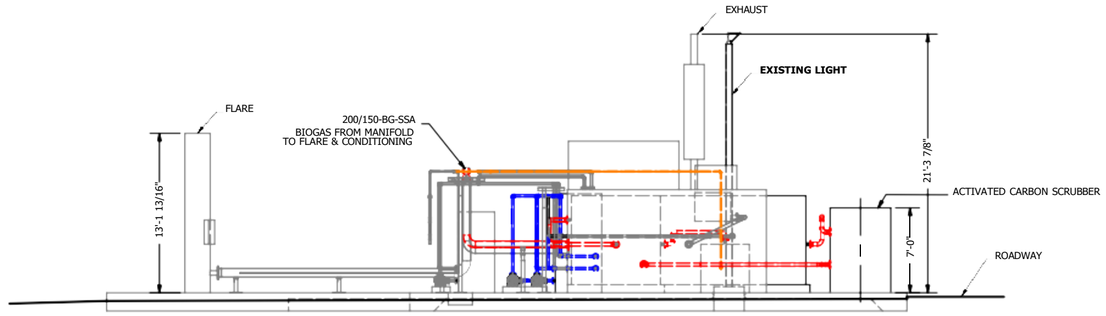
GA-400.3

REV A



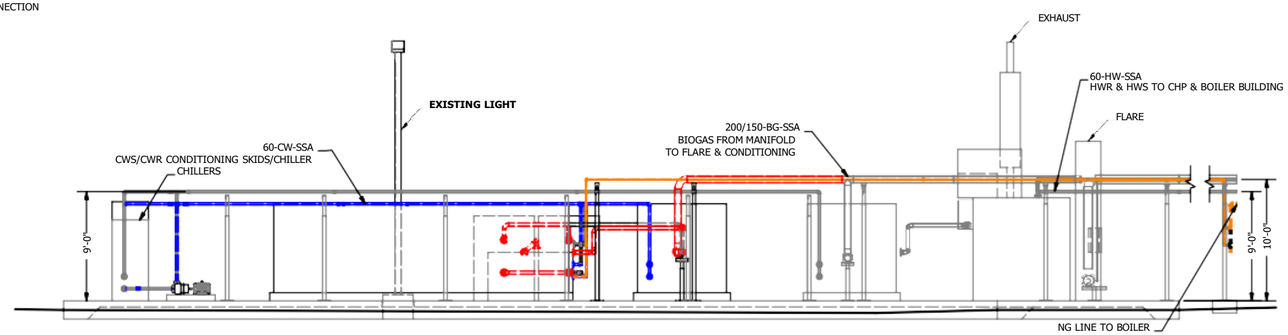
PHASE 2 BUILD-OUT - PLAN VIEW

SCALE 1 : 75



SOUTH ELEVATION

SCALE 1 : 75



WEST ELEVATION

SCALE 1 : 75

PRELIMINARY - NOT FOR CONSTRUCTION

200902-GA-400 - Gas Conditioning & CHP Area.idw 2021-01-11

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	
PROJECT NO.:	200902
SCALE:	AS NOTED

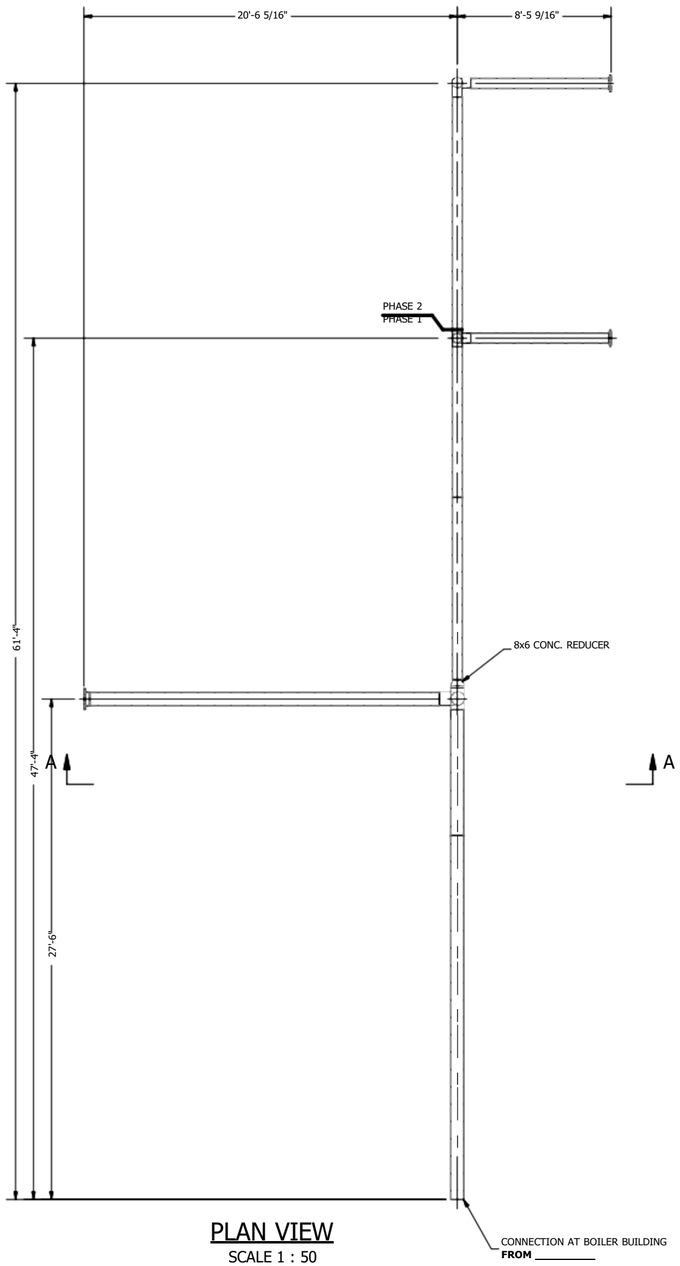
PETAWAWA

GAS CONDITIONING & CHP AREA

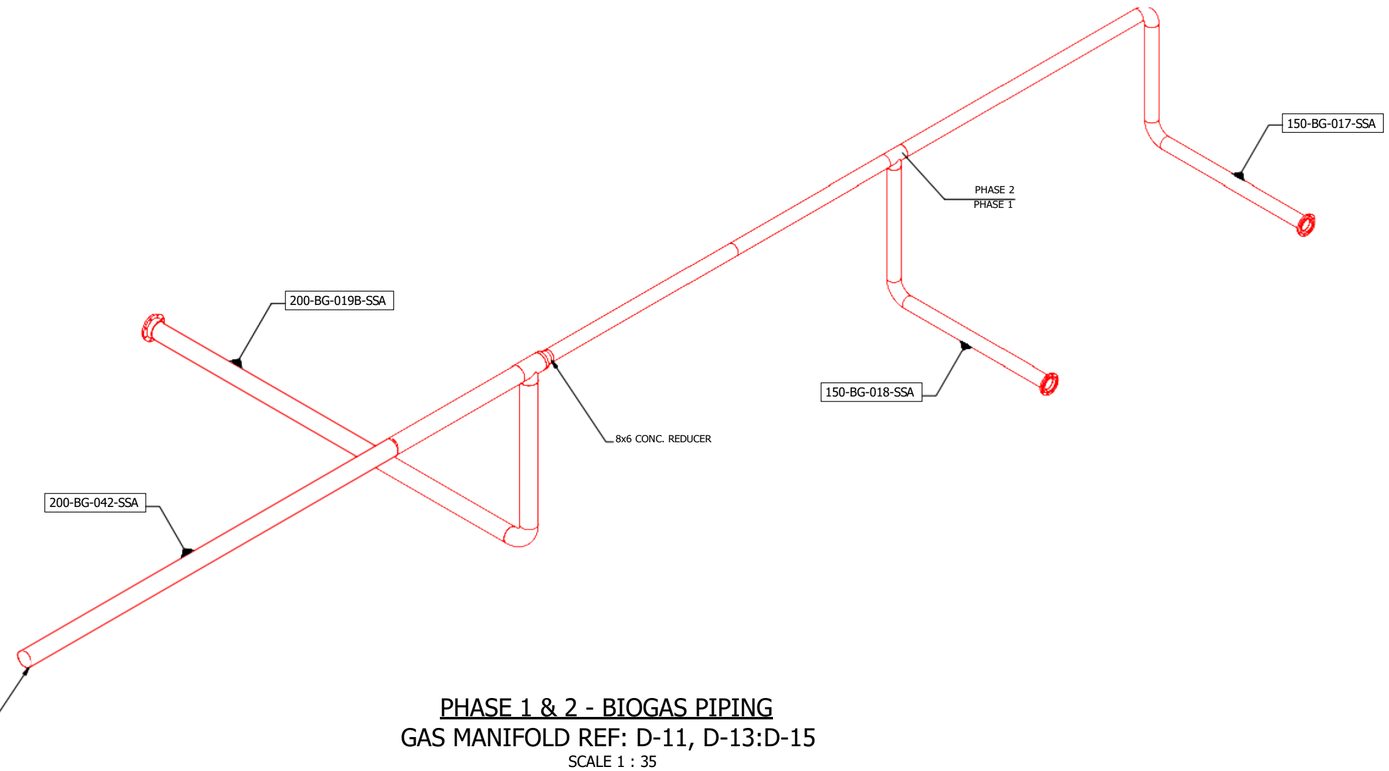
DRAWING NUMBER

GA-400.4

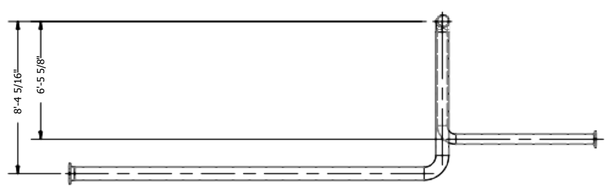
REV A



PLAN VIEW
SCALE 1 : 50



PHASE 1 & 2 - BIOGAS PIPING
GAS MANIFOLD REF: D-11, D-13:D-15
SCALE 1 : 35



SECTION A-A
SCALE 1 : 50

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
3. READ THIS DRAWING PACKAGE IN CONJUNCTION WITH P&ID'S, INSTRUMENTATION LIST(S), VALVE LIST(S) AND PIPING SPECIFCATIONS.
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-401-Gas Conditioning&CHPPiping.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
~~A~~	~~PRELIMINARY~~	~~SW~~		~~2021-01-12~~

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

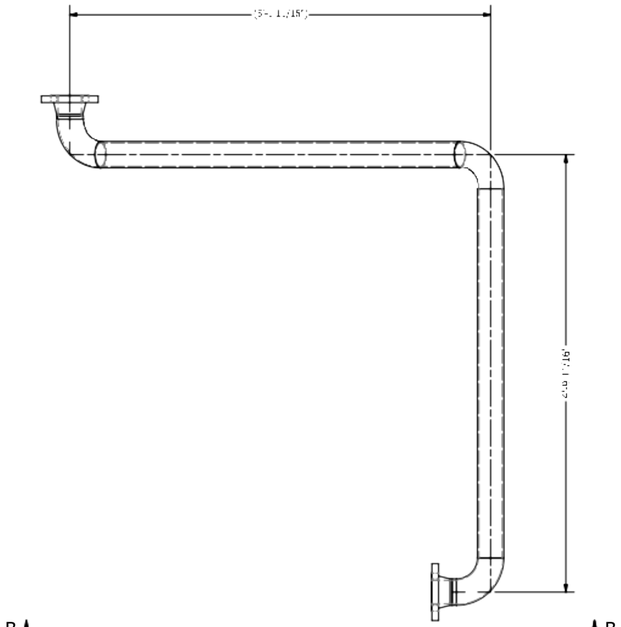
JDM DESIGNWORKS
Rosebush Wilson
ENGINEERING PROJECT MANAGEMENT

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

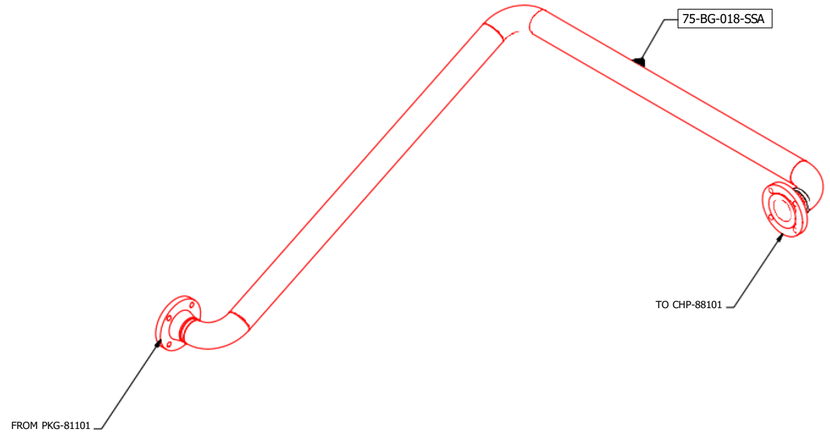
PETAWAWA

GAS CONDITIONING & CHP BIOGAS PIPING

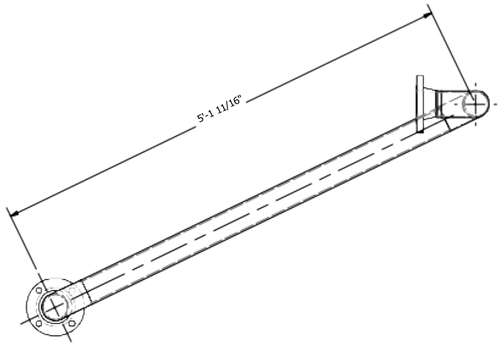
DRAWING NUMBER
M-401.1
REV
A



PLAN VIEW
SCALE 1 : 10



PHASE 1 - CHP BIOGAS
CONDITIONED GAS FOR CHP REF: D-14, D-17
SCALE 1 : 10



SECTION B-B
SCALE 1 : 10

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-401- Gas Conditioning&CHPPiping.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-12

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

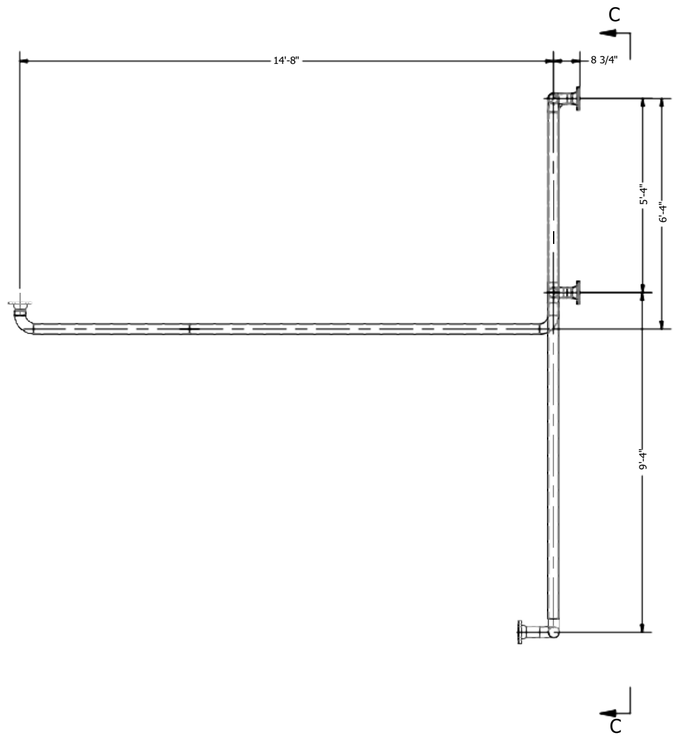
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

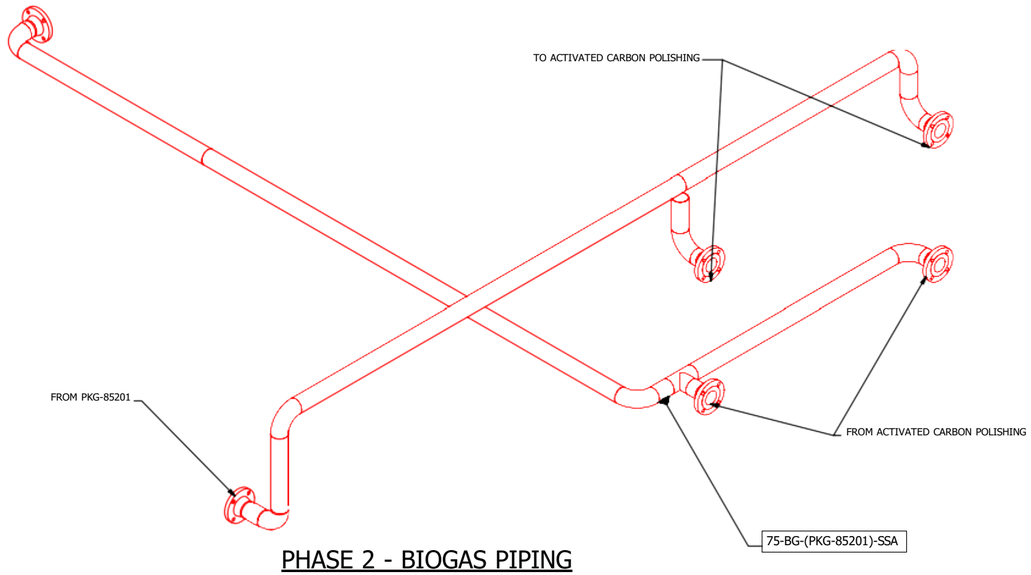
PETAWAWA

GAS CONDITIONING & CHP BIOGAS PIPING

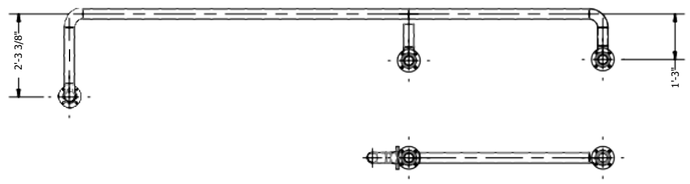
DRAWING NUMBER
M-401.2
REV
A



PLAN VIEW
SCALE 1 : 25



PHASE 2 - BIOGAS PIPING
GAS CONDITIONING REF: D-14, D-15
SCALE 1 : 15



VIEW C
SCALE 1 : 25

DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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4. NOT ALL PIPE CONNECTIONS, VALVES, AND INSTRUMENTATION MAY BE SHOWN. ANY FITTING INDICATED ON THE DRAWING IS THERE FOR REFERENCE ONLY. READ IN CONJUNCTION WITH ALL DOCUMENTATION.
5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-401-Gas Conditioning&CHPPiping.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-12

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

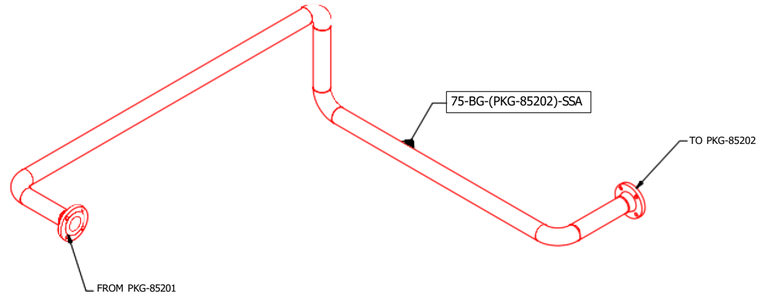
JDM DESIGNWORKS Rosebush Wilson

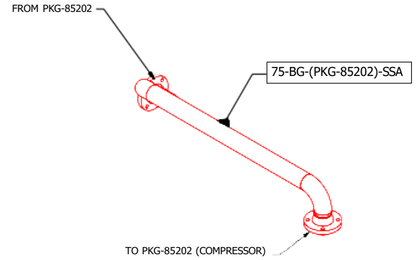
DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

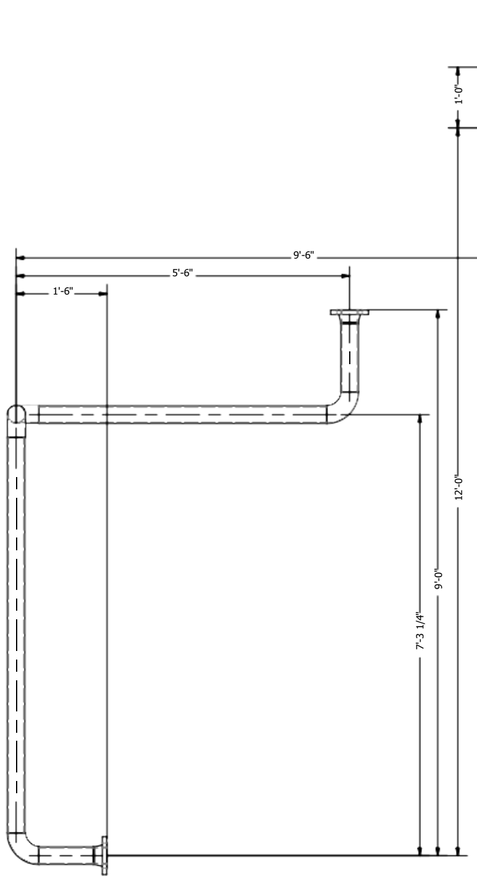
GAS CONDITIONING & CHP BIOGAS PIPING

DRAWING NUMBER
M-401.3
REV A

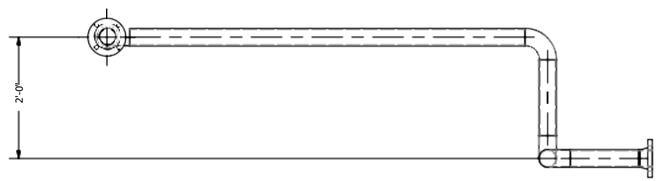




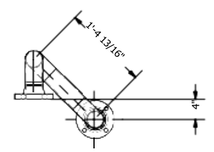
PHASE 2 - BIOGAS PIPING
UPGRADE AND INJECTION REF: D-18
SCALE 1 : 15



PLAN VIEW
SCALE 1 : 15



SECTION D-D
SCALE 1 : 15



DRAWING NOTES:
1. SEE GENERAL NOTES AND PROJECT SCOPE FOR ADDITIONAL DETAILS
2. DRAWINGS ARE FOR ILLUSTRATION ONLY. NOT FOR CONSTRUCTION. FINAL DRAWINGS MAY DIFFER.
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5. PIPE MUST BE SUPPORTED PER CODE. PIPE SUPPORTS NOT SHOWN.
6. ALL WORK TO BE DONE PER APPLICABLE CODE(S).

PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-401 - Gas Conditioning&CHPPiping.idw 2021-01-12

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-12

ATTENTION: 0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia — Breaking Barriers to Sustainability

JDM DESIGNWORKS — Rosebush Wilson

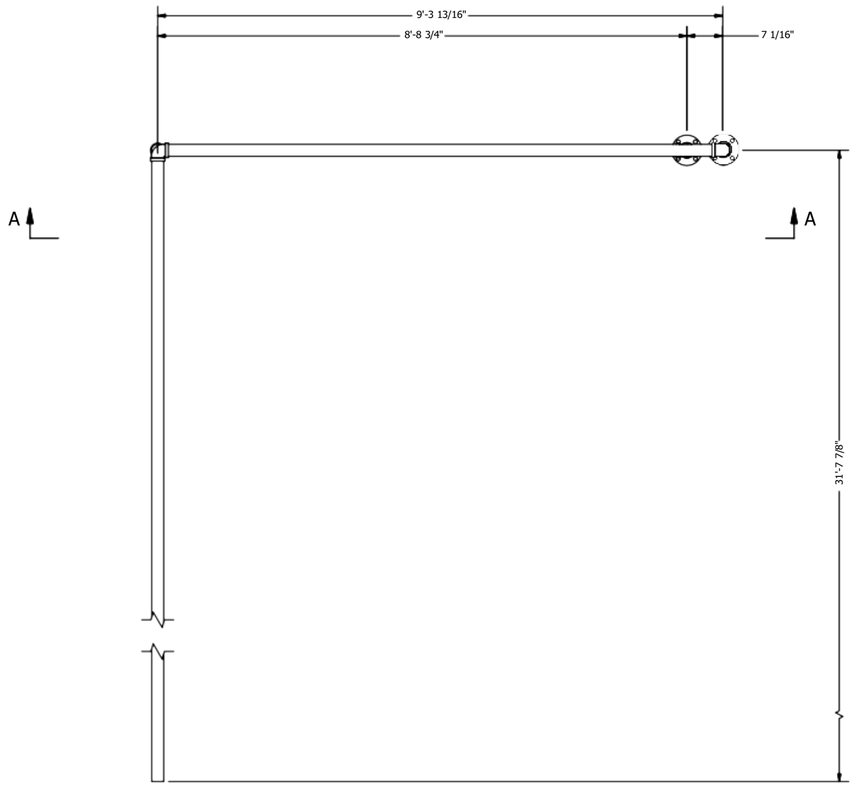
DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

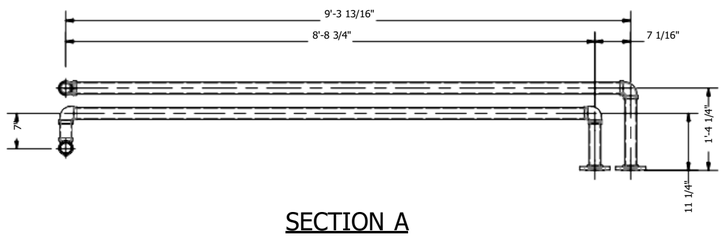
GAS CONDITIONING & CHP BIOGAS PIPING

DRAWING NUMBER: M-401.4

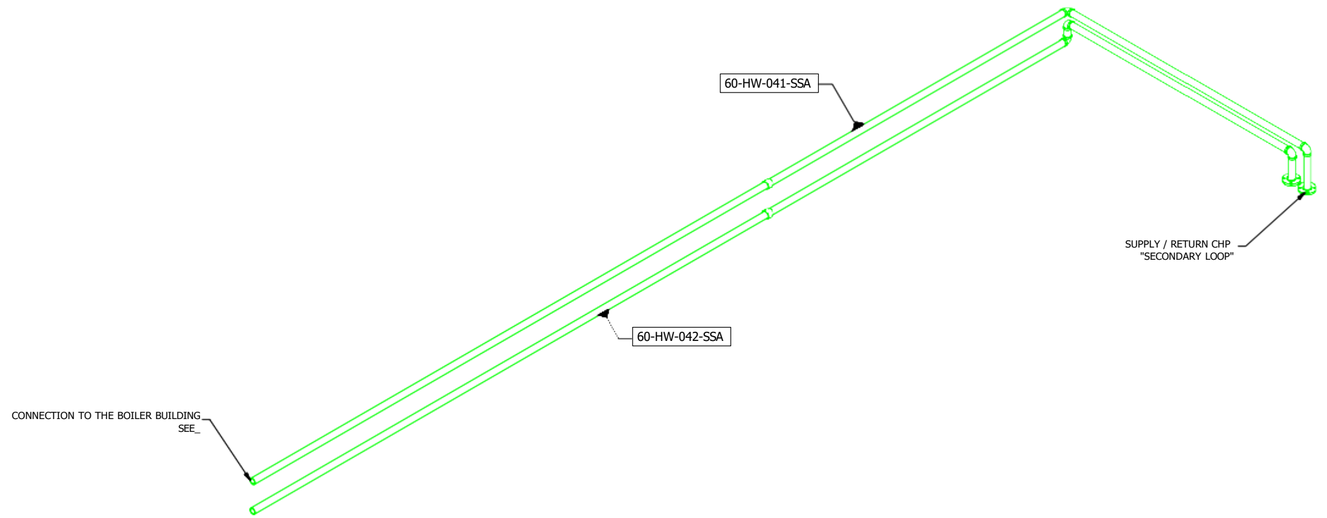
REV: A



PLAN VIEW
SCALE 1 : 15



SECTION A
SCALE 1 : 15



HOT WATER PIPING
REF: D-17
SCALE 1 : 25

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-402-Gas Conditioning & CHP HWS_HWR Piping.idw 2021-01-14

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY			2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or ½" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

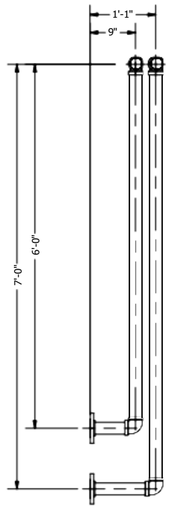
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

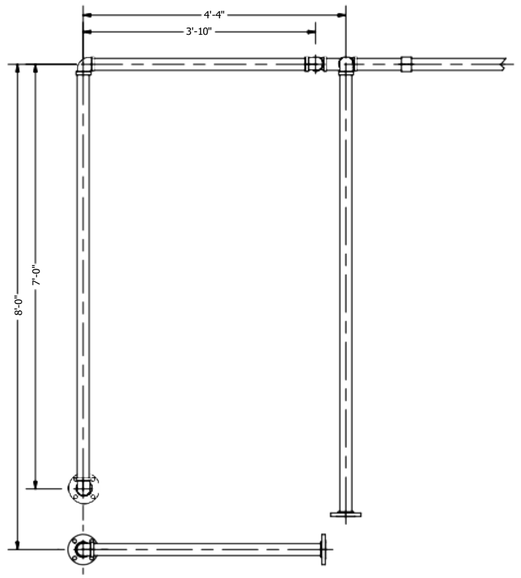
PETAWAWA

GAS CONDITIONING & CHP HWR/HWS PIPING

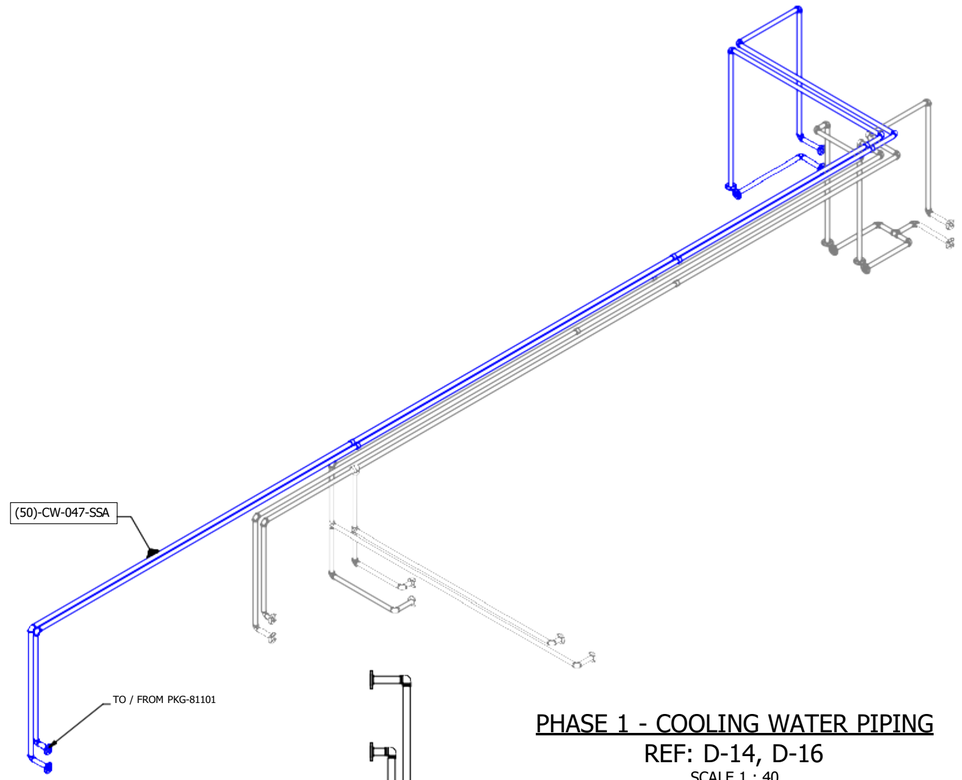
DRAWING NUMBER
M-402
REV
A



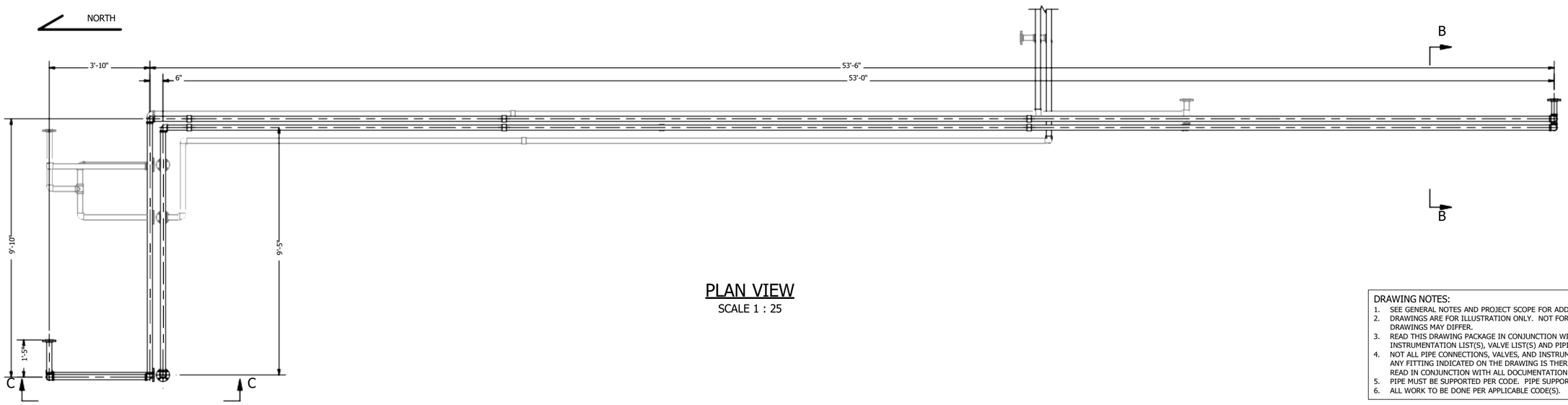
SECTION B-B
SCALE 1 : 15



SECTION C-C
SCALE 1 : 15



PHASE 1 - COOLING WATER PIPING
REF: D-14, D-16
SCALE 1 : 40



PLAN VIEW
SCALE 1 : 25

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-403 - Gas Conditioning & CHP CW Piping.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" @ 22x34 or 1/2" @ 11x17, THEN DRAWING IS NOT TO SCALE - SCALE ACCORDINGLY

Anaergia
Breaking Barriers to Sustainability

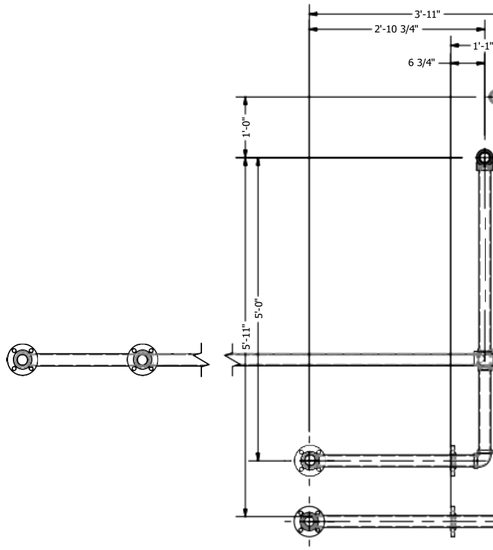
JDM DESIGNWORKS Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

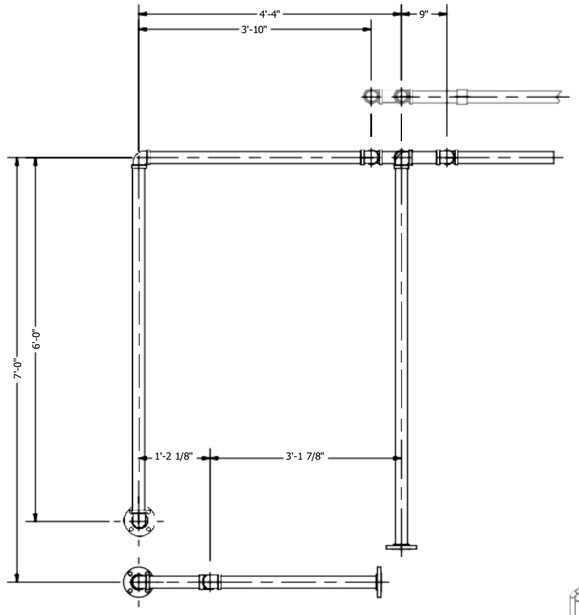
PETAWAWA

GAS CONDITIONING & CHP CW PIPING

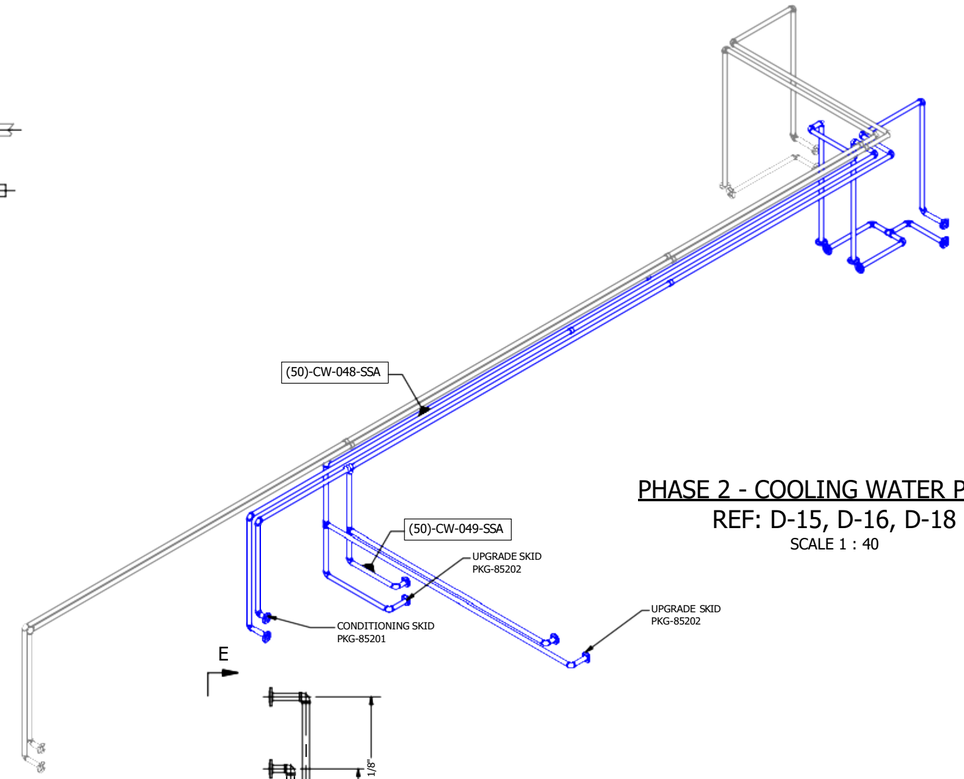
DRAWING NUMBER
M-403.1
REV A



SECTION E-E
SCALE 1 : 15



SECTION F-F
SCALE 1 : 15



PHASE 2 - COOLING WATER PIPING
REF: D-15, D-16, D-18
SCALE 1 : 40

PLAN VIEW
SCALE 1 : 25

NORTH

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-403-GasConditioning&CHPCWPiping.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
A	PRELIMINARY	SW		2021-01-11

ATTENTION: 0 1/2 1
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Anaergia
Breaking Barriers to Sustainability

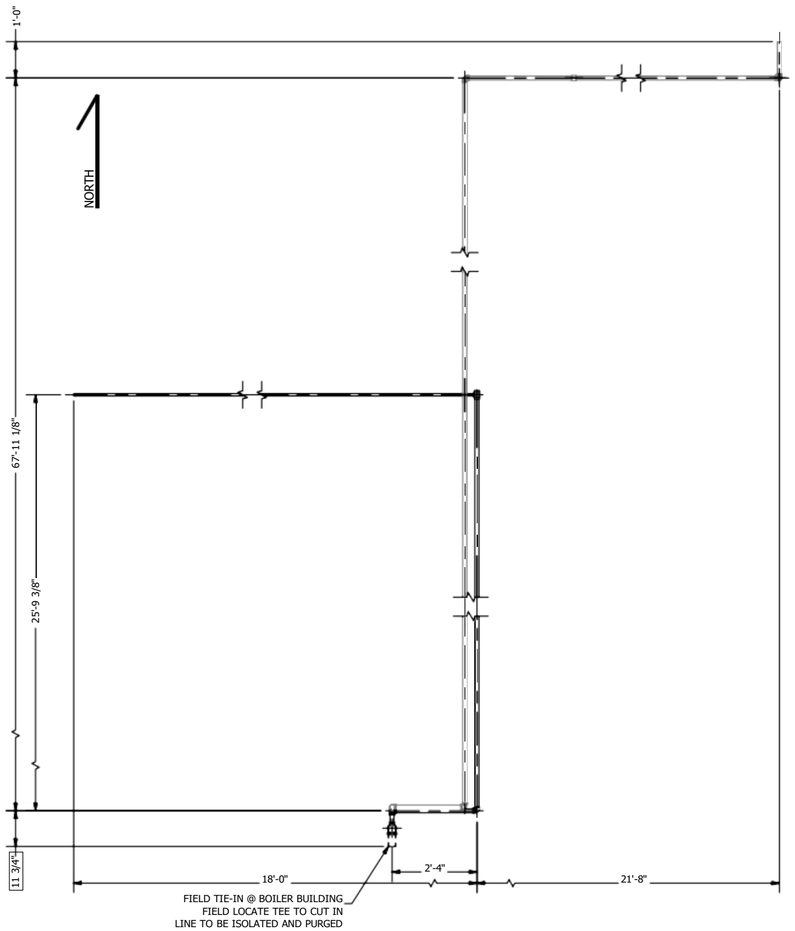
JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

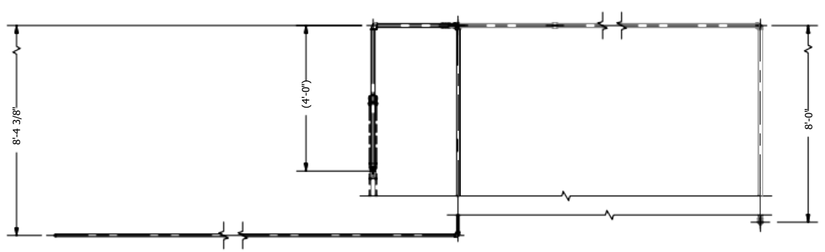
PETAWAWA

GAS CONDITIONING & CHP CW PIPING

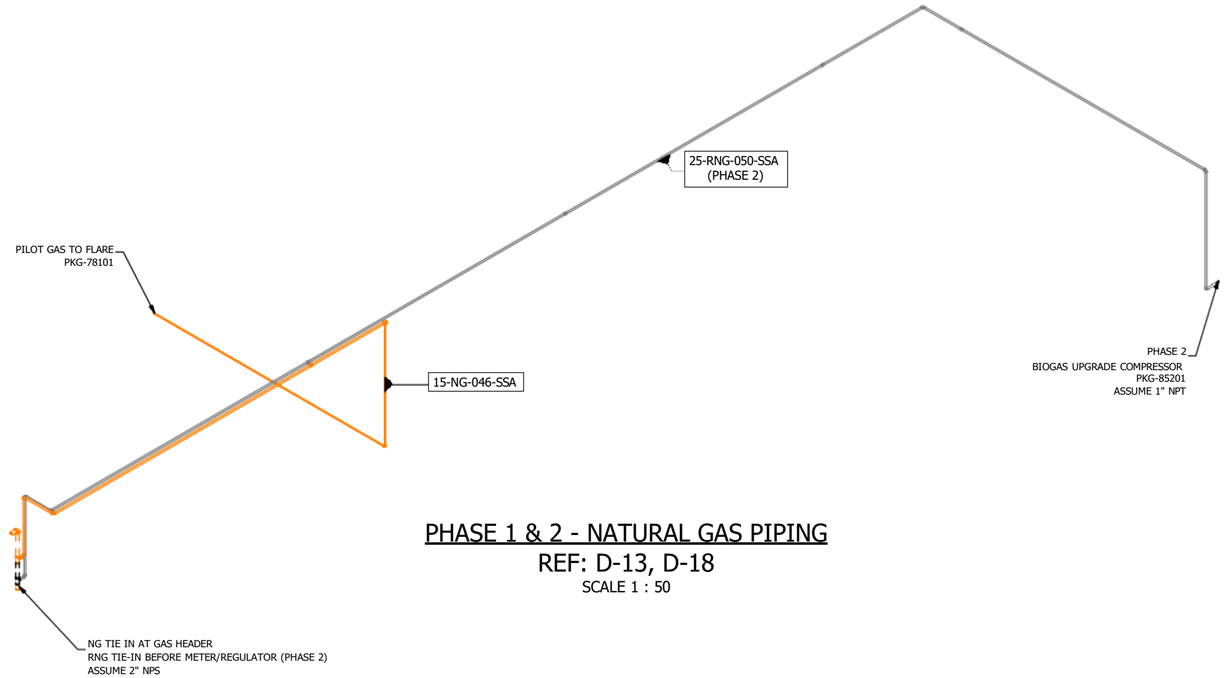
DRAWING NUMBER
M-403.2
REV A



PLAN VIEW
SCALE 1 : 25



SOUTH ELEVATION
SCALE 1 : 25



PHASE 1 & 2 - NATURAL GAS PIPING
REF: D-13, D-18
SCALE 1 : 50

DRAWING NOTES:
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PRELIMINARY - NOT FOR CONSTRUCTION

200902-M-404-Gas Conditioning & CHP NG_RNG Piping.idw 2021-01-15

REV NUM	DESCRIPTION	DRWN BY	CHK'D BY	DATE
~~A~~	~~PRELIMINARY~~	~~SW~~		~~2021-01-11~~

ATTENTION: 0 1/2 1
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Anaergia
Breaking Barriers to Sustainability

JDM DESIGNWORKS
Rosebush Wilson

DESIGNED:	SWilson
DRAWN:	SWilson
CHECKED:	
APPROVED:	Approved By
REFERENCE#:	GA-400
PROJECT NO.:	200902
SCALE:	AS NOTED

PETAWAWA

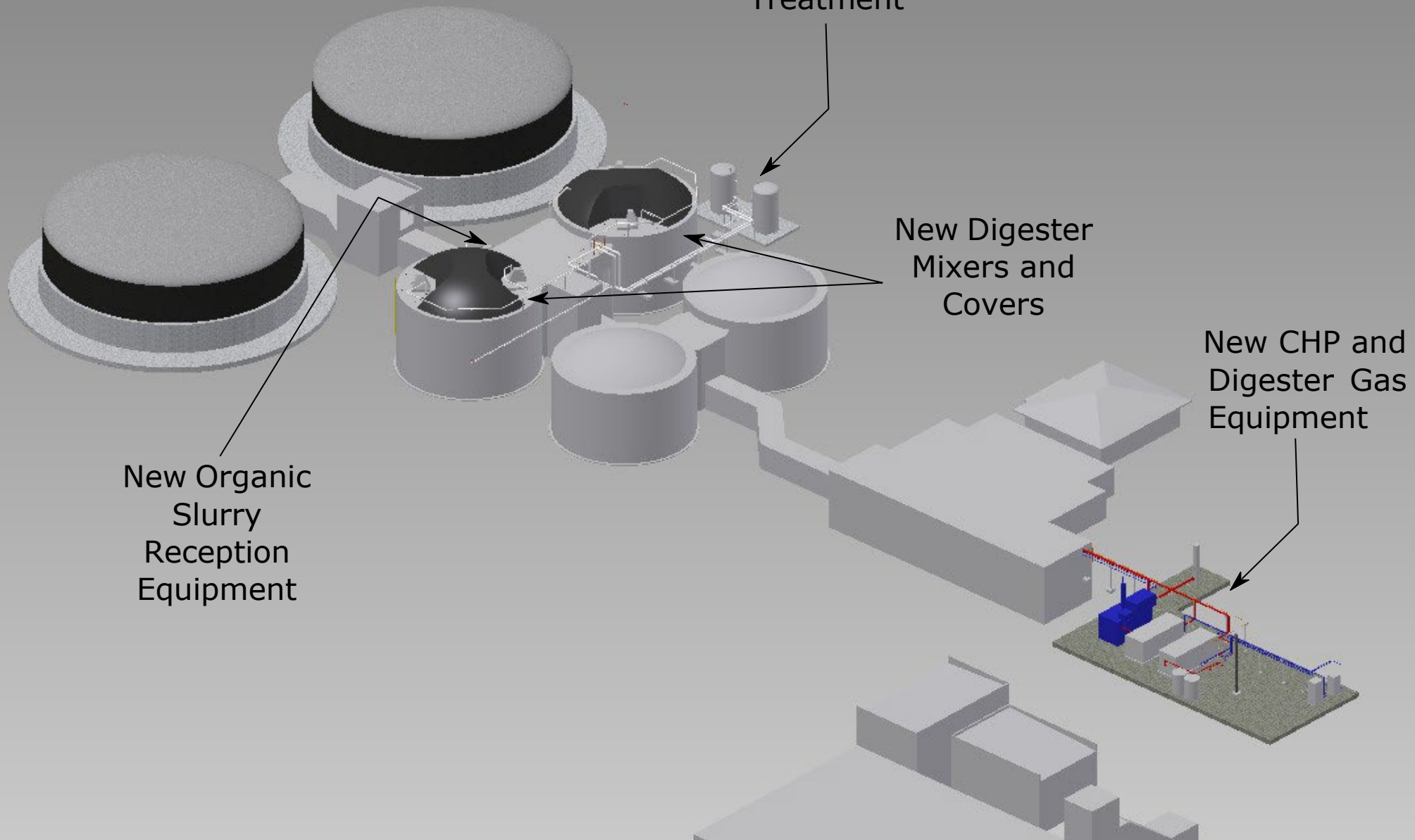
GAS CONDITIONING & CHP NG/RNG PIPING

DRAWING NUMBER
M-404
REV
A

Appendix C: Process Design

Petawawa Net Zero Facility

Phase 0

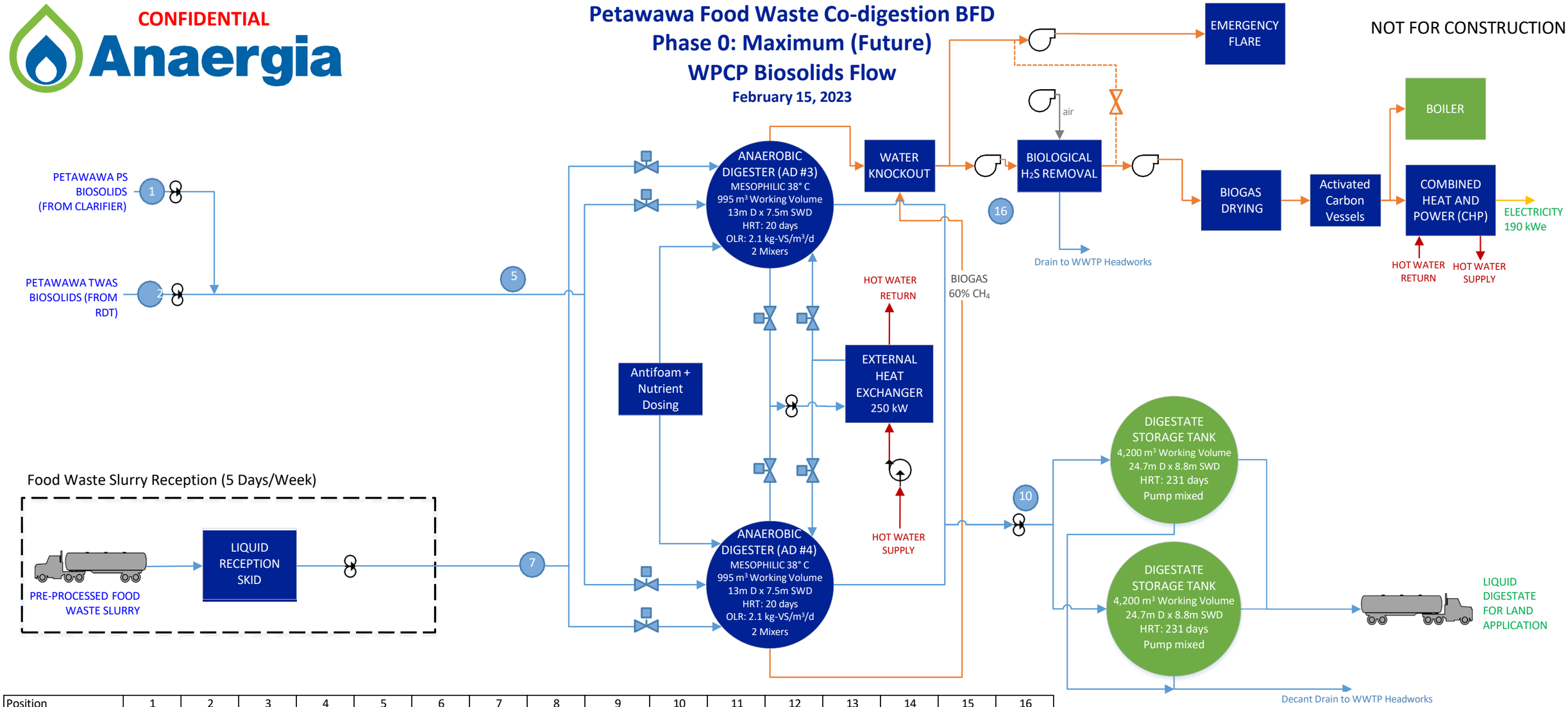


CONFIDENTIAL

Anaergia

Petawawa Food Waste Co-digestion BFD
Phase 0: Maximum (Future)
WPCP Biosolids Flow
February 15, 2023

NOT FOR CONSTRUCTION



Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stream	PS Feed	WAS Feed	SST Feed	SST dil polymer	AD Sludge Feed	SST Filt to Headworks	Food reception	Food to AD	Sludge and Food to AD	Digestae out of AD	Digestate to SSD	SSD dilute polymer	Cake solids	SSD Filtrate	Liquid dig to land	Biogas (Nm3/day)
Operation days/wk	7	7	NA	NA	7	NA	5	7	7	7	NA	NA	NA	NA	NA	7
Flow (T/day)	29.8	49.0	NA	NA	78.8	NA	20.5	20.5	99.3	95.8	NA	NA	NA	NA	NA	2814
TS	3.0%	2.0%	NA	NA	2.4%	NA	15.0%	15.0%	5.0%	1.9%	NA	NA	NA	NA	NA	
VS:TS	73%	85%					85%	85%	83%							

Comments:
1. Operation is on a 365 days/year, 7 days/week, and 24 hours per day basis unless otherwise specified.
2. Flows are expressed in metric tonnes.
3. External feedstock reception is expected to operate 250 days/year, 5 days/week.

Preliminary Design – For Approval, not for construction

SST 225
Hydraulic Capacity: 35m3/h
Solids Loading Capacity: 700 kg/h

LEGEND

ANAERGIA SCOPE | NOT IN ANAERGIA SCOPE | Optional

Rev.	Date	Edit.	Check.	Appr.	Drawing No.:
03	2021.10.01	JG	RG		
02	2021.06.30	JG	RG		
05	2020.10.05	ML	AK		
04	2022.06.13	ML	AK		

Drawing Name: Block Flow Diagram
Project: Petawawa Phase 0
Project-No:
Street: 560 Abbie Lane
City: Petawawa, ON
Country: Canada
Customer: Petawawa

Anaergia

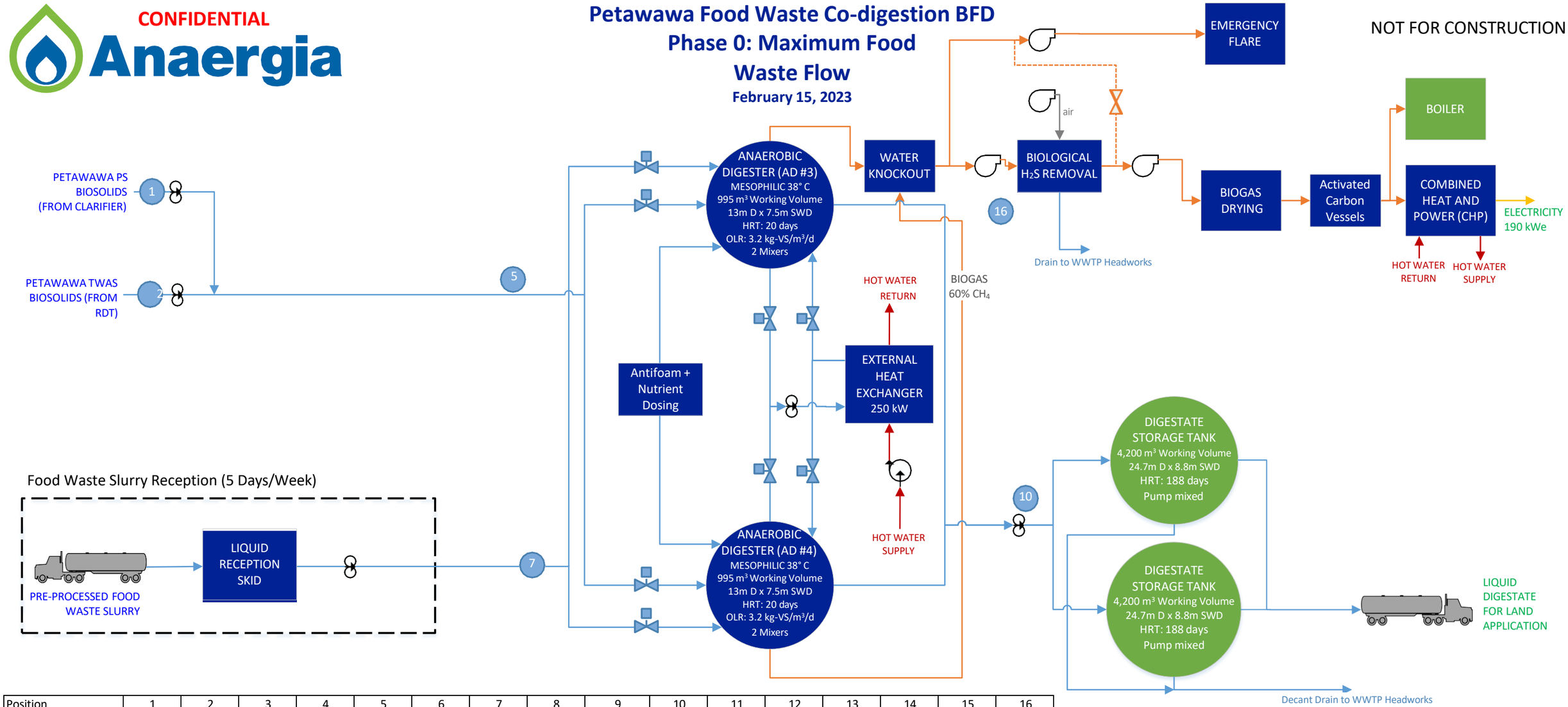
CONFIDENTIAL

Anaergia

Petawawa Food Waste Co-digestion BFD Phase 0: Maximum Food Waste Flow

February 15, 2023

NOT FOR CONSTRUCTION



Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stream	PS Feed	WAS Feed	SST Feed	SST dil polymer	AD Sludge Feed	SST Filt to Headworks	Food reception	Food to AD	Sludge and Food to AD	Digestae out of AD	Digestate to SSD	SSD dilute polymer	Cake solids	SSD Filtrate	Liquid dig to land	Biogas (Nm3/day)
Operation days/wk	7	7	NA	NA	7	NA	5	7	7	7	NA	NA	NA	NA	NA	7
Flow (T/day)	21.8	36.3	NA	NA	58.1	NA	41.1	41.1	99.2	93.2	NA	NA	NA	NA	NA	4753
TS	3.0%	2.0%	NA	NA	2.4%	NA	15.0%	15.0%	7.6%	2.4%	NA	NA	NA	NA	NA	
VS:TS	73%	85%					85%	85%	84%							

Comments:

1. Operation is on a 365 days/year, 7 days/week, and 24 hours per day basis unless otherwise specified.
2. Flows are expressed in metric tonnes.
3. External feedstock reception is expected to operate 250 days/year, 5 days/week.

Preliminary Design – For Approval, not for construction

SST 225
Hydraulic Capacity: 35m3/h
Solids Loading Capacity: 700 kg/h

LEGEND

ANAERGIA SCOPE | NOT IN ANAERGIA SCOPE | Optional

Rev.	Date	Edit.	Check.	Appr.	Drawing No.:
03	2021.10.01	JG	RG		
02	2021.06.30	JG	RG		
05	2020.10.05	ML	AK		
04	2022.06.13	ML	AK		

Drawing Name: Block Flow Diagram
Project: Petawawa Phase 0
Project-No:
Street: 560 Abbie Lane
City: Petawawa, ON
Country: Canada
Customer: Petawawa

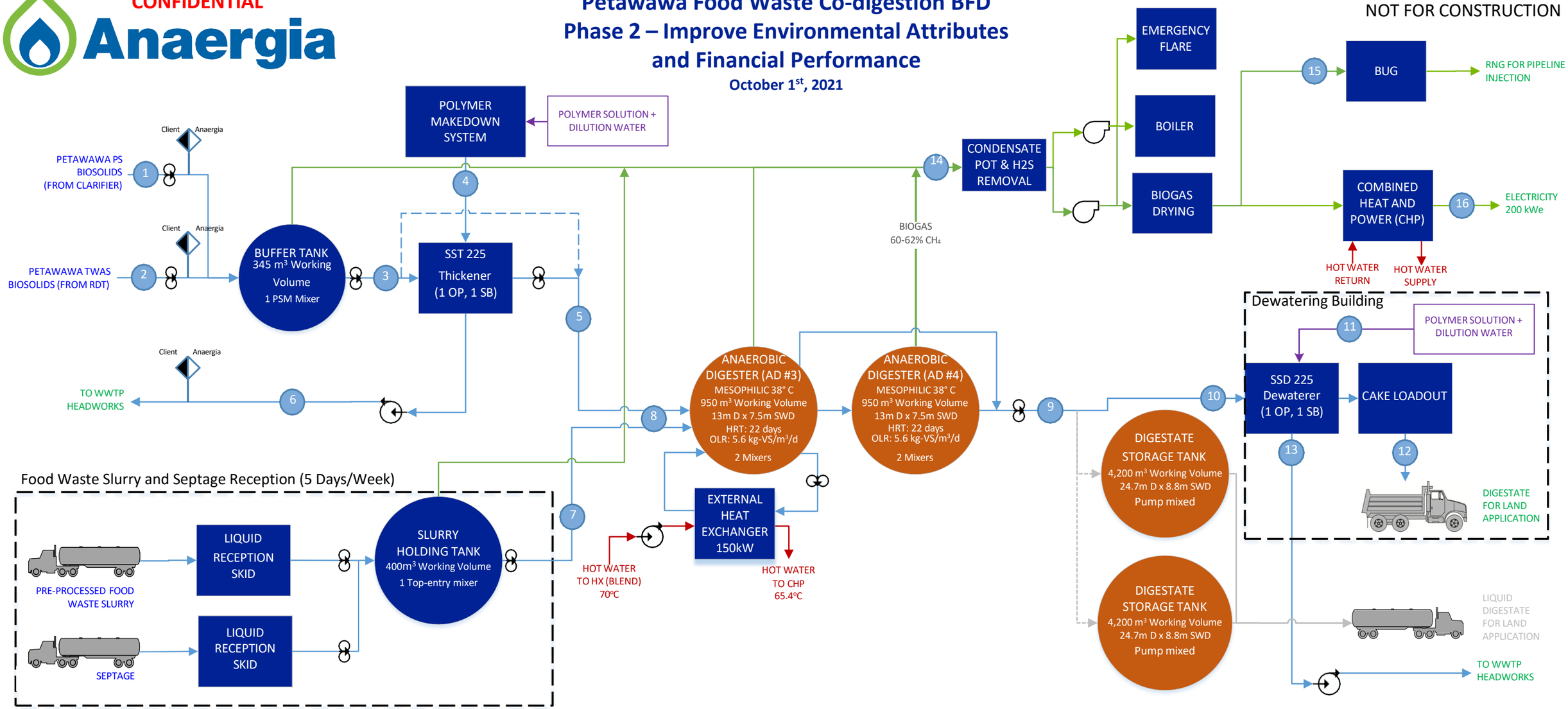
CONFIDENTIAL

Anaergia

Petawawa Food Waste Co-digestion BFD
Phase 2 – Improve Environmental Attributes and Financial Performance

October 1st, 2021

NOT FOR CONSTRUCTION



Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Stream	PS Feed	WAS Feed	SST Feed	SST dil polymer	AD Sludge Feed	SST Filt to Headworks	Food to AD	Sludge and Food to AD	Digestate out of AD	Digestate to SSD	SSD dilute polymer	Cake solids	SSD Filtrate	Total Biogas (Nm3/d)	Biogas to BUG (Nm3/d)	Power (kWe)
Operation (days/wk)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Flow (MT/day)	29.8	49.0	78.8	3.3	14.0	68.0	76.7	90.8	80.0	80.0	6.4	13.2	67.0	8,545	6,669	200
TS	3.0%	2.0%	2.4%	0.2%	12.0%	<1.0%	15.0%	14.5%	4.6%	4.6%	0.2%	25.0%	<1.0%			

Comments:

1. Operation is on a 365 days/year, 7 days/week, and 24 hours per day basis unless otherwise specified.
2. Flows are expressed in metric tonnes.
3. External feedstock reception is expected to operate 250 days/year, 5 days/week.

Preliminary Design – For Approval, not for construction

LEGEND

SST 225
Hydraulic Capacity: 35m3/h
Solids Loading Capacity: 700 kg/h
SSD 225
Hydraulic Capacity: 16m3/h
Solids Loading Capacity: 325 kg/h

NEW BY ANAERGIA | EXISTING MODIFIED BY ANAERGIA | AVAILABLE – ON STANDBY | NOT APPLICABLE

Rev.	Date	Edit.	Check.	Appr.	Drawing No.:
03	2021.10.01	JG	RG	AK	
02	2021.06.30	JG	RG		
01	2020.09.14	IK	AK		
00	2020.09.09	IK	AK		

Drawing Name: Block Flow Diagram
Project: Petawawa 30% Design Basis
Project-No:
Street: 560 Abbie Lane
City: Petawawa, ON
Country: Canada
Customer: Petawawa

Appendix D: Petawawa WPCP Emergency Response Plan

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

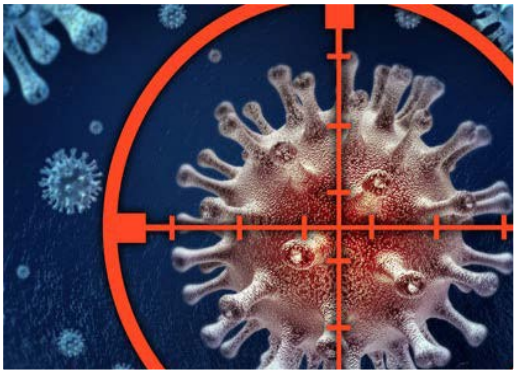
FACILITY EMERGENCY PLAN

A Program under OCWA's
Quality & Environmental Management System and
Occupational Health & Safety System

QEMS
OHSS







FOR: PETAWAWA DWS & WPCP

TABLE OF CONTENTS

Reviewed by: Brenda Royce, PCT	Approved by: Brad Sweet, Senior Operations Manager

SECTION 1: Contacts

- Emergency Communications Protocol (for Level 1, 2 and 3 Emergencies)

SECTION 2: Contingency Plans (CPs)

- CP-01 Spill Response
- CP-02 Critical Injury
- CP-03 Critical Shortage of Staff
- CP-04 Loss of Service
- CP-05 Unsafe Water
- CP-06 Security Breach
- Outbreak of Infectious Disease

SECTION 3: Appendices

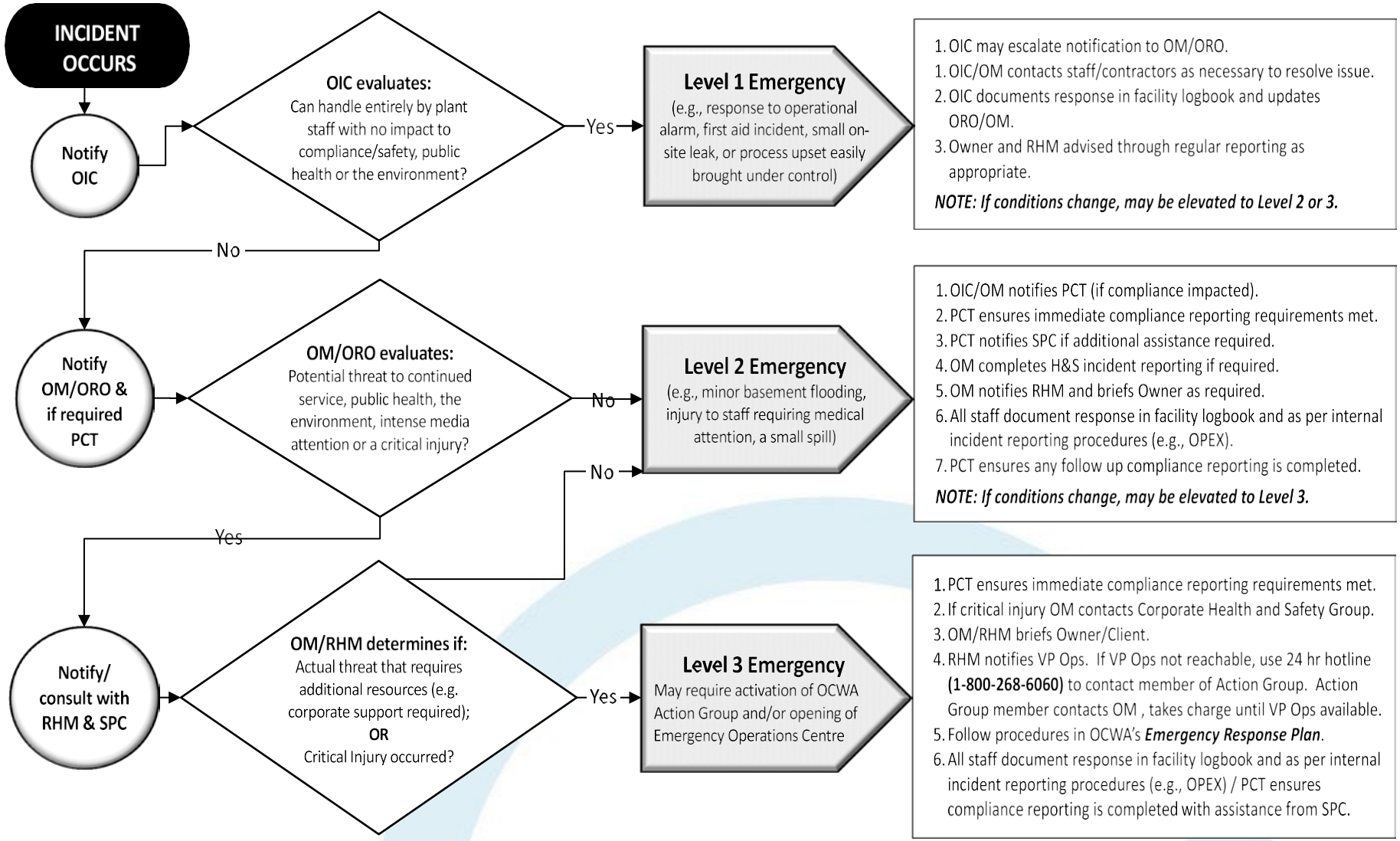
- Emergency Management Program: OCWA's Approach to Facility Emergency Planning

FACILITY EMERGENCY PLAN

Issued: 2019-04-18
Rev.: 1
Pages: 1 of 2

EMERGENCY COMMUNICATIONS PROTOCOL

Reviewed by: Corporate Compliance | Approved by: Director Operational Support Services



LEGEND: **OIC** – Operator In Charge
OM – Operations Management
ORO – Overall Responsible Operator
Owner – Owner/Client
PCT – Process Compliance Technician
RHM – Regional Hub Manager
SPC – Safety, Process & Compliance Manager
VP Ops – Vice President of Operations

EMERGENCY COMMUNICATIONS PROTOCOL

Reviewed by: Corporate Compliance	Approved by: Director Operational Support Services

Revision History

Date	Revision #	Reason for Revision
2013-11-20	0	Protocol Issued
2019-04-18	1	Revised to include communication steps/decisions prior to determination of Level 1, 2 or 3 Emergency. Updates to reflect organizational changes. Changed layout/formatting.

LEGEND: **OIC** – Operator In Charge
OM – Operations Management
ORO – Overall Responsible Operator
Owner – Owner/Client
PCT – Process Compliance Technician
RHM – Regional Hub Manager
SPC – Safety, Process & Compliance Manager
VP Ops – Vice President of Operations

TRIGGER

A discharge* of a pollutant that could cause environmental damage (adverse effects to land, water, air), property damage (e.g., basement back-ups), facility damage (e.g., flooded spaces, equipment failure, etc.) and/or impact public health.

For bypass and overflow events that occur at a wastewater facility, please refer to site specific procedures for Bypasses and Overflows.

**Discharge means addition, deposit, leak or emission.*

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
1.	Noting any potential localized hazards (to staff, yourself and/or the public) and using appropriate PPE (refer to ***Safety Data Sheets (SDS)*** if applicable), remove any person(s) from danger and notify first responders (ambulance, police, fire) if necessary. In case of critical injury to personnel, follow ***CP-02 Critical Injury.*** Notify OIC.	Responding Staff
2.	Assess the severity of the discharge. Quickly act to stop or contain the discharge. Take all reasonable steps to minimize any adverse effects on the natural environment and surrounding properties if any. Notify ORO/Operations Management. As practical, take steps to protect the treatment process. Log essential details throughout event. (Refer to ***Table 2: Documentation/Reporting*** below***)*** Notify Operations Management if additional staff/resources required beyond that immediately available and/or if there is a potential threat to public health.	Responding Staff/OIC
3.	Determine whether the discharge is a “spill” under the *Environmental Protection Act* (EPA), an “environmental emergency” as per the *Environmental Emergency (E2)* Regulations, under the *Canadian Environmental Protection Act (CEPA)* and/or an “unauthorized deposit” under the *Fisheries Act (FA).* Refer to **SOP – Reporting Spills and Other Discharges** for definitions.	ORO/OIC/ Responding Staff

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Note: If you are unsure if this is a spill, environmental emergency and/or unauthorized discharge, discuss with Operations Management/PCT. If you are unable to immediately get in contact with Operations Management/PCT and are unsure**, don't wait.** **Complete required notifications as per step 5.**	
4.	If the discharge is not a spill, environmental emergency, unauthorized deposit or a threat to public health/or continued operations, follow appropriate site specific procedures (SOPs, ***SDS***) to contain and clean up the discharge. Identify any H&S hazards/verify operation of equipment/ complete any required repairs. Return to normal operations. Proceed to ***Table 2: Documentation/Reporting*** below and complete actions as appropriate. Ensure Operations Management/ORO have been made aware of the incident.	ORO/OIC/ Responding Staff
5.	If the discharge is a spill, environmental emergency and/or unauthorized deposit, notify Operations Management and PCT. Complete "forthwith" notifications (including MECP Spills Action Centre (SAC) and the Owner/Client as well as downstream users and the Public Health Unit if drinking water supplies may be affected). Conduct sampling as directed/required. Follow the ***SOP Reporting Spills and Other Discharges.***	ORO/OIC/ Responding Staff/PCT
6.	Notify the Regional Hub Manager and Safety, Process and Compliance (SPC) Manager, if the discharge has resulted in or is likely to result in: • a threat to public health, • threat to continued operations, • a significant threat to the environment, • critical injury including loss of life, or • intense media attention. In conjunction with the Regional Hub Manager determine if this is a Level 3 emergency.	Operations Management (if not available – ORO/Responding Staff)

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
7.	For a Level 3 Emergency: Notify: – VP of Operations. o VP of Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate ***Emergency Response Plan (ERP)***. – If VP of Operations is not reachable: Call: OCWA's 24/7 Emergency Hotline through SAC (1-800-268-6060). o If calling the hotline number be sure to inform the SAC operator that the purpose of the call is to activate OCWA's emergency response plan for a Level 3 emergency.	Regional Hub Manager (if not available – SPC Manager/ Operations Management)
8.	If normal operations cannot be maintained, refer to ***CP-05 Unsafe Water and/or CP-04 Loss of Service*** as applicable**.**	Responding Staff/PCT/ Operations Management
9.	As appropriate, develop and follow a plan in collaboration with the Owner/Client, MOH, and MECP which may include taking samples if directed. Consult with Regional Hub Manager, SPC Manager, and Corporate support (if required). Follow appropriate site specific procedures (SOPs, SDS) to contain and clean up the discharge. Ensure that any health and safety hazards have been identified and controlled (e.g., physical, chemical and biological hazards).	Operations Manager/ORO/PCT/ Responding Staff
10.	If contacted by the media, direct them to the facility's designated media spokesperson. Refer to the ***Emergency Contact and Essential Supplies and Services List***.	Operations Management (if unavailable ORO/Responding Staff)
11.	If the discharge has resulted in local, residential or commercial property damage or facility damage, consult with the Owner/Client.	Operations Management

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Assist in communications and/or clean-up efforts as appropriate. Consult with OCWA's Insurance Coordinator.	
12.	Inform Operations Management, the PCT, the Owner/Client, MECP, MOH (as required), when the situation has been resolved.	ORO/OIC/PCT/ Responding Staff
13.	If the event was determined to be a Level 3 Emergency in Step 6, notify the Regional Hub Manager, SPC Manager and VP of Operations when the situation has been resolved.	Operations Management
14.	Return to normal operations.	All Staff

TABLE 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility
1.	Document the details of the incident and the actions taken to respond to this emergency in the ***facility log book***. Ensure records are maintained on-site and are available for review during MECP and Environment and Climate Change Canada (EC) inspections.	OIC/Responding Staff
2.	If clean-up involves the disposal of hazardous waste, follow requirements of ***EPA Reg. 347 (General - Waste Management).*** Consult with the PCT, SPC Manager and/or Corporate Compliance and refer to ***OCWA's Guidance: Managing Hazardous Wastes***. Document details of cleanup actions taken.	OIC/Responding Staff
3.	Enter as an ***Environmental Incident Report*** in OPEX. Determine the root cause of the release. If required, create an ***Action Plan*** (OPEX or Summary Table of Action Items) or ***WMS Work Order(s)*** related to the incident and implement corrective actions to prevent re-occurrence.	Operations Management/PCT
4.	Provide appropriate reports/updates to Regional Hub Manager, SPC Manager, VP of Operations, Owner/Client and to regulators as required. Refer to ***SOP – Reporting Spills and Other Discharges*** for	Operations Management/PCT

TABLE 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility
	specific reporting requirements if applicable.	
5.	If necessary, complete an ***Insurance Claim Report*** in OPEX.	Operations Management

Related Documents

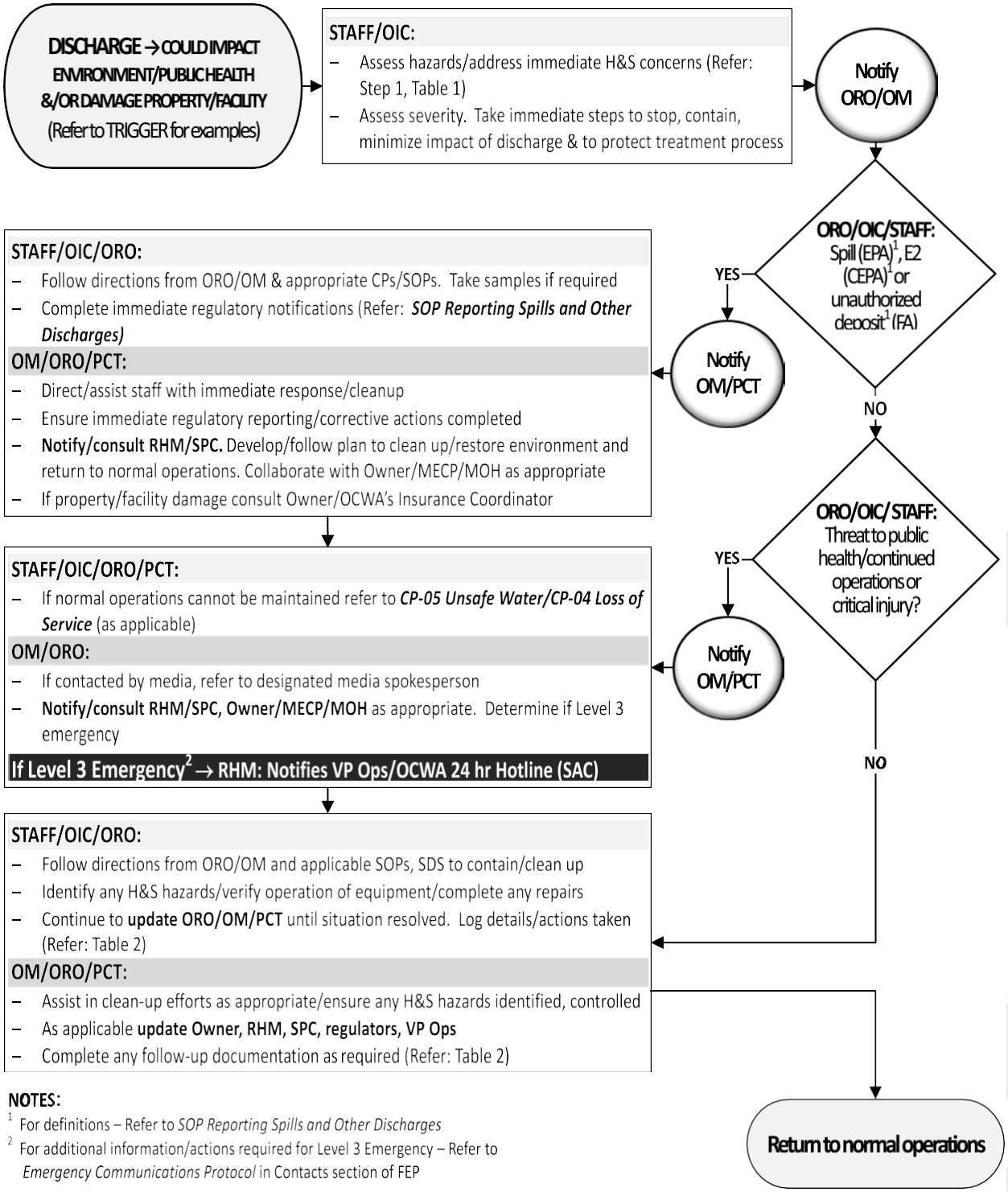
Safety Data Sheet (SDS)
CP-02 Critical Injury
SOP Reporting Spills and Other Discharges
Emergency Response Plan (ERP)
CP-05 Unsafe Water
CP-04 Loss of Service
Emergency Contact and Essential Supplies and Services List
Facility Log Book
EPA Reg. 347 (General - Waste Management)
OCWA's Guidance: Managing Hazardous Waste
Environmental Incident Report (OPEX)
Action Plan (OPEX or Summary Table of Action Items)
WMS Work Order(s)
Insurance Claim Report (OPEX)

Revision History

Date	Revision #	Reason for Revision
2005-03-07	0	CP issued
2014-04-01	1	Full Facility Emergency Program (FEP) corporate revision
2014-09-12	2	Added Chemical Spill Clean-Up Documentation requirements
2018-01-22	3	Full update to reflect new org. structure
2019-05-31	4	Removed wastewater bypass and overflow reporting requirements from this procedure and refer to site-specific procedures for bypasses/overflows. Removed Appendix section (Definitions) and moved information to SOP Reporting Spills and Other Discharges. Revised flowchart content and formatting. Removed reference to 'Communications Policy' in Step 10 of Table 1. Minor formatting changes and updates based on changes to OCWA and MECP organizational structure (Corporate Compliance Updates)
2020-02-18	5	Updated to include information on reporting an 'Environmental Emergency' under the E2 Regulations (CEPA)

SPILL RESPONSE

Reviewed by: Brenda Royce, PCT	Approved by: Brad Sweet, Sr. Ops Manager



NOTES:

[1] For definitions – Refer to *SOP Reporting Spills and Other Discharges*

[2] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC – Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

CRITICAL INJURY

Reviewed by: Process and Compliance Tech.	Approved by: SPC Manager

TRIGGER

A critical injury[1] or loss of life. This may be an incident involving staff or a contractor.

"Critically injured" means an injury of a serious nature that, places life in jeopardy, produces unconsciousness, results in substantial loss of blood, involves the fracture of a leg or arm but not a finger or toe, involves the amputation of a leg, arm, hand or foot but not a finger or toe, consists of burns to a major portion of the body, or causes the loss of sight in an eye.

OHSA, O. Reg. 834, s. 1.

If it is not a critical injury report as per OHS Reporting Directive.

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
1.	Assess the scene: • Take charge and formulate a plan • Be aware of any hazards that may place you in danger (e.g.' physical, electrical, chemical or biological hazards) • Call for additional help to respond as required (e.g., other staff or 911) • Control hazards as required (e.g., De-energize and lock out equipment), and • Move injured person away from immediate danger if possible and, if needed perform a rescue following appropriate site-specific safety procedures (e.g., a ***confined space rescue plan***).	Responding Staff
2.	Provide first aid and/or seek medical attention immediately (call 911 as needed). Ensure injured person receives appropriate transportation to a hospital/doctor as required.	Responding Staff
3.	As soon as practical, notify Senior Operations Management (SOM). Log essential details throughout incident.	Responding Staff

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
4.	a) Secure and control access to the scene. *No person shall interfere with, disturb, destroy or alter the scene, except to save a life or relieve human suffering, maintain an essential public utility service or public transportation system, or prevent unnecessary damage to equipment or other property, until permission has been given by an MOL inspector.* *OHSA s. 51(2) – Preservation of wreckage*	Responding Staff
5.	The following are to be notified: • The Regional Hub Manager and the Safety, Process and Compliance (SPC) Manager must be advised of the situation. • Contact the Corporate Health and Safety (H&S) Group. • Make regulatory notifications as required under the Occupational Health and Safety Act (*OHSA*) to: • Ministry of Labour (MOL) - Health and Safety Contact Centre (1-877-202-0008) • H&S Representative • Electrical Safety Authority within 48 hours **if** the critical injury was a result of an electrical incident.	SOM SPC Manager SOM SOM
6.	Determine if this situation will become a Level 3 Emergency if the release has resulted or is likely to result in: ○ A threat to public health ○ Critical injury including loss of life ○ Intense media attention Notify VP Operations. VP Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate *Emergency Response Plan (ERP)*.	Regional Hub Manager or SPC Manager

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
6.	As necessary ensure appropriate notification has been made to the injured person's family. Coordinate necessary support for staff/co-workers. Human Resources may be required to assist.	SOM
7.	If the incident or scene management will or has impacted the facility's ability to maintain normal compliant operations, an operational plan is to be developed with the ORO, SOM, Operations and Maintenance Team lead (OMTL), Process and Compliance Technician (PCT), SPC Manager and Regional Hub Manager. Support is also available through Corporate H&S.	Responding Staff SOM PCT OMTL
8.	If contacted by the media, direct them to the Facility's designated media spokesperson.	SOM
9.	Cooperate with any MOL investigation. Consult with SPC Manager and/or Corporate H&S Group for accident investigation support as required.	All Staff

Table 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility
1.	Document the details of the incident and the actions taken to respond to this emergency. Ensure the incident is noted in the ***facility log book*** along with any operational impacts.	Responding Staff
2.	If an OCWA employee has been injured and requires medical aid or medical treatment refer to the ***OHS Reporting Directive*** in ***OCWA's Safety Manual.***	SOM with support from Regional Hub Manager/SPC Manager
3.	Enter as a ***Health & Safety Incident Report*** in OPEX. Determine the root cause of the incident. If required ***WMS Work Order(s)*** related to the incident and implement corrective actions to prevent re-occurrence.	SOM

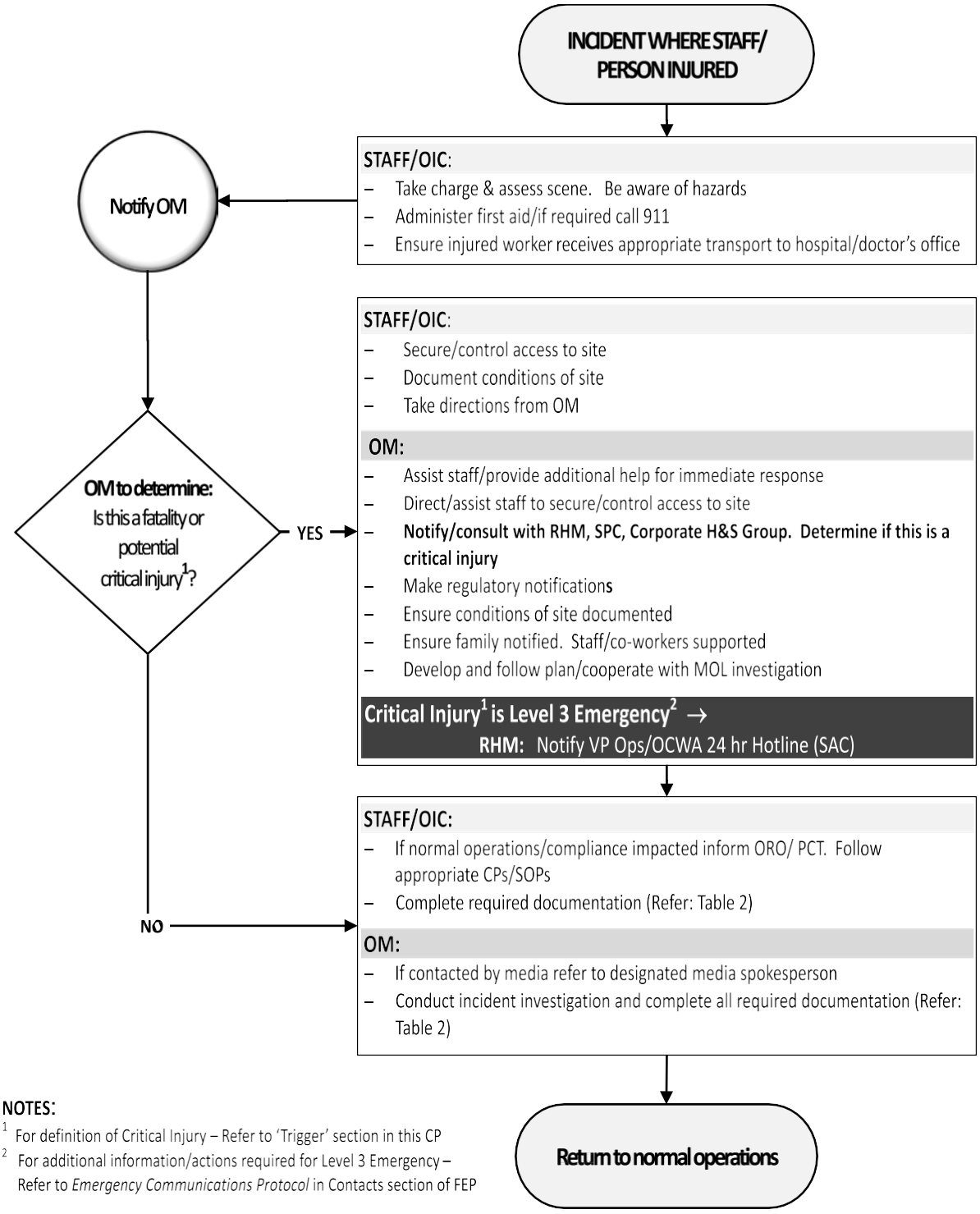
Table 2: DOCUMENTATION/REPORTING		
Step	**Description**	**Responsibility**
4.	Ensure records are maintained on-site and are available for review during the incident investigation and for reporting purposes.	
5.	Complete a follow-up review with the following goals: • Determine the root cause of the incident • Review corrective actions completed • Develop formal procedures around corrective actions taken • Review what went well and what didn't • Identify prevention measures to be implemented • Update documentation as required for continuous improvement.	All involved staff

RELATED DOCUMENTS

- Confined Space Rescue Plan
- Emergency Response Plan (ERP)
- Emergency Contact and Essential Supplies and Services List
- Facility Log Book
- WSIB Form 7
- OHS Reporting Directive (OCWA's Safety Manual)
- Health & Safety Incident Report (OPEX)
- WMS Work Order(s)

REVISION HISTORY

Date	Revision #	Reason for Revision
2019-06-18	0	CP issued under the Regional Hub



NOTES:

[1] For definition of Critical Injury – Refer to 'Trigger' section in this CP

[2] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC – Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
JHSC – Joint Health and Safety Committee
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

CRITICAL SHORTAGE OF STAFF

Reviewed by: Process and Compliance Tech.	Approved by: SPC Manager

TRIGGER

An emergency resulting in a shortage of staff such that work required to keep the water/wastewater system in compliance and in service cannot be completed.

Possible events that may lead to staff shortage could include:

- Extreme weather events (e.g., tornado, hurricane/storms)
- Natural disasters (e.g., flooding, forest fire, earthquake)
- Terrorism/criminal activity (e.g., physical threat, police barricade/evacuation, cyber security threat)
- Major accident/environmental incident (e.g., major chemical spill, explosion)
- Major power outage/loss of communications
- Civil disturbance
- An outbreak of illness (e.g., declared pandemic)

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
1.	Ensure that all absences are reported immediately to the Senior Operations Manager (SOM).	All Staff
2.	If there is a shortage of staff that could impact the ability to operate/maintain the facility/system, the SOM will contact other staff within facility/cluster/region to determine availability.	SOM
3.	Follow the directions from your Overall Responsible Operator (ORO) / SOM and applicable CPs/SOPs. Depending on the nature/severity of the event, additional instructions may be issued by OCWA Corporate office and/or from the Ontario Public Service (OPS).	All Staff
4.	As a team, review critical operational needs and develop a staffing schedule/plan to carry out essential work. Essential work includes: • Breakdown maintenance; • Response to emergency situations and alarms; • Operational checks and adjustments; • Monitoring and sampling; and	ORO SOM PCT OMTL

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	• Regulatory requirements/reporting	
5.	If essential work cannot be completed by the available facility/cluster staff: a) Cancel training, vacations or other leaves of absence b) Contact Regional Hub Manager and Safety Process and Compliance (SPC) Manager. c) Determine available regional staff by consulting with the Eastern Regional Management Team.	SOM Regional Hub Manager
6.	This situation will become a Level 3 Emergency if the shortage has resulted or is likely to result in: ○ Insufficient regional hub staff to complete the essential work ○ If the facility is no longer accessible to operations personnel due to the incident/event ○ A threat to public health ○ Critical injury including loss of life ○ Intense media attention Notify VP Operations • VP Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate *Emergency Response Plan (ERP)*.	Regional Hub Manager or SPC Manager
7.	If regulatory requirements cannot be met (i.e., do not have sufficient staff to fulfill sampling requirements or adverse water quality is detected), follow reporting procedures.	Responding Staff SOM PCT SPC Manager
8.	Maintain a daily log of the resources available, the work completed and essential work that is outstanding. Provide updates to the Regional Hub Manager, SPC Manager and Owner/Client. Provide updates to VP of Operations	All Staff SOM Regional Hub

CRITICAL SHORTAGE OF STAFF

Reviewed by: Process and Compliance Tech.	Approved by: SPC Manager

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Provide updates to regulators (MOH (public health unit) and MECP) on the status and actions as necessary.	Manager PCT
9.	Continue to complete as much work as staffing levels will permit until normal personnel coverage can be maintained by the cluster/facility staff. Document operational activities in the ***facility log book.***	Responding staff
10.	Return to normal operations.	All Staff

TABLE 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility
1.	Document the details of the incident and the actions taken to respond to this emergency in the ***facility log book***. Ensure records are maintained on-site and are available for review during MECP inspections.	OIC Responding Staff
2.	Provide reports to other stakeholders, as appropriate.	SOM PCT
3.	Complete a follow-up review with the following goals: • Determine the root cause of the incident • Review corrective actions completed • Develop formal procedures around corrective actions taken • Review what went well and what didn't • Identify prevention measures to be implemented Update documentation as required for continuous improvement.	All involved staff

RELATED DOCUMENTS

- Emergency Response Plan (ERP)
- OCWA Hours of Work Guideline (posted on OCWA intranet)

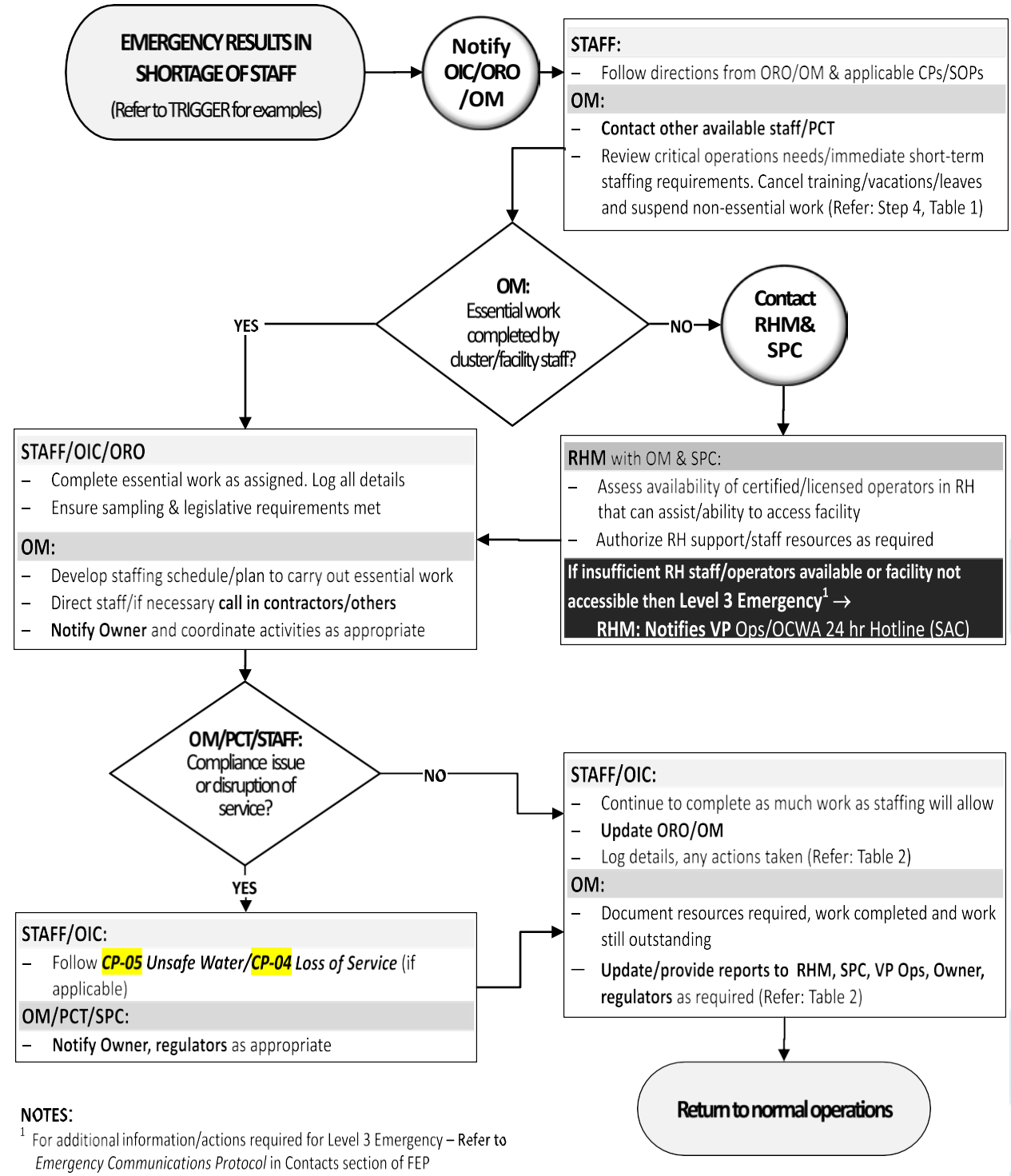
- Municipal Emergency Response Plan (MERP)
- SOP Reporting Adverse Water Quality
- SOP Reporting a Non-Compliance
- CP-05 Unsafe Water
- CP-04 Loss of Service
- Facility Log Book

REVISION HISTORY

Date	Revision #	Reason for Revision
2019-06-18	0	CP issued under the Regional Hub

CRITICAL SHORTAGE OF STAFF

Reviewed by: Process and Compliance Tech. | Approved by: SPC Manager



NOTES:

[1] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC – Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

LOSS OF SERVICE

Reviewed by: Process and Compliance Tech.	Approved by: SPC Manager

TRIGGER

An incident that results in an actual or impending loss of service such as infrastructure failure, prolonged power outage, water contamination, water shortage, major fire, natural disaster, etc.

Loss of service for **water** systems = widespread failure to supply safe drinking water/meet demands of consumers.

Loss of service for **wastewater** systems = widespread inability to collect and treat wastewater as per the facility's design capacity.

This does not apply to an overflow or bypass event during which the facility is still operational.

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
1.	Notify Overall Responsible Operator (ORO) and the Senior Operations Manager (SOM) of loss of service situation.	Responding Staff
2.	Assess extent of the situation: • Estimated duration of outage, • Status of back-up power supply including fuel levels, • Status of storage capacity (water tower/reservoir, wet wells, tanks, etc.), • System pressures, • Availability/status of standby equipment, • Bypass/flow diversion capability, etc. • Estimate length of time service can be continued (if at all).	Responding Staff
3.	Immediately begin to mitigate the issue if practical following appropriate facility SOP(s) to maintain level of treatment, Develop a response plan together using the combined operational knowledge and experience in the team. The team is to include the Responding Operator, Operator in Charge (OIC), ORO, SOM, Process and Compliance	Responding Operator ORO SOM PCT OMTL Support from

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Technician (PCT), Operations and Maintenance Team Lead (OMTL). Action plans can reference or include: • Facility specific SOP's where available • Past experiences/Operator knowledge • Safety Data Sheets • Facility drawings and manuals • Divert flows/open bypass channels/pump to storage, • Activate/install/arrange for standby/backup equipment (e.g., portable generator, vacuum truck etc.), • Make arrangements/confirm future deliveries of fuel for backup power supply as necessary, • Isolation or temporary water services • Continue to monitor facility (process and equipment), and • Coordinate maintenance personnel and contractors to complete repairs as appropriate. Log essential details throughout event.	Regional Hub Manager SPC Manager
4.	In some situations regulator notifications or exemptions will be required. Complete all reporting and requests following reporting SOP's. Should additional actions or notifications be requested from the regulator ensure these become part of the response plan. Consult with SPC Manager and Regional Hub Manager (if required).	PCT
5.	Continue to monitor and follow the response plan until normal operations are resumed. If any reportable incidents occur ensure follow the appropriate CPs/SOPs and ensure all regulatory reporting requirements and corrective actions are completed as required.	Responding Staff ORO SOM PCT

LOSS OF SERVICE

Reviewed by: Process and Compliance Tech.	Approved by: SPC Manager

Table 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Verify the operation of all system equipment/complete any repairs. Then follow the documentation requirements outlined in ***Table 2: Documentation/Reporting*** below.	
6.	Determine if this situation will become a Level 3 Emergency if the release has resulted or is likely to result in: ○ A threat to public health ○ Critical injury including loss of life ○ Intense media attention Notify VP Operations VP Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate *Emergency Response Plan (ERP)*.	Regional Hub Manager or SPC Manager
7.	Ensure all regulator directions are followed.	All Staff
8.	Consult with the Owner/Client who may activate their ***Municipal Emergency Response Plan (MERP)*** and/or issue water/usage restrictions as warranted. Assist the Owner/Client in communicating with residents.	SOM
9.	If contacted by the media, direct them to the facility's designated media spokesperson. Refer to the ***Emergency Contact and Essential Supplies and Services List***.	SOM
10.	When service has been restored, notify all affected/previously notified parties. Update the Regional Hub Manager and SPC Manager on the status of operations/compliance and if the event was determined to be a Level 3 Emergency, notify the VP of Operations when the situation has been resolved.	PCT SOM
11.	Return to normal operations.	All Staff

TABLE 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility

TABLE 2: DOCUMENTATION/REPORTING

Step	Description	Responsibility
1.	Document the details of the incident and the actions taken to respond to this emergency in the ***facility log book***. Ensure records are maintained on-site and are available for review during MECP inspections.	OIC Responding Staff
2.	Complete an ***Environmental Incident Report*** and submit to PCT. If required create ***WMS Work Order(s)*** related to the incident and implement corrective actions to prevent re-occurrence.	Responding Staff
3.	Check the facility's ***approval(s)*** and ***operating agreement*** for additional reporting requirements. As required, provide appropriate report(s)/updates to the Owner/Client, VP of Operations and regulators as per regulatory/contractual timelines.	SOM PCT
4.	If necessary, complete ***Insurance Claim Report*** in OPEX.	SOM
5.	Complete a follow-up meeting with the following goals: • Determine the root cause of the incident • Review corrective actions completed • Develop formal procedures around corrective actions taken • Review what went well and what didn't • Identify prevention measures to be implemented • Update documentation as required for continuous improvement.	All involved staff

RELATED DOCUMENTS

- Emergency Response Plan (ERP)
- Municipal Emergency Response Plan (MERP)
- Emergency Contact and Essential Supplies and Services List
- CP-01 Spill Response
- CP-05 Unsafe Water
- Facility Log Book

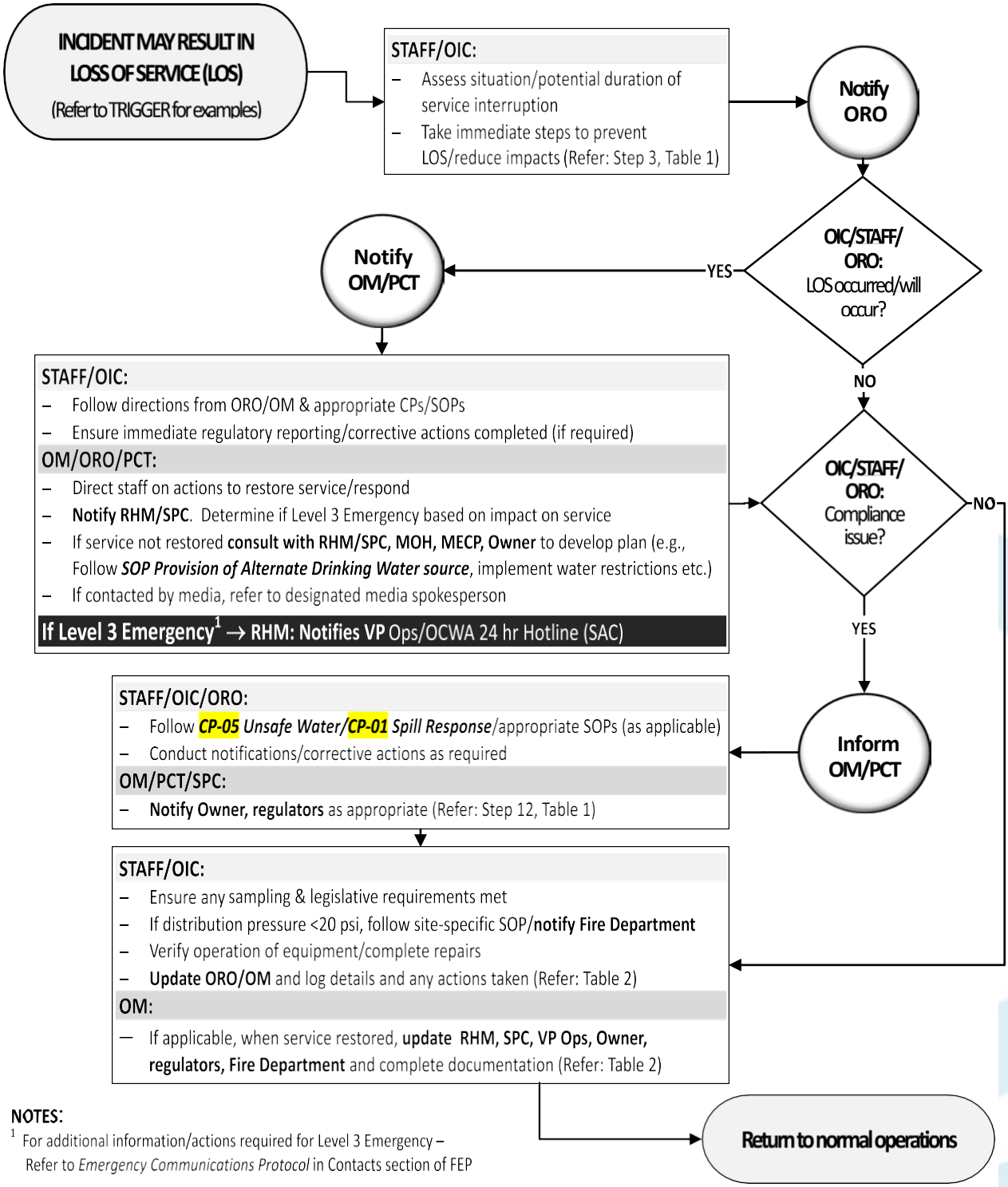
- Environmental Incident Report
- WMS Work Order(s)
- Insurance Claim Report (OPEX)

REVISION HISTORY

Date	Revision #	Reason for Revision
2019-06-18	0	CP issued under the Regional Hub

LOSS OF SERVICE

Reviewed by: Process and Compliance Tech. | Approved by: SPC Manager



NOTES:

[1] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC – Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

UNSAFE WATER

Reviewed by: Process and Compliance Tech	Approved by: SPC Manager

TRIGGER

- An adverse water quality incident (AWQI) where the corrective actions did not resolve the situation (i.e., adverse water quality is still present);
- Contamination of the raw water source that may be beyond the capabilities of the treatment processes; and/or
- Confirmed sewage or chemical contamination in the distribution system.

TABLE 1: IMMEDIATE ACTIONS

Action Item	Action Description	Responsibility
1.	Take charge and formulate a plan. If practical, take immediate and safe action to resolve the problem. Use best efforts to restrict the contamination or adverse situation rom reaching users by potentially isolating affected process.	Responding Staff
2.	Responding Operator will immediately notify the Overall Responsible Operator (ORO), Process and Compliance Technician (PCT) and Senior Operations Manager (SOM). If a report has not already been made follow Reporting Adverse Water Quality and Health Advisories Standard Operating Procedure. Compliance staff will assist with MOECC and Health Unit correspondence.	Responding Operator
3.	The SOM notify the Regional Hub Manager and the SPC Manager. At this point: • The SOM will become the contact for the Owner • The PCT will become the contact for the Regulators • SOM will designate Media Spokesperson	Responding Staff SOM Regional Hub Manager PCT
4.	Together using the combined operational knowledge in the team, establish and document an action plan. Action plans can reference or include: • The corrective actions in the Health Advisory • Process specific SOP's where available	Responding Staff ORO SOM OMTL PCT

TABLE 1: IMMEDIATE ACTIONS

Action Item	Action Description	Responsibility
	• Past experiences/Operator knowledge • Safety Data Sheets • Facility drawings and manuals Things to note: • User Notification • Laboratory availability • Alternative source	Support from Regional Hub Manager SPC Manager
5.	Communicate the action plan to the Owner, Health Unit and Local MECP Inspector and Implement the action plan.	PCT
6.	Determine if this situation will become a Level Emergency if the release has resulted or is likely to result in: o A threat to public health o Critical injury including loss of life o Intense media attention Notify VP Operations VP Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate Emergency Response Plan (ERP).	Regional Hub Manager or SPC Manager
7.	Confirm action plan with HU and MOECC. Proceed with implementation of plan.	PCT SOM ORO OIC
8.	If contacted by the media, direct them to the designated media spokesperson or, if appropriate, the Emergency Information Officer. Refer to the OCWA Communications Policy.	SOM
9.	Create work order(s) as required in Maximo.	All Staff
10.	Resume normal operations.	All Staff

TABLE 2: FOLLOW-UP ACTIONS

Action Item	Action Description	Responsibility
1.	Document the details of the actions taken to respond this emergency in the facility log book. Ensure records are maintained on-site and are available for review during MOECC inspections.	OIC Responding Staff
2.	Review all documentation and ensure all reports are filed/sent as required in reporting SOP's.	PCT
3.	Complete a follow-up meeting with the following goals: • Determine the root cause of the incident • Review corrective actions completed • Develop formal procedures around corrective actions taken • Review what went well and what didn't • Identify prevention measures to be implemented • Update documentation as required for continuous	All involved staff

Related Documents

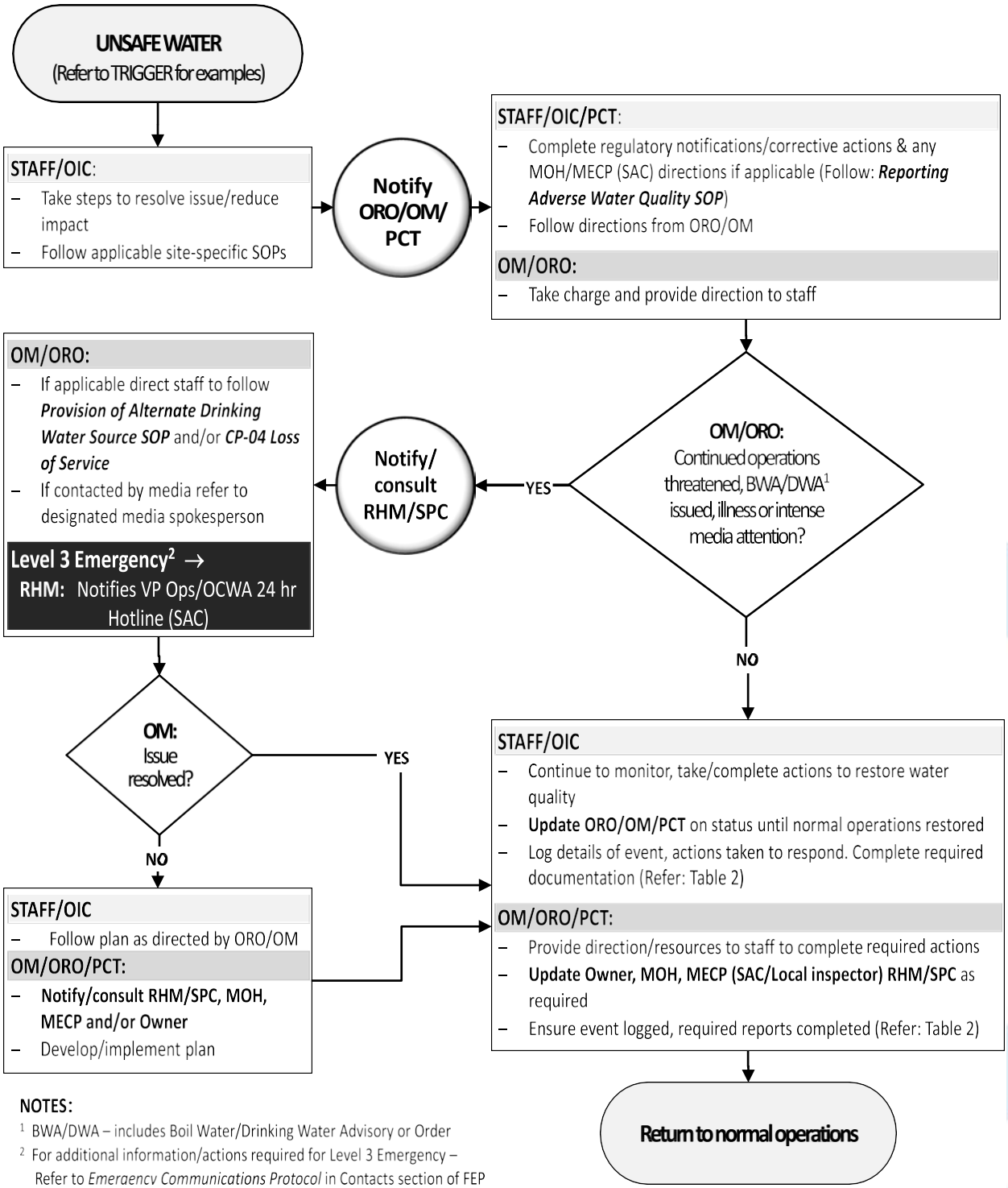
SOP Reporting Adverse Water Quality
CP-04 Loss of Service
Emergency Response Plan (ERP)
Emergency Contact and Essential Supplies and Services List
Facility Log Book
WMS Work Order(s)

Revision History

Date	Revision #	Reason for Revision
2019-06-18	0	CP issued under Regional Hub

UNSAFE WATER

Reviewed by: Process and Compliance Tech | Approved by: SPC Manager



NOTES:

[1] BWA/DWA – includes Boil Water/Drinking Water Advisory or Order

[2] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC - Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

SECURITY BREACH

Reviewed by: Brenda Royce, PCT	Approved by: Brad Sweet, Sr. Ops Manager

TRIGGER

A security breach may include:

- A cyber threat,
  Example:
  - An attempt to hack into OCWA's network/applications/remote monitoring systems to gather electronic information or to access OCWA's SCADA
  - A laptop, communication device (Blackberry/iPhone) or electronic information being stolen/lost.
- Direct observation of intruder(s) or notification from a witness,
- An intrusion alarm that represents a credible threat to security, and
- Evidence such as forced entry, missing or damaged equipment, or other vandalism.

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
If this is a cyber security threat:		
1.	If there is an indication of a cyber threat to OCWA's systems, immediately contact ORO and OCWA's Service Desk (if after hours contact Operations Management). **NOTE**: If the threat is to an OCWA managed SCADA system you should also contact your UPIT/Instrumentation Tech or SCADA specialist, if applicable. If the threat is to the Owner/Client's system (e.g., SCADA), ensure you notify Operations Management and the Owner/Client and follow their protocols/directions for a cyber security breach.	Responding Staff
2.	If the threat could potentially impact operations, monitor/check online process controls/monitoring systems to assess if there are any irregularities. Notify Senior Operations Manager	Responding Staff
3.	If there are no signs of an impact to operations, update ORO/Operations Management and ensure any applicable details of the event are logged and reported as required (Refer to ***Table 2: Documentation/Reporting*** below). Complete any follow up action as directed by OCWA's IT and/or the Owner/Client's IT department (if applicable).	Responding Staff

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
4.	If there are signs that a breach has impacted the facility's processes, the ability to control the process (e.g., SCADA not functioning) and/or ability to continue normal operations/maintain compliance: a) Inform the ORO, Operations Management and notify the PCT. Take corrective actions/follow applicable site-specific SOPs, as required. Action may include isolating the system/components of the system and/or operating in manual mode (if possible/practical) until situation is resolved. Follow **CP-01 Spill Response, CP-04 Loss of Service** and/or **CP-05 Unsafe Water**, if applicable.	Responding Staff/ORO
	b) If the facility is out of compliance, ensure immediate regulatory notifications to the Owner/Client, MOH and MECP are made as appropriate and corrective actions are completed as required. Follow: • **SOP Reporting Adverse Water Quality;** • **SOP Reporting a Non-Compliance; and/or** • **SOP Reporting Spills and Other Discharges**	PCT/Operations Management
	c) Assess the need for additional staff to maintain continued operations (e.g., If required to operate in manual mode). Refer to: **CP-03 Critical Shortage of Staff.** **(Continue to Step 8.)**	Senior Operations Manager
If this is a physical security threat:		
5.	Ensure personal safety. Notify ORO/Operations Management and then make an initial assessment of the incident. Document findings and observations throughout event.	Responding Staff
6.	If the initial assessment confirms that no breach has occurred, update ORO/Operations Management, log details of the event and the response (Refer to ***Table 2: Documentation/ Reporting*** below) and return to normal operations.	Responding Staff
7.	If a physical security breach is confirmed or suspected:	

SECURITY BREACH

Reviewed by: Brenda Royce, PCT	Approved by: Brad Sweet, Sr. Ops Manager

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	a) Report to ORO and provide the findings of the assessment including any observations made at the site (if onsite). **NOTE**: If at any time a threat is observed, withdraw and take appropriate action to maintain personal safety.	Responding Staff/ORO
	b) Report to the police, Operations Management and the Owner/Client.	Responding Staff/ ORO
	c) Where practical, accompany police as they investigate. When cleared by the police, do a facility check/walk-through. Maintain phone/radio contact with offsite staff/ORO/ Operations Management.	Responding Staff/ORO
	d) Inform the ORO, Operations Management and/or the PCT if: • there is a risk that drinking water quality and/or wastewater effluent quality has been impacted; • the facility is out of compliance; or • there is extensive damage that may compromise the continued operation of the facility. Follow **CP-01 Spill Response, CP-04 Loss of Service** and/or **CP-05 Unsafe Water**, as applicable.	Responding Staff/ORO
	e) Ensure any regulatory notifications/corrective actions are completed if required. Refer to: • **SOP Reporting Adverse Water Quality;** • **SOP Reporting a Non-Compliance; and/or** • **SOP Reporting Spills and Other Discharges** **(Continue to step 8)**	PCT/Operations Manager
Continue to Step 8 >>>		
8.	If contacted by the media, direct them to the Facility's designated media spokesperson (Refer to the ***Emergency Contact and Essential Supplies and Services List***).	Operations Management
9.	If the situation has not been resolved, notify and consult with the Owner/Client, MOH and MECP (Local Inspector) to develop and follow a plan for this emergency.	Operations Management/ ORO/PCT

SECURITY BREACH

Reviewed by: Brenda Royce, PCT	Approved by: Brad Sweet, Sr. Ops Manager

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
	Consult with Regional Hub Manager, Safety, Process and Compliance (SPC) Manager and Corporate support (if required).	
10.	Ensure the Regional Hub Manager and SPC Manager are informed if: – Continued operations/safety is threatened, – There is an impact to public health/the environment, and/or – The facility cannot maintain compliance. (e.g., continuous monitoring unavailable). Update and consult with Owner/Client and MOH/MECP (SAC/Local Inspector). In conjunction with the Regional Hub Manager determine if this is a Level 3 Emergency.	Operations Management/ ORO/PCT
11.	**If determined to be a Level 3 Emergency:** a) Notify: – VP of Operations. o VP of Operations to decide if the Emergency Operations Centre (EOC)/Action Group is to be activated under the corporate ***Emergency Response Plan (ERP)***. – If VP of Operations is not reachable: Call: OCWA 24/7 Emergency Hotline through SAC (1-800-268-6060). o If calling the hotline number be sure to inform the SAC operator that the purpose of the call is to activate OCWA's emergency response plan for a Level 3 emergency.	Regional Hub Manager (if not available – SPC Manager/ Operations Management)
12.	Complete necessary corrective actions/repairs and ensure that any health and safety hazards resulting from the breach have been identified/controlled. Notify Operations Management, the PCT, Owner/Client, MECP and MOH (as required), when the situation has been resolved. Return to normal operations.	ORO/OIC/ Responding Staff

TABLE 1: IMMEDIATE ACTIONS

Step	Description	Responsibility
13.	Notify the Regional Hub Manager, SPC Manager when the situation has been resolved. (If the event was determined to be a Level 3 Emergency, include the VP of Operations)	Operations Management

TABLE 2: DOCUMENTATION /REPORTING

Step	Description	Responsibility
1.	Document the details of the incident and any actions taken to respond to the event in the ***facility logbook***. Ensure records are maintained on-site and are available for review during an MECP inspection, for OCWA's or the Owner's IT department and the police (if required).	Responding Staff/OIC
2.	If there was a confirmed security breach, enter as an ***Environmental Incident Report*** in OPEX. Determine the root cause of the incident. If required, create an ***Action Plan*** (in OPEX or Summary Table of Action Items) or ***WMS Work Order(s)*** related to the incident and implement corrective actions to prevent re-occurrence.	Operations Management/PCT
3.	Complete ***Insurance Claim Report*** in OPEX if required.	Operations Management
4.	Provide appropriate reports/updates to the Regional Hub Manager, SPC Manager, VP of Operations, IT Department, Owner/Client and regulators, as required.	Operations Management/PCT

Related Documents
CP-01 Spill Responses
CP-04 Loss of Service
CP-05 Unsafe Water
SOP Reporting Adverse Water Quality
SOP Reporting a Non-Compliance
SOP Reporting Spills and Other Discharges
CP-03 Critical Shortage of Staff
Emergency Response Plan (ERP)
Emergency Contact and Essential Supplies and Services List
Facility Log Book
Environmental Incident Report (OPEX)
Action Plan (OPEX or Summary Table of Action Items)

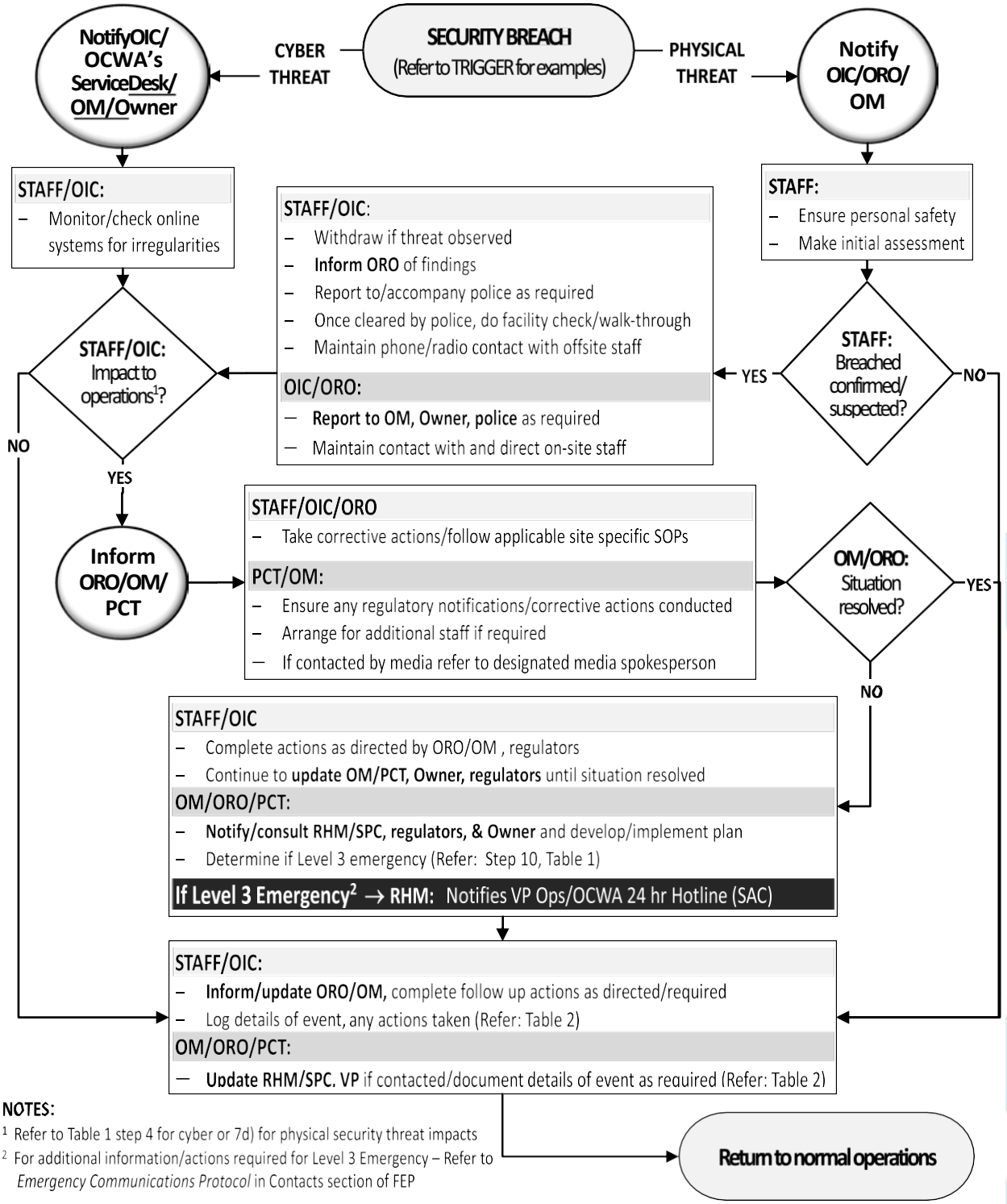
WMS Work Order(s)
Insurance Claim Report (OPEX)

Revision History

Date	Revision #	Reason for Revision
2014-04-01	0	CP Issued; Full Facility Emergency Plan (FEP) corporate revision
2019-05-31	1	Clarified trigger statement (moved cyber threats previously listed in Step 2). Removed description of Help Desk's actions from Step 1 and 2. Added steps/information to cyber threats section to clarify potential breach of Owner's systems vs. OCWA's (to Step 1), and added assessment of potential impacts to operations/steps to take (Steps 2, 3, 4 b) c) d)). Added notifications of OIC/ORO/Operations Management prior to assessing the incident in Step 5. In general section (step 8 and on): Added steps for consulting, developing and following a plan, action if contacted by media and ensuring health and safety hazards identified/controlled. Updated responsibilities/notifications throughout to reflect organizational changes. Updated/reformatted flowchart. Other minor formatting/ wording edits (Corporate Compliance revisions)
2021-07-07	2	Added references to SOP's to refer to that were left out in #4 (a),(b),(c) and #7 (d),(e)

SECURITY BREACH

Reviewed by: Brenda Royce, PCT | Approved by: Brad Sweet, Sr. Ops Manager



NOTES:

[1] Refer to Table 1 step 4 for cyber or 7d) for physical security threat impacts

[2] For additional information/actions required for Level 3 Emergency – Refer to *Emergency Communications Protocol* in Contacts section of FEP

LEGEND:

Staff – Responding Staff
OIC – Operator In Charge
ORO – Overall Responsible Operator
OM – Operations Management
PCT – Process Compliance Technician
SPC – Safety, Process & Compliance Manager
RHM – Regional Hub Manager
RH – Regional Hub
VP Ops – Vice President Operations
Owner – Owner/Client

Outbreak of Infectious Disease

This contingency applies to all staff and facilities in the Eastern Region where there is a suspected or confirmed infectious disease outbreak between staff or declared pandemic situation resulting through person to person contact.

Throughout history, there have been numerous outbreaks due to infectious diseases, including Cholera, Influenza, Coronavirus, Typhus, Smallpox, Measles, Tuberculosis, Malaria. Transmission of these outbreaks have been contracted through water supply, insects (such as mosquitos), animal to human contact and human to human contact, some of these outbreaks have been localized while others have caused large scale pandemics.

While some of these outbreaks might cause relatively mild symptoms, for example seasonal influenza (flu), others can have a significant impact on the population including healthy individuals. In the case there is an outbreak of an infectious disease in the community or at a South Peel facility, all staff must remain diligent to ensure the health and safety of all individuals, this includes proper hygienic practices (washing hands, covering coughs and sneezes), staying home if you are experiencing symptoms and avoiding others to stop the spread.

Additional information related to symptoms and specific measures required to be taken due to an outbreak of an infectious disease may be communicated through Operations Manager, OCWA's Corporate Health & Safety Group, local Public Health Department, Ministry of Health or Health Canada and can include PPE, social distancing requirements and infectious disease self-assessment tools. Individuals are responsible for self-assessments.

TRIGGER

- Increased health risk to employee's specifically related to infectious disease.
- Declared public pandemic.
- Reduced availability of operations staff specifically related to illness.
- Potential for transmission or exposure through workplace activities.

IMMEDIATE ACTION

Item	Action Description	Responsibility
1.	The Regional Hub Manager (RHM) will receive communications from the following stakeholders: • Eastern Region OCWA communications • OCWA Corporate communications • Local Health Unit • Ontario Government Communications • Health Canada Communications • Ontario Public Service	RHM

IMMEDIATE ACTION		
Item	Action Description	Responsibility
2.	The RHM will schedule a meeting with the Management Team and establish schedule for teleconference meetings. Update the Eastern Region Operational Staff Plan spreadsheet.	RHM/SOM's/ RHBM/SPCM
3.	Review and update the following operational Outbreak of Infectious Disease (Pandemic) SOP's with critical information related to the disease causing the outbreak/pandemic. • Response-ERCP-07A • Cleaning and Disinfection-ERCP-07B • Physical Distancing-ERCP-07C • Personal Health & Safety-ERCP-07D • Contracted or Suspected Disease-ERCP-07E • Compliance Relief-ERCP-07F • Contractors/Visitors-ERCP-07G	RHM and SPCM
4.	Senior Operations Managers (SOM) provide feedback and implement procedures with operations staff. Operations Staff are to follow provided SOP's. All issues identified preventing the implementation are to be addressed with the SOM.	SOM Operations Staff
5.	The RHM and the Business Development Manager (BDM) will identify and establish the communications protocols between clients. The RHM will provide to SOM's.	RHM / BDM
6.	The Safety Process and Compliance Manager (SPCM) will provide communications to the Management team regarding regulatory compliance and health and safety. The SPCM will also maintain and update procedures related to the pandemic response.	SPCM
7.	Review and procure required PPE. In the case of an outbreak or pandemic, direction for additional PPE and hygiene requirements should be provided through Health Canada, Ministry of Health, local Health Department or OCWA's Corporate Health & Safety Group.	RHM/RHBM/ SPCM
8.	All members of the Management Team are to relay feedback from operations to the Management Team for continual improvement and ability to support the entire region.	All Staff
9.	Develop a regional re-entry to normal operations plan for the region.	Management Team

DOCUMENTATION/REPORTING

Step	Description	Responsibility
1.	All meetings are to be documented appropriately	Meeting Lead
2.	Complete and maintain the Eastern Region Operational Staff Plan for the duration of the pandemic.	Management Team
3.	Provide reports to other stakeholders, as appropriate.	Management Team
4.	Complete a follow-up review with the following goals: • Determine the root cause of the incident • Review corrective actions completed • Develop/Review formal procedures around corrective actions taken • Review what went well and what didn't • Identify prevention measures to be implemented Update documentation as required for continuous improvement.	All involved staff

RELATED DOCUMENTS

- Critical Shortage of Staff-ERCP-03
- Eastern Region-Operational Staffing Plan (Excel)
- Response-ERCP-07A
- Cleaning and Disinfection-ERCP-07B
- Physical Distancing-ERCP-07C
- Personal Protective Equipment-ERCP-07D
- Contracted or Suspected Disease-ERCP-07E
- Compliance Relief-ERCP-07F
- Contractors/Visitors-ERCP-07G

REVISION HISTORY

Date	Revision Number	Details	Revision By
2020-Jul-22	0	Issued Contingency Plan	SPC Manager

APPENDIX A - DEFINITIONS

Forensic Cleaning: Specialized service for the decontamination and remediation of biological or infectious agents.

Asymptomatic: If an individual is a carrier of a disease or infection but experiences no symptoms.

Clean Room: A room that has been isolated from individuals during a pandemic to ensure that infectious diseases are not present in the case it needs to be utilized if primary work area has been compromised.

Infectious Disease: Caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi. These diseases can spread from the environment or from one person to another resulting in illness.

Ontario Clean Water Agency
Agence Ontarienne Des Eaux

EMERGENCY MANAGEMENT PROGRAM

OCWA's Approach to Facility Emergency Planning

A Program under OCWA's
Quality & Environmental Management System and
Occupational Health & Safety System

QEMS
OHSS

Developed By: Corporate Compliance
Reviewed & Approved By: Director Operational Support Services

Revision: 1
Issued: 2019-04-18

Revision History

Date of Issue	Revision #	Reason for Revision
2013-11-04	0	Program document issued.
2019-04-18	1	Added numbering to sections for easier reference (similar to ERP). Updated R&Rs throughout to reflect changes to MECP & OCWA organizational structure including adding SPC Managers. Moved responsibility for acting as media spokesperson from Ops. Management to Regional Hub Manager in Table 1. Modified figure 1 in section 1.0, to remove boxes referring to Physical Security Plan and Threat Risk Assessments (references included in paragraph above). Updated Section 4.0 to reflect changes to legislative framework (including references to standardized WW ECAs templates and changes to E2 plans). Removed figure 2 in section 6.2 (Schedule 6 of Reg. 170 related to alarm requirements) and added bullets for WW alarms. Removed reference to SOP Low Distribution System Pressure and added 5. Bypasses and Overflows in Table 2 of Section 7.0. Expanded/clarified guidance on using an Actual Event/Incident as a CP Test/Review in Sections 8.2. Minor updates/clarifications to wording throughout.

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OCWA's Facility Emergency Plan (FEP)

Executive Summary

The Facility Emergency Plan (FEP) is the corporate standard for emergency management at water and wastewater facilities operated by the Ontario Clean Water Agency (OCWA). The FEP (formerly the Environmental Contingency Plan) was one of the first elements of OCWA's Quality & Environmental Management System (QEMS) following OCWA's formation in 1993. The corporate FEP template documents are reviewed and revised as required when changes to the program and/or legislative requirements warrant. The corporate FEP underwent a review in 2018 and was revised to reflect changes to OCWA's organizational structure.

Corporate Compliance will continue to maintain and improve the corporate FEP documentation and provide Regional Hub/facility level support as required.

This document provides an overview of OCWA's approach to emergency management and outlines the corporate requirements for implementing the FEP at each facility operated by OCWA.

1.0 Background and Program Overview

OCWA takes a proactive approach to managing emergencies. OCWA's Emergency Management Program is an important element of both OCWA's Quality & Environmental Management System (QEMS) and Occupational Health & Safety System (OHSS).

OCWA's **Emergency Plan** is the umbrella corporate level plan that describes OCWA's Emergency Management Program. The Emergency Plan sets out the interrelationship between the facility level emergency plans and the corporate level plans that are designed to be used in conjunction with the FEP to ensure effective emergency measures are in place to prepare/respond to all levels of emergencies that may impact OCWA.

OCWA's Facility Emergency Plan (FEP)
This facility level plan is implemented at each OCWA-operated drinking water and wastewater facility to help prepare for operational emergencies that can be managed by plant staff and local resources. The FEP is linked to client Emergency Plans (i.e. Municipal Emergency Plans) and to the corporate ERP.

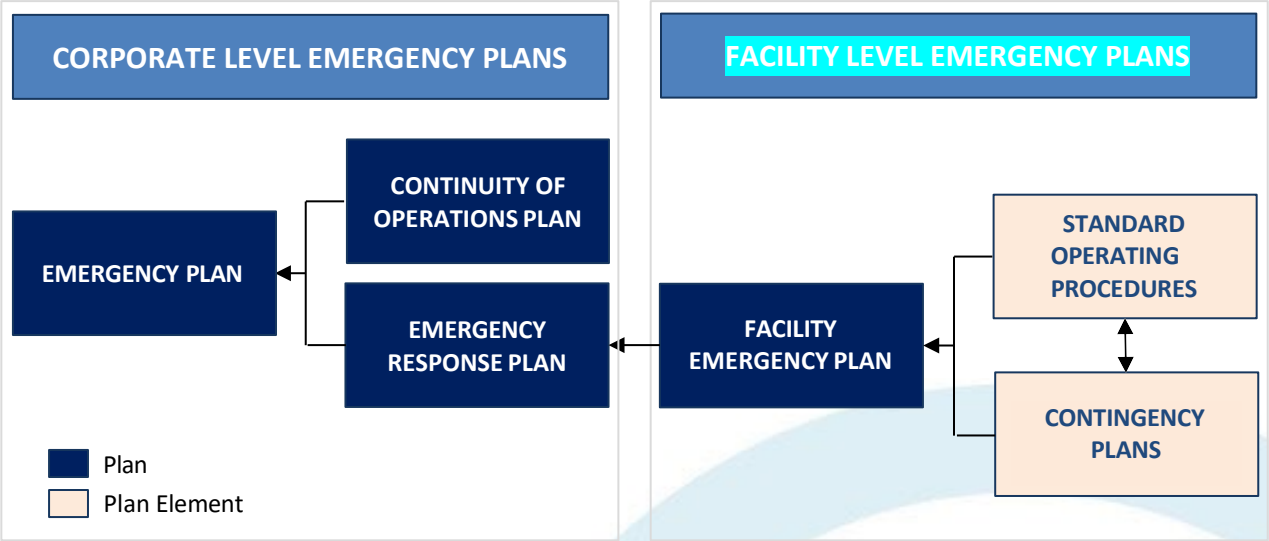
OCWA's Emergency Response Plan (ERP)
This is the corporate level plan that describes OCWA's preparedness and the corporate resources available to assist operations staff in responding to and recovering from serious operations emergencies.

OCWA's Continuity of Operations Plan
This corporate level plan documents OCWA's preparedness to respond to and recover from emergencies related to OCWA's critical business systems.

In addition:

- In support of the Ministry of Government Service's Ontario Public Service (OPS) Physical Security Operating Policy, OCWA has conducted structured threat risk assessments for the corporate, and Regional Hub offices to identify potential security risks and has developed a Physical Security Plan (PSP) to assist in managing the identified risks. The PSP and its processes are integrated with both the corporate and facility level plans where appropriate.

Figure 1: OCWA's Emergency Management Program – Plan Interrelationships



2.0 Level of Events

OCWA recognizes three levels of events:

Level 1 is an event that can be handled entirely by plant staff and regular contractors. The event and the actions taken to resolve it (and to prevent a reoccurrence, if possible) are then included in regular reporting (both internally and externally). Examples include response to an operational alarm, first aid incident, small on-site spill, or a process upset that can be easily brought under control.

Level 2 is an event that is more serious and requires immediate notification of others (regulator, client). Examples include minor basement flooding, injury to staff that requires medical attention, or a spill that causes or is likely to cause localized, off-site adverse effects. If an event reaches this level, the instructions must indicate the need to contact the Safety, Process and Compliance Manager/appropriate Regional Hub Manager.

Level 3 is an actual or potential situation that will likely require additional resources and/or threatens continued operations. It may require corporate-level support including the activation of the OCWA Action Group and opening of an Emergency Operations Centre (EOC) as described in the corporate ERP. Level 3 events usually involve intervention from outside organizations (client, emergency responders, the Ministry of Environment, Conservation and Parks (MECP), media, etc.).

The MECP has the authority under the *Safe Drinking Water Act* to serve OCWA with a Notice of Emergency Response. Receipt of this Notice triggers a Level 3 event.

Other examples of potential Level 3 events include:

- Disruption of service/inability to meet demand from any cause - including:
  - Explosion/fire
  - Power failure
  - Equipment failure
- Critical injury including loss of life;
- Breach of security that is a threat to public health;
- Intense media attention where the integrity of OCWA, its employees or its Operations is under scrutiny;
- Community emergency affecting water supply/treatment;
- Declared pandemic in Ontario; and
- Catastrophic failure (from any cause) that could impact public health or the environment, or cause significant property damage.

An event may initially be responded to as a Level 1 or 2, but continuing circumstances could elevate it to a Level 3 event (e.g., a continuing rainfall/storm). If an event reaches this level, there is a need for both an effective operations response and effective incident management.

In the event of a Level 3 event, the FEP directs operations personnel/management to immediately contact their Regional Hub Manager, or the VP of Operations, or as a 24/7 back-up, the Hotline (MECP Spills Action Centre (SAC): 1-800-268-6060), to trigger the ERP.

3.0 Scope of the Facility Emergency Plan

The FEP supports the facility level response to and recovery from Level 1, 2 and 3 events related to water and wastewater operations and directly links to the ERP for the management of serious operations emergencies that require corporate support (Level 3 events). Events are addressed through facility-specific contingency plans and/or standard operating procedures.

The FEP does not address the following:

- Labour disruptions (a confidential plan is in place for these emergencies);
- Failure of a critical business function/service at OCWA's corporate office (refer to OCWA's Continuity of Operations Plan specifically created for these emergencies); and
- Corporate level response and recovery to Level 3 events related to operations (refer to OCWA's ERP).

4.0 Legislative Framework

The FEP is an important part of OCWA's QEMS which supports compliance with both legislative and OCWA corporate requirements. The FEP was initially approved by OCWA's former Operations & Compliance Committee as a mandatory program. On-going revisions to the FEP are approved by the Safety, Process and Compliance Advisory Group (SPCAG). A sound FEP, with complete documentation,

provides evidence of due diligence during regulatory inspections/investigations and is verified through internal and external audits.

In developing, maintaining and continually improving the FEP, the following requirements were taken into consideration:

- **Wastewater Environmental Compliance Approvals** (ECA) issued by the MECP. ECAs may have slightly different wording related to Contingency Plans requirements depending on when the ECA was issued.
    - In older ECAs, the Owner of a wastewater facility is required to:
        - Establish a spill prevention control and contingency plan, consisting of procedures and contingency plans for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the local District Manager.
    - In newer ECAs, they are required to include:
        - Operating procedures to handle situations outside Normal Operating Conditions and emergency situations such as a structural, mechanical or electrical failure, or an unforeseen flow condition, including procedures to minimize Bypasses and Overflows.
        - A spill prevention and contingency plan, consisting of procedures and contingency plans, including notifications to the District Manager, to reduce the risk of spills of pollutants and prevent, eliminate or ameliorate any adverse effects that result or may from spills of pollutants;
- **Municipal Drinking Water Licences** issued by the MECP require Owners/Operators of drinking water systems to establish contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies, upset conditions and equipment breakdown.
- The **Drinking Water Quality Management Standard (DWQMS)**, established under the *Safe Drinking Water Act*, requires operators of municipal residential drinking water systems to establish an emergency management procedure that includes:
    - A list of potential emergency situations or service interruptions;
    - Processes for emergency response and recovery;
    - Emergency response training and testing requirements;
    - Owner and Operating Authority responsibilities during emergency situations;
    - References to municipal emergency planning measures (as appropriate); and
    - An emergency communication protocol and an up-to-date list of emergency contacts.
- The **DWQMS** also requires:
    - Operators of municipal residential drinking water systems to identify all supplies and services essential for the delivery of safe drinking water; and
    - That a risk assessment be conducted for each drinking water system to identify potential hazardous events. The risk assessment outcomes may indicate when there is a need for a site-specific contingency plan to address a particular hazardous event.
- Under the federal **Environmental Emergency (E2) Regulations** of the *Canadian Environmental Protection Act* (CEPA), any facility which has a listed substance located onsite must prepare and implement an environmental emergency plan (E2 Plan) if:

- some or all of the substance is not in a container system and the maximum expected quantity of the substance is at or above the specified threshold quantity for that substance; or
- the substance is in a container system and the maximum expected quantity of the substance is at or above the specified threshold quantity for that substance and the container system's maximum capacity is equal to or greater than the specified quantity for that substance. (A container system includes the network of receptacles used to contain a substance and any connected piping but does not include any parts of that network that can be automatically or remotely segregated from the rest by shut-off valves, or other mechanisms.)

An E2 Plan must include:

- A description of characteristics of the substance, the maximum expected quantity at the facility and the activity/process that involves the substance at the facility;
- A description of the facility and the area around the facility that may be affected in the case of an environmental emergency;
- Identification of any environmental emergency reasonably expected to occur with an identification of the harm or danger;
- Measures used to prevent, prepare for, respond to, and recover from the environmental emergency;
- Positions, roles and responsibilities of individuals who are responsible for carrying out the plan;
- Training taken or to be provided for the individuals above;
- List of emergency response equipment and its location; and
- Measures to be taken to notify the public who may be affected by the environmental emergency.

The E2 Plan must undergo a simulation test annually and a full-scale test (with the deployment of personnel, resources and equipment) every 5 years.

- **ISO 14001**, the international standard for environmental management systems, requires organizations to establish, implement and maintain procedures to identify potential emergency situations and potential accidents that can impact the environment and how the organizations will respond to them to prevent or mitigate associated adverse environmental impacts. The organization must set requirements for the periodic review and testing of the procedures.
- Ontario's ***Emergency Management & Civil Protection Act (EMCPA)*** sets clear rules for emergency planning for municipalities and ministries and designated government agencies.

Although not all of the above requirements apply universally to water and wastewater facilities, OCWA recognizes their value as useful models for the FEP and every effort has been made to incorporate the requirements as well as industry best practices where practical. It is OCWA's expectation that where specific legislative and regulatory requirements apply, facility Operations Management will ensure that the site-specific Facility Emergency Plan (and other documentation as necessary) fully complies.

5.0 Roles and Responsibilities

The following table (Table 1) summarizes the key roles and responsibilities for implementation of the FEP at OCWA-operated facilities. Specific roles and responsibilities related to a particular emergency

situation or service interruption (including those of the Owner/Client where applicable) are set out in the relevant site-specific contingency plan. Additional information on emergency roles and responsibilities may also be contained in the service agreement with the facility's Owner/Client. For corporate level roles and responsibilities related to Level 3 Events, refer to the ERP.

Table 1: FEP-Related Roles and Responsibilities

Position	Responsibilities
Owner/Client	• Make decisions related to repair and replacement when damage exceeds a predetermined level. • May make external communications related to the emergency situation depending on local arrangements. • May have specific responsibilities for emergency response/recovery set out in the appropriate contingency plan. • Additional responsibilities may also be included in the operating agreement.
VP of Operations	• Refer to the ERP for corporate level roles and responsibilities.
Regional Hub Manager (General Manager may also fulfill these responsibilities)	• Ensure that each facility in the Regional Hub has a site-specific emergency plan that meets the corporate standard. • Establish, with their Operations Management team, the method and the timing of notification for emergencies and other incidents. • Act as a communication link between Operations Management and the VP of Operations. • May act as a designated media spokesperson. • Other duties as defined in the ERP.
Safety, Process and Compliance (SPC) Manager	• Support the implementation of the FEP at each facility in the Regional Hub including advising on/assisting with reviews/tests and training (as required). • Report to the Regional Hub Manager on any need for improvement. • Provide support to Operations Management and operations personnel including incident reporting & response to regulators.
Operations Management	• Establish a site-specific emergency plan (FEP) that meets the corporate standard for each facility. • Take charge; lead on-site emergency response. • Ensure FEP training is provided for staff (in conjunction with the SPC Manager as required). • Coordinate with Owner/Client on Owner/Client responsibilities and the Municipal Emergency Response Plan. • Other duties as defined in the ERP.
Operations Personnel	• Participate in training on the FEP. • Participate in reviews/tests and contribute to continual improvement of contingency plans and standard operating procedures. • In the event of an emergency take action in keeping with training and knowledge and in accordance with the FEP.
Process & Compliance Technician (PCT)/ Operations & Compliance Team Lead	• Actively participate in the development and maintenance of facility emergency plans (assist Operations Management/SPC Managers in fulfilling their role). • Conduct internal audits (as required) to ensure the FEP requirements are being met. • Ensure facility FEPs are kept up-to-date (with records of reviews and updates) and made available to all operations personnel. • Ensure facility contingency plans are reviewed and tested as required. • Report to the SPC Manager on FEP implementation and any need for improvement. • Support cluster/facility level training on the FEP.

Position	Responsibilities
Administrative Assistant	• Assist in maintenance of the FEP as assigned. • Enter training records related to the FEP in the training database (as assigned).
Corporate Compliance	• Coordinate the development and continual improvement of the corporate standard template for the FEP. • Communicate any changes within the FEP corporate standard template/ procedures to appropriate staff and provide guidance/support for FEP implementation.
Emergency Management Program Committee	• Provide overall direction on OCWA's approach to facility emergency planning
Safety, Process and Compliance Advisory Group (SPCAG)	• Review and approve the corporate standard templates for the FEP.

6.0 Prevention/Mitigation, Preparation, Response and Recovery

OCWA has built its Emergency Management Program on the principles of *prevention/mitigation, preparation, response* and *recovery*. The prevention/mitigation and preparation approach is the same for all OCWA-operated facilities and so this documentation can be applied at all facilities. The response and recovery elements are detailed in the site-specific contingency plans which are intended to effectively cover response and recovery right back to restoration of normal operations.

6.1. Prevention/Mitigation

Prevention refers to measures taken in advance of an emergency to prevent or reduce the likelihood of an emergency occurring. Mitigation refers to the steps taken in advance of an emergency to reduce the negative effects or consequences of an emergency. In practice these can be considered together. Preventive/mitigation measures can significantly reduce the need for response and recovery activities and associated costs.

The four main elements of effective prevention/mitigation at OCWA-operated facilities are:

1. **Well-designed facilities** – Whenever possible, equipment/process redundancies (including back-up power generation) have been incorporated into the facility's design in keeping with modern engineering practices and regulatory requirements. Facilities should also have effective monitoring and alarms to warn of potential emergencies (further discussed below). OCWA's clients own the facilities and are responsible for the design and construction; therefore, this is an element of prevention/mitigation that OCWA does not have control over. However, problems with design, that compromise effective operations, must be brought to the attention of the Owner/Client.

2. **Effective maintenance** – The failure of a critical piece of equipment is often the trigger for an emergency condition. As a preventive measure, equipment maintenance requirements are identified and scheduled in OCWA's Work Management System (WMS). Replacement parts or

equipment may be maintained on-site to limit the duration this equipment is out-of-service.

3. **Professional staff** – OCWA staffs its facilities with appropriately licensed/certified operators and qualified trades people. Operations personnel receive site-specific training on relevant operational and emergency response procedures to ensure they are able to perform their duties effectively.

4. **Quality & Environmental Management System (QEMS)** – The Emergency Management Program is an important element of OCWA's QEMS. The effectiveness of the Emergency Management program is verified through OCWA's Internal Audit Program. The audits identify deficiencies that can then be addressed before they lead to an emergency situation, and also are a driver to support continual improvement of the program.

6.2. Preparation

OCWA understands that even with the best prevention measures in place, emergency conditions will arise. Therefore, it is essential to be prepared by taking action prior to an emergency to ensure an effective response. Preparation activities can both support and enhance mitigation, response and recovery.

Preparation for serious emergencies (Level 3) that need corporate OCWA support include:

- Development and annual review of the corporate emergency plan which includes the Emergency Response Plan (ERP);
- Maintenance of a 24-hour emergency hotline (through MECP Spills Action Centre);
- Training of senior management on their responsibilities; and
- Testing of the ERP.

Preparation for facility emergencies includes:

- Development and continual improvement of the FEP;
- The review of the FEP by operations personnel;
- Training for key staff on the FEP;
- Assignment of clear roles and responsibilities;
- Development, testing and maintenance of contingency plans;
- Setting of critical alarms and development of response procedures (see below for additional guidance); and
- Striving to maintain a state of readiness that will enable self-sufficiency should an emergency occur.

<u>Alarms – Additional Guidance</u>
Operations Management must ensure that regulatory and operational requirements for alarms are met. Taking into account the wide range of facilities and the range of alarm configurations, the following are offered as a guide to Operations Management:

Note: The focus here is on alarms that require an immediate response by an operator including an after-hours response (i.e. critical alarms).

- Maintain a list of critical alarms.

  - For drinking water facilities, include alarms required under Schedule 6 of O. Reg. 170 under the SDWA and, if applicable, those that relate to a DWQMS "critical control point" (Element 8 of the DWQMS requires that these points and their respective critical control limits (e.g., alarm set points) be identified in the drinking water system's Operational Plan).
  - For wastewater facilities, identify alarms that relate to critical processes within the operations. (Review your operations manual, equipment manuals, and Environmental Compliance Approvals (ECA).)

- For all facilities ensure there are procedures that document the expected response to specific alarms, the essential steps to be taken when responding to each critical alarm and instructions on documenting the response. (This documentation would be critical to establish due diligence if the incident and the response is investigated.)
  - For drinking water systems, Element 8 of the DWQMS also requires written procedures for monitoring critical control limits and for responding to, reporting and recording deviations from the critical control limits.
  - For wastewater facilities, the ECA requires procedures for inspecting and calibrating monitoring equipment and for dealing with emergency situations and those outside of Normal Operating Conditions as outlined in section 4 (Refer to your facility's ECA for specific requirements).
- Ensure relevant staff are trained so that they understand and are ready to follow these procedures. Document that relevant staff are aware of these procedures.

Potential critical alarms could include:

- General
  - Intrusion
  - Power failure
  - Loss of communication
  - Chemical leak (e.g., chlorine gas, sodium hypo, alum, etc.)
- Water System
  - Low/high chlorine residual
  - High turbidity
  - Low distribution system pressure
  - Low/high tower/clearwell/reservoir level
  - Low/high fluoride residual
  - Low UV dose/intensity/UV Transmittance (UVT)
  - Chemical system failure (e.g. coagulant)
- Wastewater System
  - Low/high wet well/tank/chamber
  - Blower failure/low dissolved oxygen (DO)
  - Bypassing/Overflows (high flows)
  - Disinfection failure (e.g., low chlorine residual, low UV dose)

6.3. Response and Recovery

Response to an emergency involves measures to react and manage the situation until it is resolved. Response activities seek to address immediate and short-term effects and are normally in accordance with standard operating procedures and/or contingency plans. In contrast, recovery focuses on repairing damage, returning to acceptable conditions/normal operations and recovering losses. Response and recovery activities will vary depending on the specific circumstances of the emergency and may require action that goes beyond the scope of a contingency plan. In each case a more detailed plan for response and later recovery will likely be required.

The main goals of the response and recovery aspects are to:

- Protect public health and ensure the safety and the protection of the health of responding staff;
- Protect the environment and property;
- Minimize any disruption to drinking water/wastewater service;
- Facilitate effective communications with all parties;
- Adequately staff and fund the recovery process. A dedicated recovery team with a leader may be appropriate;
- Identify and manage any risks that could have an impact on the success of recovery;
- Fully restore service; and
- Provide feedback for continual improvement.

7.0 Minimum Requirements for the Facility Emergency Plan

Corporate Compliance is responsible for coordinating the development, maintenance and continual improvement of the corporate standard templates for the FEP. It is the responsibility of the Operations Management (in conjunction with the Safety Process and Compliance Manager) to ensure that a site-specific FEP that meets the corporate standard is established and kept up-to-date for each facility that they are responsible for.

Minimum Requirements for a Site-Specific FEP
The following table (Table 2) sets out the contents of the current OCWA standard for a FEP and related minimum requirements.

Table 2: OCWA's Minimum Requirements for a Site-Specific FEP

Section	OCWA Requirements
General Requirements	• All employees involved in emergency response at a facility must be trained on the contents of the site-specific FEP (refer to Table 4 in section 9.0). • Training on the FEP must be recorded on OCWA's Training Record as on-the-job practical training and must be entered in the training database. • Records related to the development, implementation, testing and maintenance of the FEP must be retained as per OCWA's retention schedules. • The FEP template includes the fundamentals of sound document control (e.g., dates, page numbers, revision numbers, revision histories, etc.). Final versions of the site-specific documents must maintain the document control features of the templates (with appropriate modifications).

Section	OCWA Requirements
Contact List	• Each FEP must contain an emergency contact and essential supplies and services list. • The list must be reviewed/updated at least **once per calendar year**. A reminder work order may be scheduled in OCWA's Work Management System (WMS). • A current copy of the corporate "Emergency Communication Protocol" must be included in this section.

Contingency Plans (CPs)[1]	• CPs to address potential emergency situations or service disruptions must be established for each facility. These must include:
	  ○ The OCWA mandatory contingencies applicable to the type of facility, (corporate mandatory CP templates are available but will require some modifications to make them facility specific); and
	  ○ CPs to address site-specific risks identified for the facility.
	• **One CP must be tested each calendar year** (an actual event counts as a test as long as a debrief of the event occurs and lessons learned from the event are documented).
	• **Each CP must be reviewed at least once in a five calendar year period** (a test or an actual event counts as a review of the relevant CP).
	• The results of CP reviews and tests must be recorded on OCWA's "Contingency Plan Review/Test Summary Form". Time spent by staff participating in a facilitated review (e.g., during a staff meeting or one-on-one/group review with manager/PCT) or in a test of a CP should be recorded as on-the-job practical training (use OCWA's Training Record and ensure it is entered in the training database). A reminder work order may also be scheduled in WMS as appropriate. Completed forms may be maintained electronically (e.g., on a shared drive or as an attachment in WMS) as long as they are accessible for auditing purposes.

Related SOPs	• Corporate Compliance has developed the following SOP templates that are associated with and referenced within the OCWA mandatory CPs:
	  1. Reporting Adverse Water Quality[2]
	  2. Provision of An Alternate Water Source
	  3. Reporting a Non-Compliance
	  4. Reporting Spills and Other Discharges
	  5. Bypasses and Overflows[3]
	• These related SOP templates set out the procedures for activities that would be required to be conducted as part of the response outlined in the CPs (e.g., documenting/reporting during emergencies). They are intended as guidance and can be modified to incorporate site-specific requirements.
	• Each FEP should include the related SOPs as applicable to that type of facility (or an equivalent if a similar site specific SOP has previously been developed). However, if the facility prefers to keep these SOPs in another location accessible to responding staff, a reference to that location should be included in this section. Other 'operational' SOPs for the facility may also be contained in this binder (e.g. in the appendices section) or in another manual (e.g. O&M manual or SOP binder).
	• The related SOPs are expected to be tested and reviewed at the same time as the associated CP which references it and the SOP reviewed/tested should be

Section	OCWA Requirements
	recorded on OCWA's "Contingency Plan Review/Test Summary Form". Time spent by employees participating in facilitated reviews of these related SOPs (e.g., during a staff meeting) can be recorded as on-the-job practical (OTJ) training (use OCWA's Training Record and ensure it is entered in the training database).
Site Plan/Process Diagram/Emergency Equipment	• This section should contain a general process diagram/schematic. • It should also contain site plan(s) that indicate the location of each building and tank (above and underground), important piping and key valves and, if practical, confined spaces. • The plan(s) must indicate the location of emergency equipment within each building as applicable. This may include: ○ Spill kits (an inventory of the spill kit should be posted with the kit and regular checks should be scheduled in WMS) ○ First aid kits (refer to OCWA's Safety Manual for requirements) ○ SDS (Right-To-Know) stations ○ Fire extinguishers ○ Deluge showers and eye wash stations ○ Gas detectors and alarms ○ Personal Protective Equipment (PPE) storage ○ Self-Contained Breathing Apparatus (SCBAs) and/or other types of respirators • Plan(s) must be updated each time there is a significant change and facilitated reviews of this section by staff should be recorded as on-the-job practical training. • To enhance preparedness, arrangements should be made with the local fire department to allow them to familiarize themselves with the site plan(s) and overall facility.
Appendices	• OCWA's Approach to Facility Emergency Planning ○ An up-to-date version of this program document must be maintained as an appendix (Corporate Compliance will advise when new revisions are issued). • Municipal Emergency Response Plan (MERP) ○ Where they exist, any relevant sections of the MERP must be included as an appendix (include and highlight sections where a specific role has been assigned to the operator of the water/wastewater facility). ○ Providing clear direction as to where the most current version of the MERP is located is an acceptable alternative. ○ Measures specified in the MERP should be incorporated into the facility's CPs where appropriate. ○ As a best practice, Operations Management should request that any changes to the MERP that may impact OCWA's role in emergency situations be communicated by the Municipal Emergency Management Program Coordinator. • Other suggested appendices include: ○ Up-to-date sludge/waste hauler's contingency plans. ○ Emergency requirements set out in applicable Source Protection

Section	OCWA Requirements
	Policies, or Federal Environmental Emergencies (E2) Plans. ○ Other appropriate support/guidance materials (e.g., OCWA's Managing Hazardous Waste Guidance Document as referenced in CP-01). ○ Other operational SOPs not specifically related/referenced in CPs may also be kept in the FEP binder.

[1] Additional guidance with respect to mandatory and site-specific contingency plans is provided below.

[2] Two versions are available – one for drinking water systems regulated under SDWA O. Reg. 170 and one for small drinking water systems regulated under HPPA O. Reg. 319.

[3] This SOP template was designed to be used for wastewater facilities that have been issued an Environmental Compliance Approval (ECA) based on the MECP's Standardized template ECA for Sewage Works. For facilities issued an ECA that does not use the MECP's template ECA, a site-specific SOP should be developed based on the conditions within the facility's current ECA.

8.0 Contingency Plans

Corporate Compliance (in consultation with key internal stakeholders) has developed generic contingency plan templates for the six mandatory contingencies. These require review and at least minor input to make them site-specific.

The following table (Table 3) sets out OCWA's current list of mandatory contingencies:

Table 3: OCWA's Mandatory Contingencies for Water and Wastewater Facilities

Emergency Situation/Service Disruption	Applies to:	
	Water	Wastewater
Unsafe Water	✓	✗
Spill Response	✓	✓
Critical Injury	✓	✓
Critical Shortage of Staff	✓	✓
Loss of Service	✓	✓
Security Breach (addresses cyber and physical security threats)	✓	✓

Site-specific risks may also be identified that require a contingency plan (e.g., flooding, forest fires or other natural disasters, upset conditions caused by upstream industrial discharge, source water contamination, alternative sludge storage/haulage, etc.). These additional site-specific CPs must also be contained with the FEP binder.

To set out procedures for situations under normal operating conditions or situations outside normal operating conditions, a Standard Operating Procedure (SOP) should be implemented/followed. As appropriate, these 'operational' SOPs may link to a contingency plan(s) for situations that become a more serious emergency. As noted in Table 2 of section 7, these SOPs may be also be contained in this binder (e.g., in the appendices section) or in another manual (e.g., O&M manual or SOP binder).

8.1. CP/Related SOP Review Requirements

As indicated in Table 2 of section 7, each contingency plan (mandatory and site-specific) must be reviewed at least once within five calendar years (effective beginning in 2014). A test or a debrief of an

actual event relevant to a CP can also be counted as a review. A review can be as simple as an individual (e.g., PCT, operator or manager), or a small group of staff, reading through a CP and any related SOPs referenced in the CP, identifying opportunities for improvements, if any, and recording the review on the Contingency Plan Review/Test Summary Form and in WMS as appropriate. CP/related SOP reviews can be recorded as training if they meet the requirements of OTJ training as per Section 9 below.

8.2. CP/Related SOP Test Requirements

At least one CP must be tested each calendar year. Wherever possible CP tests should be structured as a training exercise and include as many facility/operations personnel (OICs/ORO) as are available.

A test can be:

- *Table-top exercise* – A scenario related to one of the CPs (and any related SOPs) for the facility that is worked through by personnel with responsibility for responding.
- *Walk-through drill* – A scenario related to one of the CPs (and any related SOPs) for the facility that is tested on-site with appropriate personnel performing at least some of the actions they would take in a response (no off-site involvement).
- *Full-scale exercise* – A scenario related to one of the CPs (and any related SOPs) for the facility that is fully tested on-site with appropriate personnel and involves coordination with at least some of the external contacts/off-site resources.
- *Actual Event/Incident*– In order to be counted as a test, a debrief must take place to review the situation that occurred that relates to the CP for the facility. Details of the situation, the actions taken to respond and any lessons learned following the resolution of the actual event, should be reviewed with staff and recorded along with any opportunities for improvement.

If a CP (or related SOP) is applicable to multiple facilities (or the entire Regional Hub), a single test may be conducted to satisfy the testing requirement for all of the applicable facilities (or Regional Hub). In this case the description of the test and summary of actions resulting from the test should take into consideration how it would be implemented at each facility and identify site-specific circumstances (if any).

Note: When conducting a test and making contact with participants, be sure to preface your remarks with *"This is a test"*.

Record the test(s) on the Contingency Plan Review/Test Summary Form and in WMS as appropriate.

Ideally, the type of test should be varied from year-to-year to fully support the preparedness of emergency responders. The Safety, Process and Compliance Manager and/or Corporate Compliance can support tests and may be able to assist in providing sample scenarios.

9.0 Training Requirements

The following table sets out OCWA's training requirements related to the FEP. **Note:** This table does not include training requirements for employees with responsibilities under OCWA's other emergency plans (e.g., ERP, Continuity of Operations Plan, etc.).

Table 4: OCWA's FEP Training Requirements

Training Topic	Training Provider	Type of Training	Frequency	Required For
Establishing and maintaining a FEP that meets the corporate standard	Safety, Process and Compliance Manager and/or Corporate Compliance (as required)	On-the-Job Practical	Upon hire and when changes are made to the corporate standard*	PCTs (or others identified by the Operations Management)
Contents of the site-specific FEP	Facility-Level (e.g., Coordinated by PCT /QEMS Representative)	On-the-Job Practical	Upon hire and when changes to the FEP are made	All operations personnel with responsibilities for responding to an emergency**

*Note: Changes to the corporate standard templates may only require the change to be communicated to Operations for implementation. Therefore, not all changes will require training.

**Consideration should be given to invite municipal/Owner/Client representatives to participate in this training if appropriate.

As indicated above, reviewing and testing contingency plans and other elements of the FEP constitutes on-the-job practical training provided it meets requirements listed in the *MECP's guidance 'Training Requirements for Drinking Water Operator's'*. To meet the MECP's requirements, the training must:

- Be a structured learning event, involving contact between the learner and instructor (contact implies 2-way communication);
- Have documented learning objectives;
- Be delivered by a person with expertise in the subject matter that is being covered;
- Include a training record (OCWA's Training Record meets the requirements); and
- Be on a subject directly related to the duties typically performed by an operator (this includes emergency and contingency planning).

The instructor in this case could be the PCT, SPC Manager, Operations Management or some other person/staff member with expertise related to the FEP or the specific CP/related SOP being tested or reviewed. A sample learning objective for a review could be: *"To review CP XX to identify opportunities to improve the CP and to increase operator awareness of response procedures."* A sample learning objective for a test could be: *"to identify opportunities to improve the response procedures and to ensure operators have the information and equipment necessary to respond to XX events"*

10.0 FEP Support

For additional information or guidance regarding the FEP or OCWA's Emergency Management Program, contact Corporate Compliance or your Safety, Process Compliance Manager.