BCX ENVIRONMENTAL CONSULTING

Emission Summary and Dispersion Modelling (ESDM) Report in Support of an Application for an Amended Environmental Compliance Approval (Air and Noise)

The Midhurst Landowners Group c/o 1755575 Ontario Inc. Midhurst Interim Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP)

Report to: Ministry of the Environment, Conservation and Parks
Client Services and Permissions Branch
135 St. Clair Ave W., 1st Floor
Toronto, Ontario
M4V 1P5

Prepared for: The Midhurst Landowners Group
c/o 1755575 Ontario Inc.
300-3190 Steeles Avenue East
Markham, Ontario
L3R 1G9

Site Address: Midhurst Interim Water and Wastewater Treatment Plant
1432 Snow Valley Road
Springwater, Ontario
L0L 1Y3

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BCX File No. 1365-01.02

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Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) report is being submitted by The Midhurst Landowner's Group (the Company) in support of an application for an amended Environmental Compliance Approval (Air & Noise) under Section 9 of the Environmental Protection Act for ultimate phase 1 of the proposed water treatment plant (WTP) and wastewater treatment plant (WWTP) to be located at 1432 Snow Valley Road in Springwater, Ontario (Facility).

The ESDM Report has been prepared in accordance with Section 26 of Ontario Regulation 419/05; the Ministry of the Environment, Conservation and Parks' (Ministry's) *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2018)* (Ministry Procedure), the Ministry's *Air Dispersion Modelling Guideline for Ontario (February 2017)* (ADMGO), and the *Technical Bulletin: Methodology for Modelling Assessments of Contaminants with 10-Minute Average Standards and Guidelines for Odour under O. Reg. 419/05 (September 2016).*

In accordance with the approved Midhurst Class Environmental Assessment, the Facility is to be designed and constructed in phases. This application is for the ultimate phase 1 of the Facility, which will service up to 5,000 residential units.

The primary air emissions expected from the Facility will be (i) ammonia and odour-causing compounds including hydrogen sulphide, and total reduced sulphur, as well as odour generated through the processing and treatment of wastewater; and (iii) nitrogen oxides (NO_X), generated from the routine testing of the standby diesel generators servicing the WTP and WWTP.

The emission inventory was developed based on source testing data for both a larger scale conventional WWTP as well as a similar membrane bioreactor WWTP, engineering calculations, and manufacturer's specifications.

Maximum site-wide emissions were modelled using the Ministry approved U.S. EPA AERMOD system (version 19191) and the Ministry processed site-specific meteorological data. The resulting Point-of-Impingement (POI) concentrations were compared to the standards, guidelines, and screening levels in the Ministry Air Contaminants Benchmark (ACB) List, dated April 2023. As presented in Table ES-1, all modelled concentrations were below their respective Ministry standards, guidelines, or screening levels.

NO_X emissions from routine testing of the emergency generator were modelled using the Ministry approved U.S. EPA AERMOD dispersion model (version 19191) and compared to applicable POI limit contained in the Ministry *Emergency Generator Checklist Supplement to Applications for Approval, EPA S.9 (November 2010)*. All modelled concentrations were below Ministry limits, as presented in Table ES-1.

With respect to odour, the maximum 10-min average odour concentrations are no greater than 1 OU/m^3 for more than 0.5% of the time at any of the offsite existing and proposed sensitive receptors, using a conservative maximum emissions scenario. As shown in Table ES-1, the Facility meets the Ministry's odour guideline.

Table ES-1: Emission Summary Table

Contaminant	CAS No	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Averaging Period Emission Rate	Averaging Period POI Concentration	Ministry POI Limit (µg/m^3)	Limiting Effect	Regulation Schedule #	Percentage of Ministry POI Limit (%)
Scenario 1 - Treatment Operations										
Hydrogen Sulphide	7783-06-4	6.63E-05	AERMOD	1.62E-07	1 hr	10 min	13	Odour	3	0.0%
Hydrogen Sulphide	7783-06-4	6.63E-05	AERMOD	4.05E-08	24 hr	24 hr	7	Health	3	0.0%
Ammonia	7664-41-7	1.91E-01	AERMOD	1.17E-04	24 hr	24 hr	100	Health	3	0.00%
Total Reduced Sulphur	TRS	6.63E-05	AERMOD	1.62E-07	1 hr	10 min	13	Odour	3	0.0%
Total Reduced Sulphur	TRS	6.63E-05	AERMOD	4.05E-08	24 hr	24 hr	7	Health	3	0.0%
Odour [(2)]	-	4.98E+03	AERMOD	6.65E-01	1 hr	10 min	1	Odour	Guideline	66.5%
Nitrogen Oxides	10102-44-0	8.86E-02	AERMOD	9.90E+01	1 hr	1 hr	400	Health	3	24.8%
Nitrogen Oxides	10102-44-0	8.86E-02	AERMOD	3.48E+01	24 hr	24 hr	200	Health	3	17.4%
Scenario 2 - Emergency Generator Testing [(1)]										
Nitrogen Oxides	10102-44-0	8.38E+00	AERMOD	3.05E+02	1 hr	1/2 hr	1880	Health	Other	16.2%
Nitrogen Oxides	10102-44-0	8.38E+00	AERMOD	4.18E+01	1 hr	1/2 hr	500	Health	Other	8.4%

[(1)] Other - The modelling results at the non-sensitive receptors (houses, commercial plazas) were compared to the 1/2-hour screening level of 1880 µg/m^3. The modelling results of sensitive receptors (places of worship, schools, daycares) were compared to the 1/2-hour screening level of 500 µg/m^3 for the sensitive receptors outlined in the Ministry Emergency Generator Checklist, Supplement to Application for Approval, s.9.

[(2)] The maximum concentration for odour was calculated in OU/m^3. The odour concentration is based on the maximum 99.5th percentile result from AERMOD after removing the top 0.5% results for all offsite receptors.

Ontario

Ministry of the Environment, Conservation and Parks

Emission Summary and Dispersion Modelling Report Checklist

Company Name

1766676 Ontario Inc.

Company Address

Unit Number	Street Number	Street Name	PO Box
300	3190	Steeles Avenue East	

City/Town	Province	Postal Code
Markham	Ontario	L3R 1G9

Location of Facility

1432 Snow Valley Road, Springwater, Ontario, L0L 1Y3

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s. 26 of O. Reg. 419/05 and the guidance in the MECP document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

Company Contact

Vimal Patel

Company Contact Name

Last Name	First Name	Middle Initial
Patel	Vimal	

Title	Telephone Number
Senior Project Manager	905-413-7174

Signature	Date (yyyy/mm/dd)
	2023/04/12

Technical Contact

Technical Contact

Xiaoxi (Winnie) Song, M.Sc., P. Eng.

Technical Contact Name

Last Name	First Name	Middle Initial
Song	Xiaoxi	

Representing	Telephone Number
BCX Environmental Consulting	905-235-4218

Signature	Date (yyyy/mm/dd)
	2023/04/12

* This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009.

Emission Summary and Dispersion Modelling Report Checklist

	Required Information	Submitted	Explanation/Reference
	Executive Summary and Emission Summary Table		
	1.1 Overview of ESDM Report	☑ Yes	Executive Summary
	1.2 Emission Summary Table	☑ Yes	Table ES-1
1.0	**Introduction and Facility Description**		
	1.1 Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☑ Yes	Section 1.0
	1.2 Description of Processes and NAICS code(s)	☑ Yes	Section 1
	1.3 Description of Products and Raw Materials	☑ Yes	Section 1.2 and 1.3
	1.4 Process Flow Diagram	☑ Yes	Figure 1A and 1B (Appendix A)
	1.5 Operating Schedule	☑ Yes	Section 1.2
2.0	**Initial Identification of Sources and Contaminants**		
	2.1 Sources and Contaminants Identification Table	☑ Yes	Section 2, Table 1
3.0	**Assessment of the Significance of Contaminants and Sources**		
	3.1 Identification of Negligible Contaminants and Sources	☑ Yes	Section 2, Table 1
	3.2 Rationale for Assessment	☑ Yes	Section 3
4.0	**Operating Conditions, Emission Rate Estimating and Data Quality**		
	4.1 Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☑ Yes	Section 4, Appendix B
	4.2 Explanation of Method used to calculate the emission rate for each contaminant	☑ Yes	Appendix B
	4.3 Sample calculation for each method	☑ Yes	Appendix B
	4.4 Assessment of Data Quality for each emission rate	☑ Yes	Table 2, Appendix B
5.0	**Source Summary Table and Property Plan**		
	5.1 Source Summary Table	☑ Yes	Table 2
	5.2 Site Plan (scalable)	☑ Yes	Figure 2A and 2B (Appendix A)
6.0	**Dispersion Modelling**		
	6.1 Dispersion Modelling Input Summary Table	☑ Yes	Table 4
	6.2 Land Use Zoning Designation Plan	☑ Yes	Appendix A
	6.3 Dispersion Modelling Input and Output Files	☑ Yes	N/A
7.0	**Emission Summary Table and Conclusions**		
	7.1 Emission Summary Table	☑ Yes	Table 5
	7.2 Assessment of Contaminants with no MECP POI Limits	☑ Yes	N/A
	7.3 Conclusions	☑ Yes	Section 7
	Appendices (Provide supporting information or details such as…)		
	Figures and Zoning Map/Emission Calculations	☑ Yes	Appendix A/B
	Equipment Specifications/AERMOD Supporting Files	☑ Yes	Appendix C/D
		☐ Yes	

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APPENDICES

1 INTRODUCTION

The Midhurst Landowner's Group (the Company) retained BCX Environmental Consulting (BCX) to prepare this Emission Summary and Dispersion Modelling (ESDM) report in support of an amended Environmental Compliance Approval (Air & Noise) (ECA) under Section 9 of the Environmental Protection Act for ultimate phase 1 of the proposed Midhurst Water Treatment Plant (WTP) and Wastewater Treatment Plant (WWTP) to be located at 1432 Snow Valley Road in Springwater, Ontario (Facility).

The ESDM report has been prepared in accordance with Section 26 of Ontario Regulation (O. Reg.) 419/05; the Ministry of the Environment, Conservation and Parks' (Ministry's) *Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2018)* (Ministry Procedure), the Ministry's *Air Dispersion Modelling Guideline for Ontario (February 2017)* (ADMGO), and the *Methodology for Modelling Assessments of Contaminants with 10-Minute Average Standards and Guidelines for Odour under O. Reg. 419/05 (September 2016)* (Methodology).

The Facility's primary North American Industry Classification System (NAICS) codes are 221310 – Water Supply and Irrigation Systems, and 221320 – Sewage Treatment Facilities.

1.1 Environmental Activity and Sector Registry Eligibility

O. Reg. 1/17 details the eligibility for registration in the Environmental Activity and Sector Registry (EASR) for activities requiring assessment of air emissions (Air Emissions EASR).

Section 2(2) of O. Reg. 1/17 describes facility activities and/or operations that are not eligible for the Air Emissions EASR, thereby requiring the facility to obtain an Environmental Compliance Approval (ECA) under Section 9 of the Environmental Protection Act.

The primary NAICS codes for the Facility are 221310 – Water Supply and Irrigation Systems and 221320 – Sewage Treatment Facilities. Per Section 2(2) item 1 of O. Reg. 1/17 facilities with a primary NAICS code of 221320 are not eligible for the Air Emissions EASR. Therefore, the Facility must be permitted under an ECA.

1.2 Site Description

The Facility will be located at 1432 Snow Valley Road in Springwater, Ontario. The site layout (Figures 2A & 2B) and zoning map are provided in Appendix A.

The purpose of the Facility is to service the Midhurst Secondary Plan area as identified in the approved Midhurst Class Environmental Assessment (Ainley, 2018). The Facility is to be designed and constructed in phases. This application is for ultimate phase 1 of the Facility, which will service up to 5,000 residential units. This ESDM report addresses emissions from ultimate phase 1, only.

The WTP will use an ion exchange system to treat groundwater. The ultimate phase 1 WTP will have a maximum capacity of 2,114 cubic metres of influent per day (m^3/day) and will operate 24 hours per day, 7 days per week.

The WWTP will use membrane bioreactor (MBR) technology to treat wastewater. The ultimate phase 1 WWTP will have a maximum peak instantaneous flow of 15,517.4 m^3/day. The actual WWTP capacity is based on an average day flow of 6,450 m^3/day. The WWTP will operate 24 hours per day, 7 days per week.

1.3 Process Description

1.3.1 Water Treatment Plant

The ultimate phase 1 WTP will be composed of the following processes and primary components:

- Intake Pumphouses
- Cartridge Filtration
- Ion Exchange System
- High Lift Pump Station
- Disinfection
- Treated Water Reservoir

The WTP will be equipped with a dedicated stand-by diesel generator. The detailed process flow diagram is presented as Figure 1A (in Appendix A). The WTP plant does not have any odorous sources.

1.3.2 Wastewater Treatment Plant

Currently, the WWTP has the following processes and primary components, constructed during the interim phase:

- Headworks (influent pumping station, screen building, one equalization tank);
- Biological treatment (one anoxic, one aerobic tank, and three membrane tanks);
- UV Disinfection; and
- Waste activated sludge management (one sludge tank with jet mixing).

The existing interim WWTP will be removed and replaced with Ultimate phase 1 WWTP including the following processes and primary components:

- New headworks building (equipped with an onsite submersible sewage pump station (SPS), equalization tank, emergency storage tank);
- Aeration tanks (2);
- Circular secondary clarifiers (2);
- Recycled Activated Sludge (RAS)/ Waste Activated Sludge (WAS) rotary drum thickening building;

- Autothermal Thermophilic Aerobic Digesters (ATAD) (2);
- Storage Nitrification denitrification Reactor (SNDR) (1);
- Aeration Biological Nutrient Removal (BNR) Step Feed process;
- Biosolids storage tanks (2);
- Tertiary membrane filtration building (2 membrane tanks) with UV Disinfection (1 UV treatment); and
- Septage receiving station and storage tank.

The WWTP will also be equipped with two (2) dedicated stand-by diesel generators.

The detailed process flow diagram is presented as Figure 1B (in Appendix A). A detailed process description for the treatment train is presented in the following sections.

1.3.2.1 Headworks

Influent Submersible Sewage Pumping Station

The influent wastewater enters the WWTP through the influent submersible sewage pumping station.

Screen Building

The influent wastewater will be pumped through one of two mechanical bar rotating drum screens and a degritting system to remove any debris that might damage the membranes and pump equipment in the WWTP. The screenings (solids) will be transferred directly to a disposal bin. The effluent from the screening and degritting process is then pumped to the bioreactor process.

Secondary Distribution Chamber

The secondary distribution chamber allows for the split of the flow by weirs between the Phase 1 and Phase 2 secondary treatment plants. Tertiary backwash is discharged into this chamber along with thickening liquor flow. Alum is dosed directly into each of the weir chambers.

Odour Control for Head Works

The odorous air from the headworks is treated by a high performance two-stage carbon biofilter through two identical stacks before being exhausted to the atmosphere.

1.3.2.2 Secondary Treatment

Bioreactors

The wastewater leaving the Headworks building will enter the 4-pass bioreactor system for denitrification and reduce oxygen demand. The wastewater enters the bottom of the Bioreactor Distribution Chamber, from which the flow will be split four ways into the common feed channel. The flow will then enter each of the four passes in turn. Additional alum is added at the end of the common feed channel before heading to the clarifiers. The two concentric tanks share common headspace.

Secondary Clarifiers

Wastewater leaving the BNR process will enter two circular secondary clarifiers in series where the wastewater will sit for a period, allowing the suspended solids to settle to the bottom, forming the activated sludge which will be held in one of two underground sludge holding tanks. Some of this sludge is removed or wasted (WAS) and sent to the Thickener Building, and some is recycled

(RAS) back to the head of the common feed channel to ensure an adequate level of microorganisms are maintained to carryout the biological nutrient removal.

Odour Control for Secondary Treatment

The odorous air from the underground sludge holding tanks is treated by a biofilter unit through two identical stacks.

1.3.2.3 Tertiary Treatment

Fine Screen Filtration

The treated water leaving the clarifier will pass through two rotating belts with 0.5 mm micro-strainer screens, equipped with a trough wash, travelling spray bar, and a high-pressure wash booster pump. The solids will be washed and dewatered before being moved to the screenings bin. The filtrate will be sent to a flash mixer which will introduce aluminium sulphate before being sent to the flocculation tank.

Flocculation Tank

The two-stage flocculation tank will provide a detention time sufficient for the development of floc. The solid/liquid mixture will then be sent for membrane filtration.

Membrane Filtration Tanks

The effluent wastewater from the flocculation tank will undergo solid/liquid separation through the membranes in the membrane tanks. The treated water (i.e. permeate) will be filtered through the membranes and go through the UV Disinfection process. The backwash will be sent to a backwash tank, and can be sent back to the secondary distribution chamber.

UV Disinfection

The effluent leaving the membrane tanks will enter the UV disinfection system prior to being discharged into the environment.

1.3.2.4 Waste Activated Sludge Management

The waste activated sludge (WAS) will be pumped from the secondary clarifiers and membrane tanks to the closed top sludge storage tank for storage prior to disposal. The tank will be jet mixed to encourage continual biological oxidization of most odourous compounds and mitigate formation of odourous compounds.

RAS/WAS Rotary Drum Thickening

WAS from the secondary clarifiers will be thickened using added polymers and a rotary drum thickener. The thickened WAS will be pumped to the ATAD facility for stabilization. The filtrate will be sent back to the influent pumping station.

Autothermal Thermophilic Aerobic Digestion (ATAD)

The ATAD process will aerate the thickened WAS facilitating aerobic digestion of the volatile solids. After digestion, the digested sludge will be cooled and sent to the Storage Nitrification Denitrification Reactor (SNDR).

Storage Nitrification Denitrification Reactor (SNDR)

The SNDR will receive the thermophilic sludge from the ATAD process where it will undergo nitrification and denitrification, by controlling factors like pH, temperature, and oxygen levels, to reduce the concentration of ammonium in the biosolids, and improve its dewaterability and cake (dewatered sludge) quality. The processed sludge will then be pumped to one of the two outdoor biosolids storage tanks.

Biosolids Storage Tanks

The biosolids storage tanks will receive processed biosolids from the SNDR process. These tanks will provide storage and mixing of the stored biosolids. The biosolids can then be reused as non-agricultural source materials (NASM) or sent to a waste facility.

Odour Control for Wasted Sludge Management

The odorous air from the Thickening and ATAD Buildings is treated by the same biofilter unit for the secondary treatment process as described in Section 1.3.2.2.

1.3.2.5 Comfort Heating

The Facility is serviced by natural gas-fired comfort heating units for the buildings onsite. These units differ in capacity based on the needs of the building they are heating.

1.3.2.6 Emergency Generators

In addition to the one (1) diesel-fired emergency generator servicing the existing WTP, two (2) additional 2250kW diesel-fired emergency generators are being added to the Facility to provide the proposed WWTP with power in emergency situations.

1.4 Summary of Equipment and Operations for which Approval is Sought

The Company is requesting an ECA to include the following equipment exhausting to the atmosphere:

- One (1) carbon filtration odour control system, venting to the atmosphere through two (2) stacks, each having a flow rate of 7.0 m^3/s, stack diameter of 0.5 m, and a release height of 6.0 m above grade, controlling the emissions from two (2) screens, one (1) grit classifier and the secondary distribution chamber;

- One (1) biofilter odour control system, venting to the atmosphere through two stacks, each having a flow rate of 2.4 m^3/s, stack diameter of 0.5 m, and a release height of 10.3 m above grade, controlling the emissions from the Thickener and ATAD buildings including all enclosed process units;

- One (1) emergency diesel-fired generator, servicing the water treatment plant, having a maximum power rating of 500 kW discharging products of combustion to the atmosphere through a stack having an exit diameter of 0.2 metre, extending 2.0 metres above grade; and
- Two (2) emergency diesel-fired generators, servicing the wastewater treatment plant, each having a maximum power rating of 2250 kW, discharging products of combustion to the atmosphere through stacks each having exit diameter of 0.5 metre, extending 10.5 metres above grade.

This ESDM Report provides a full site-wide emission inventory and air dispersion modelling exercise for the entire Facility.

2 INITIAL IDENTIFICATION OF SOURCES AND CONTAMINANTS

Table 1 below provides a summary of sources and contaminants on site. Negligible sources are discussed in Section 3.0. Significant sources are discussed in Section 4.0.

Table 1: Source and Contaminant Identification Summary

Source Information			Expected Contaminants	Included in Modelling?
Source I.D.	Source Description	General Location		Significant? (Yes or No)
Water Treatment Plant				
1-1	Pumphouses	See Figure 2	n/a	No - Insignificant
1-2	Filter System	See Figure 2	n/a	No - Insignificant
1-3	Treated Water Reservoir	See Figure 2	n/a	No - Insignificant
1-4	Standby Diesel Generator for WTP	See Figure 2	NO_x	Yes
Wastewater Treatment Plant				
2-1	Influent Pumping Station, venting through the carbon filtration system (CF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-2	Headworks Building (inc. screening/grit removal unit), venting through the carbon filtration system (CF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-3	Bioreactor Building (including bioreactor/aeration tanks)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	No - Insignificant No - Insignificant No - Insignificant No - Insignificant
2-4A	Clarifier 1	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-4B	Clarifier 2	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-5	Teriary Building (incl. membrane filteration, UV disinfection and chemical storage tanks)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	No - Insignificant
2-6	Thickener Building venting through the biofilter unit (BF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-7	ATAD Building venting through the biofilter unit (BF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-8A	Underground Sludge Holding Tank 1 venting through the biofilter unit (BF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-8B	Underground Sludge Holding Tank 2 venting through the biofilter unit (BF)	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-9A	Standby Diesel Generator #1 for WWTP	See Figure 2	Nitrogen Oxides	Yes
2-9B	Standby Diesel Generator #2 for WWTP	See Figure 2	Nitrogen Oxides	Yes
2-10A	Biosolids Storage Tank 1	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
2-10B	Biosolids Storage Tank 2	See Figure 2	Hydrogen Sulphide Ammonia Total Reduced Sulphur Odour	Yes Yes Yes Yes
Comfort Heating				
3-1	Comfort Heating - Headworks Building	See Figure 2	Nitrogen Oxides	Yes
3-2	Comfort Heating - Secondary Treatment Building	See Figure 2	Nitrogen Oxides	Yes
3-3	Comfort Heating - Substation	See Figure 2	Nitrogen Oxides	Yes
3-4	Comfort Heating - Tertiary Treatment Building	See Figure 2	Nitrogen Oxides	Yes
3-5	Comfort Heating - Thickener Building	See Figure 2	Nitrogen Oxides	Yes
3-6	Comfort Heating - ATAD Building	See Figure 2	Nitrogen Oxides	Yes
Other Activities				
3	Maintenance activities	See Figure 2	Not Applicable	No - Exempt per EPA Section 9 (3)(a)

Notes: NO_x = Nitrogen Oxides; n/a = Not Applicable

3 ASSESSMENT OF SIGNIFICANCE OF CONTAMINANTS AND SOURCES

As identified in Table 1, some contaminant sources are expected to be negligible and are, therefore, not included in the emission summary or source summary tables. The rationale for defining these sources as insignificant is presented below.

3.1 Sources Exempt from Requiring an ECA (Air & Noise)

Section 9(3) of the *Environmental Protection Act* identifies equipment and operations which are exempt from requiring an Environmental Compliance Approval (Air & Noise). Item "a" identifies routine maintenance carried out on any plant, structure, equipment, apparatus, mechanism, or thing to be exempt. Maintenance activities at the WWTP are, therefore, considered exempt.

3.2 Screening Out Sources that Emit Odour in Negligible Amounts

Water Treatment Plant

There are no significant air contaminants including odour emissions expected to be emitted from the treatment of drinking water, apart from the nitrogen oxide (NO_X) emissions from testing of the WTP emergency generators.

Bioreactor, Aeration and Membrane Tanks, and UV Disinfection (Biological & Tertiary Treatment)

Any odours realized from biological treatment processes, including aeration tanks, are generally earthy and musty and not sulphide-based, therefore, they are less objectionable to human receptors than those produced from headworks or primary treatment processes. Furthermore, the type of aeration mechanism (blower and diffuser) and biological process (extended aeration) proposed for the Midhurst WWTP produce lower odour levels than those produced by mechanical aerators and non-extended aeration systems.[1]

Based on the above and the tank construction with bolt and mastic at every joint[2], it is anticipated that odour emissions from the proposed Midhurst WWTP bioreactor, aeration and membrane tanks, as well as tertiary treatment, will be negligible.

Combustion of Natural Gas

Section 7.1.1 of the Ministry Procedure identifies that "the significant contaminant from the combustion of natural gas/propane may be nitrogen oxides. Other contaminants, for this type of source are generally emitted in negligible amounts". As such, only emissions of nitrogen oxides are calculated for natural gas combustion.

[1] Control of Odors and Emissions from Wastewater Treatment Plants, Water Environment Federation, MOP 25, 2004.
[2] H2Flow Tanks and Systems Inc., Permastore Tanks and Silos.

4 EMISSION ESTIMATION AND MAXIMUM EMISSIONS SCENARIOS

Emission rate calculations for significant sources are shown in Appendix F. The data quality rating and emission estimation technique are identified for significant sources in the Source Summary Table, Table 2.

4.1 Emission Estimation Methodologies

Odour

Since site specific odour emission sampling data is not available for the proposed Midhurst WWTP, emissions for potentially odourous sources were derived from source testing data for a comparable WWTP (Innisfil Water Pollution Control Plant (WPCP)), which was recently reviewed and approved by the Ministry.

The odour emission rates from the influent pumping station, headworks building, clarifiers, ATAD and thickener buildings were prorated based on the source testing from the comparable WWTP. Source testing data for the influent pumping station was not available at the comparable WWTP, therefore the higher odour emission rate from the headworks building was conservatively used to estimate emissions from this source at the Midhurst WWTP.

A conservative control efficiency of 90% was assumed for the Innisfil WPCP, and a similar control efficiency of 90% was applied to the Midhurst WWTP based on manufacturer specifications for the odour control systems, which will be used to control emissions from the Midhurst WWTP influent pumping station, headworks building, ATAD process, solids thickening building, biosolids storage tanks, and septage receiving station and storage tanks. The manufacturer specification is provided in Appendix C.

A detailed sample calculation is presented with the calculation sheets in Appendix B.

Hydrogen Sulphide, Ammonia, Total Reduced Sulphur (TRS)

Emissions data for hydrogen sulphide (H_2S), ammonia, and total reduced sulphur is available in the source testing report for the comparable WWTP. Emissions were derived from the source testing data for equivalent processes in the Odour Study for Lakeshore WPCP Expansion (Black & Veatch, March 2010) and from sampling results in a study entitled "Innisfil Water Pollution Control Plant's Odour Testing Program," (Ortech Environmental, December 2009) .

The emission calculations for each contaminant were completed using the following steps:

1. The H_2S and ammonia emission rates from the headworks building in the Innisfil Study were selected as a conservative representation of the influent pumping station at Midhurst WWTP. A conservative control efficiency of 90% was assumed to be applied to

the Innisfil H_2S and ammonia emission rates. The emissions rates were prorated based on the Midhurst WWTP's proposed maximum peak capacity of 6,450 m^3/day; and

2. The uncontrolled emission rate (g/s) for total reduced sulphur was assumed to be equivalent to that of hydrogen sulphide as per RWDI's Odour and Air Quality Study in support of the Environmental Impact Assessment (May 28, 2018); and

3. A control efficiency of 90% was applied for the carbon filtration system controlling the influent pumping station and headworks station, and odour control unit servicing the thickener, ATAD, and sludge holding tanks The manufacturer specification is provided in Appendix C.

A detailed sample calculation is presented with the calculation sheets in Appendix B.

4.2 Maximum Emissions Scenario

Two maximum emission scenarios, Scenario 1 and Scenario 2 were identified to assess emissions from treatment operations and emergency generator testing, respectively.

4.2.1 Scenario 1 – Treatment Operations

The maximum emissions scenario for the WWTP treatment operations (Scenario 1) was based on the daily average influent capacity for Phase 1 (6,450 m^3/day). The maximum emissions scenario also assumed all equipment and processes operate simultaneously at their respective maximum capacity, 24 hours per day, all year round.

These operating conditions represent very conservative maximum worst-case scenarios. Actual facility maximum operations are not expected to approach these conditions.

4.2.2 Scenario 2 – Emergency Generator Testing

The emergency generator testing (Scenario 2) modelling was based on the NO_X emitted during the testing of the emergency generators at 100% of the load capacity. The testing was assumed to occur 24 hours per day, all year round.

These operating conditions represent very conservative maximum worst-case scenarios. Actual facility maximum operations are not expected to approach these conditions.

5 SOURCE SUMMARY TABLE

The Source Summary Table (Table 2) shows the emission rate for each significant contaminant emitted from each significant source. The Ministry Procedure, Appendix D Formats are used. As required by O. Reg. 419 only significant sources and contaminants are listed in the Source Summary Table.

Table 2: Source Summary Table

Source I.D.	Description	Source Data							Emissions Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
Water Treatment Plant															
1-4	Standby Diesel Generator for WTP	1.7	531.1	0.2	2.0	n/a	n/a	EGEN1	Nitrogen Oxides	10102-44-0	8.38E-01	1 hr	EF	Above Average	9.9%
Wastewater Treatment Plant															
2-1	Influent Pumping Station, venting through the carbon filtration system (CF)	n/a	n/a	n/a	n/a	n/a	n/a	CF1 - CF2	Hydrogen Sulphide	7789-06-4	4.24E-08	1 hr	EC	Average	0.1%
									Hydrogen Sulphide	7789-06-4	4.24E-08	24 hr	EC	Average	0.1%
									Ammonia	7664-41-7	2.02E-09	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	8.08E-09	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	8.08E-09	24 hr	EC	Average	0.0%
									Odour	-	3.28E+02	1 hr	EC	Average	6.6%
2-2	Headworks Building (inc. screening/grit removal unit), venting through the carbon	n/a	n/a	n/a	n/a	n/a	n/a	CF1 - CF2	Hydrogen Sulphide	7789-06-4	4.24E-08	1 hr	EC	Average	0.1%
									Hydrogen Sulphide	7789-06-4	4.24E-08	24 hr	EC	Average	0.1%
									Ammonia	7664-41-7	2.02E-09	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	8.08E-09	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	8.08E-09	24 hr	EC	Average	0.0%
									Odour	-	3.28E+02	1 hr	EC	Average	6.6%
2-4A	Clarifier 1	n/a	n/a	10.0	2.5	n/a	n/a	CLF1	Hydrogen Sulphide	7789-06-4	6.37E-11	1 hr	EC	Average	0.0%
									Hydrogen Sulphide	7789-06-4	6.37E-11	24 hr	EC	Average	0.0%
									Ammonia	7664-41-7	6.37E-10	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	6.37E-11	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	6.37E-11	24 hr	EC	Average	0.0%
									Odour	-	9.34E+01	1 hr	EC	Average	1.9%
2-4B	Clarifier 2	n/a	n/a	10.0	2.5	n/a	n/a	CLF2	Hydrogen Sulphide	7789-06-4	6.37E-11	1 hr	EC	Average	0.0%
									Hydrogen Sulphide	7789-06-4	6.37E-11	24 hr	EC	Average	0.0%
									Ammonia	7664-41-7	6.37E-10	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	6.37E-11	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	6.37E-11	24 hr	EC	Average	0.0%
									Odour	-	9.34E+01	1 hr	EC	Average	1.9%

Source I.D.	Description	Source Data							Emissions Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
Wastewater Treatment Plant															
2-6	Thickener Building venting through the biofilter unit (BF)	n/a	n/a	n/a	n/a	n/a	n/a	BF1-BF2	Hydrogen Sulphide	7789-06-4	4.15E-09	1 hr	EC	Average	0.0%
									Hydrogen Sulphide	7789-06-4	4.15E-09	24 hr	EC	Average	0.0%
									Ammonia	7664-41-7	2.08E-08	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	4.15E-09	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	4.15E-09	24 hr	EC	Average	0.0%
									Odour	-	3.07E+03	1 hr	EC	Average	61.6%
2-7	ATAD Building venting through the biofilter unit (BF)	n/a	n/a	n/a	n/a	n/a	n/a	BF1-BF2	Hydrogen Sulphide	7789-06-4	2.21E-05	1 hr	EC	Average	33.3%
									Hydrogen Sulphide	7789-06-4	2.21E-05	24 hr	EC	Average	33.3%
									Ammonia	7664-41-7	6.37E-02	24 hr	EC	Average	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	1 hr	EC	Average	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	24 hr	EC	Average	33.3%
									Odour	-	3.55E+02	1 hr	EC	Average	7.1%
2-8A	Underground Sludge Holding Tank 1 venting through the biofilter unit (BF)	n/a	n/a	n/a	n/a	n/a	n/a	BF1-BF2	Hydrogen Sulphide	7789-06-4	2.27E-10	1 hr	EC	Average	0.0%
									Hydrogen Sulphide	7789-06-4	2.27E-10	24 hr	EC	Average	0.0%
									Ammonia	7664-41-7	2.27E-09	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	2.27E-10	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	2.27E-10	24 hr	EC	Average	0.0%
									Odour	-	1.21E+02	1 hr	EC	Average	2.4%
2-8B	Underground Sludge Holding Tank 2 venting through the biofilter unit (BF)	n/a	n/a	n/a	n/a	n/a	n/a	BF1-BF2	Hydrogen Sulphide	7789-06-4	2.27E-10	1 hr	EC	Average	0.0%
									Hydrogen Sulphide	7789-06-4	2.27E-10	24 hr	EC	Average	0.0%
									Ammonia	7664-41-7	2.27E-09	24 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	2.27E-10	1 hr	EC	Average	0.0%
									Total Reduced Sulphur	TRS	2.27E-10	24 hr	EC	Average	0.0%
									Odour	-	1.21E+02	1 hr	EC	Average	2.4%
2-9A	Standby Diesel Generator #1 for WWTP	8.5	482.2	0.5	10.5	n/a	n/a	EGEN23_1	Nitrogen Oxides	10102-44-0	3.77E+00	1 hr	EF	Above Average	33.1%
2-9B	Standby Diesel Generator #2 for WWTP	8.5	482.2	0.5	10.5	n/a	n/a	EGEN23_2	Nitrogen Oxides	10102-44-0	3.77E+00	1 hr	EF	Marginal	33.1%

Source I.D.	Description	Source Data							Emissions Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
Wastewater Treatment Plant															
2-10A	Biosolids Storage Tank 1	n/a	n/a	n/a	n/a	n/a	n/a	BST1	Hydrogen Sulphide	7789-06-4	2.21E-05	1 hr	EC	Marginal	33.3%
									Hydrogen Sulphide	7789-06-4	2.21E-05	24 hr	EC	Marginal	33.3%
									Ammonia	7664-41-7	6.37E-02	24 hr	EC	Marginal	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	1 hr	EC	Marginal	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	24 hr	EC	Marginal	33.3%
									Odour	-	3.55E+02	1 hr	EC	Marginal	7.1%
2-10B	Biosolids Storage Tank 2	n/a	n/a	n/a	n/a	n/a	n/a	BST2	Hydrogen Sulphide	7789-06-4	2.21E-05	1 hr	EC	Marginal	33.3%
									Hydrogen Sulphide	7789-06-4	2.21E-05	24 hr	EC	Marginal	33.3%
									Ammonia	7664-41-7	6.37E-02	24 hr	EC	Marginal	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	1 hr	EC	Marginal	33.3%
									Total Reduced Sulphur	TRS	2.21E-05	24 hr	EC	Marginal	33.3%
									Odour	-	1.21E+02	1 hr	EC	Marginal	2.4%
Comfort Heating															
3-1	Comfort Heating - Headworks Building	n/a	n/a	n/a	n/a	n/a	n/a	CHHDW	Nitrogen Oxides	10102-44-0	8.95E-03	1 hr	EF	Above Average	0.1%
									Nitrogen Oxides	10102-44-0	8.95E-03	24 hr	EF	Above Average	10.1%
3-2	Comfort Heating - Secondary Treatment Building	n/a	n/a	n/a	n/a	n/a	n/a	CHSEC	Nitrogen Oxides	10102-44-0	1.25E-02	1 hr	EF	Above Average	0.1%
									Nitrogen Oxides	10102-44-0	1.25E-02	24 hr	EF	Above Average	14.1%
3-3	Comfort Heating - Substation	n/a	n/a	n/a	n/a	n/a	n/a	CHSUB	Nitrogen Oxides	10102-44-0	8.03E-04	1 hr	EF	Above Average	0.0%
									Nitrogen Oxides	10102-44-0	8.03E-04	24 hr	EF	Above Average	0.9%
3-4	Comfort Heating - Tertiary Treatment Building	n/a	n/a	n/a	n/a	n/a	n/a	CHTER	Nitrogen Oxides	10102-44-0	1.54E-02	1 hr	EF	Above Average	0.1%
									Nitrogen Oxides	10102-44-0	1.54E-02	24 hr	EF	Above Average	17.4%

Source I.D.	Description	Source Data							Emissions Data						
		Stack Volumetric Flow Rate (m^3/s)	Stack Exit Temperature (°C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Source Coordinates (m)	Modelled Source	Contaminant	CAS #	Maximum Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
Comfort Heating															
3-5	Comfort Heating - Thickener Building	n/a	n/a	n/a	n/a	n/a	n/a	CHTCK	Nitrogen Oxides	10102-44-0	4.23E-02	1 hr	EF	Above Average	0.4%
									Nitrogen Oxides	10102-44-0	4.23E-02	24 hr	EF	Above Average	47.8%
3-6	Comfort Heating - ATAD Building	n/a	n/a	n/a	n/a	n/a	n/a	CHATD	Nitrogen Oxides	10102-44-0	8.66E-03	1 hr	EF	Above Average	0.1%
									Nitrogen Oxides	10102-44-0	8.66E-03	24 hr	EF	Above Average	9.8%

Notes: n/a = Not Applicable; EC = Engineering Calculations; EF = Emission Factor

6 AIR DISPERSION MODELLING

Air dispersion modelling for the treatment operations (Scenario 1) and emergency diesel generator testing (Scenario 2) was undertaken using the U.S. EPA AERMOD dispersion system (version 19191). This model calculates maximum hourly concentrations, which is used to provide maximum average concentrations for other averaging periods using the appropriate meteorological data provided by the Ministry.

6.1 AERMOD

AERMOD is a Ministry approved steady-state Gaussian plume dispersion modelling system that can be used to assess pollutant concentrations from a wide variety of complex industrial settings including multiple stacks, fugitive emissions, and building wake effects. The AERMOD modelling system was developed by the AMS/EPA Regulatory Model Improvement Committee (AERMIC) and consists of two pre-processors (AERMET and AERMAP) and the dispersion model, AERMOD.

AERMET is a general-purpose meteorological pre-processor which uses surface and upper air meteorological conditions together with surface characteristics to calculate the boundary layer parameters needed by AERMOD. AERMAP is the terrain pre-processor used to calculate a representative terrain-influenced height associated with each receptor within the modelling domain.

6.1.1 Dispersion Modelling Input Summary Table

To demonstrate compliance with O. Reg. 419/05, Table 3 provides a description of the way in which the approved dispersion model was used.

6.1.2 Land Use Zoning Designation Plan

The land use zoning plan is provided in Appendix A.

6.1.3 Dispersion Modelling Input and Output files (AERMOD)

The AERMOD input and output files will be provided through email once requested.

The maximum POI concentrations and percentage of the limit for each contaminant is shown in the Emission Summary Table (Table 5).

6.1.4 Meteorology

Site-specific hourly surface and upper air meteorological data processed by the Ministry (AERMET Version 19191) were used for the AERMOD dispersion modelling. A copy of the approval under Section 13(1) and the wind rose is provided in Appendix D. The wind rose shows the distribution of wind directions and wind speeds from the surface data.

Table 3: Dispersion Modelling Input Summary Table

Relevant Section of Regulation 419	Section Title	Description of How the Approved Dispersion Model was Used
Section 6	Approved Dispersion Models	AERMOD Version 19191
Section 8	Negligible Sources of Contaminants	See Section 3
Section 9	Same Structure Contamination	Not Applicable
Section 10	Operating Conditions	See Section 4.2
Section 11	Source of Contaminant Emission Rate	See Appendix B, and Table 2
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	See Section 4
Section 13	Meteorological Conditions	See Section 6.1.4
Section 14	Area of Modelling Coverage	See Section 6.1.6
Section 15	Stack Height for Certain New Sources of Contaminant	Not Applicable
Section 16	Terrain Data	See Section 6.1.5
Section 17	Averaging Periods	10-minute, ½-hr, 1-hour, 24-hour

6.1.5 Terrain

The terrain data used, *cdem_dem_031D*, was downloaded from Ontario Digital Elevation model Data on the Ministry's website.

6.1.6 Modelling Domain and Receptor Grid

All modelling was undertaken in UTM coordinates as defined in Table 4. The model was based on a receptor grid centered in the site and extended out approximately 1 km from the property line in all directions. A tiered grid was used for receptor placements and was created based upon the receptor spacing recommended in the ADMGO.

In addition, fenceline receptors and a set of forty-five discrete receptors with flagpole heights set at one and a half metres and four metres (32 proposed residential homes, 10 existing residential homes, 1 golf course, 1 snowmobile club and 1 provincial park, shown in Figure 2C and Table 6) were included in the modelling exercise to assess the Facility's potential off-site impact on nearby existing and proposed sensitive receptors. As identified in Figure 2C, the closest sensitive receptor is a proposed residence (R29) located approximately 306 metres southeast of the proposed WWTP.

Figure 3 (Appendix A) shows the modelling domain, receptor grid and the general locations of the discrete receptors. All modelling was undertaken in Universal Transverse Mercator (UTM) coordinates.

6.1.7 Source Parameters

The physical parameters of the modelling sources are summarized in Table 4-1.

A multiplier of 1.65 was included in the model source input for odour, which converts the averaging period for the modelling results from 1 hour to 10 minutes.

A multiplier of 10^6 was included in the model source input for hydrogen sulphide, ammonia and total reduced sulphur to obtain results from AERMOD. The results were divided by 10^6 in the emission summary table.

6.1.8 Building Downwash

The carbon filtration unit stacks, biofilter unit stacks, and emergency generators were modelled as point sources. As such, building downwash has been considered in the modelling exercise. The building profile input program (BPIP Prime) input file will be included in the AERMOD input and output files, that will be provided to the Client Services and Permissions Branch as indicated in Section 6.1.3 above.

Table 4: AERMOD Source Input Parameters

Source Type	Modelling Source ID	Source ID	Description	Emission Rates								Base Elevation	Release Height Above Grade	Stack Inner Diameter	Exit Velocity	Stack Exit Temperature	Stack Release Type	Initial Lateral Dimension	Initial Vertical Dimension	Length of Side	X Coordinate	Y Coordinate
				Hydrogen Sulphide	Ammonia	Total Reduced Sulphur	Nitrogen Oxides	Hydrogen Sulphide	Nitrogen Oxides	Total Reduced Sulphur	Odour											
				(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(OU/s)	m	m	m	m/s	K		m	m	m	m	m
Averaging Period				24 hr	24 hr	24 hr	24 hr	1 hr	1 hr	1 hr	1 hr											
Wastewater Treatment Plant																						
VOLUME	BIOH	2-3	Bioreactor Building (including bioreactor/aeration tanks and NGF HVA	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	237.5	10.5	-	-	AMBIENT	-	8.1	4.9	35.0	598830.8	4920232.7
AREA_CI	CLF1	2-4A	Clarifier 1	6.37E-11	6.37E-10	6.37E-11	0.00E+00	6.37E-11	0.00E+00	6.37E-11	9.34E+01	238.0	2.5	10.0	-	AMBIENT	-	-	-	-	598829.7	4920292.6
AREA_CI	CLF2	2-4B	Clarifier 2	6.37E-11	6.37E-10	6.37E-11	0.00E+00	6.37E-11	0.00E+00	6.37E-11	9.34E+01	237.2	2.5	10.0	-	AMBIENT	-	-	-	-	598815.9	4920313.2
POINT	CF1	2-1, 2-2	Carbon Filtration System controlling Headworks and Influent Pumping	4.24E-08	2.02E-09	8.08E-09	0.00E+00	4.24E-08	0.00E+00	8.08E-09	3.28E+02	240.0	6.0	0.5	7.0	AMBIENT	VERTICAL	-	-	-	598880.6	4920238.2
POINT	CF2	2-1, 2-2	Carbon Filtration System controlling Headworks and Influent Pumping	4.24E-08	2.02E-09	8.08E-09	0.00E+00	4.24E-08	0.00E+00	8.08E-09	3.28E+02	239.9	6.0	0.5	69.9	AMBIENT	VERTICAL	-	-	-	598878.2	4920236.7
POINT	EGEN23_1	2-9A	Standby Diesel Generators x 2 for WWTP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E+00	0.00E+00	0.00E+00	236.0	10.5	0.5	53.2	AMBIENT	VERTICAL	-	-	-	598743.2	4920275.0
POINT	EGEN23_2	2-9B	Standby Diesel Generators x 2 for WWTP	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E+00	0.00E+00	0.00E+00	236.0	10.5	0.5	53.2	AMBIENT	VERTICAL	-	-	-	598745.7	4920269.8
POINT	BF1	2-6, 2-7, 2-8A, 2-8B	Biofilter Unit Exhaust #1	1.10E-05	3.19E-02	1.10E-05	0.00E+00	1.10E-05	0.00E+00	1.10E-05	1.83E+03	236.0	10.3	0.5	12.0	AMBIENT	CAPPED	-	-	-	598764.4	4920356.2
POINT	BF2	2-6, 2-7, 2-8A, 2-8B	Biofilter Unit Exhaust #2	1.10E-05	3.19E-02	1.10E-05	0.00E+00	1.10E-05	0.00E+00	1.10E-05	1.83E+03	236.0	10.3	0.5	12.0	AMBIENT	CAPPED	-	-	-	598765.7	4920356.9
VOLUME	BST1	2-10A	Biosolids Storage Tank 1	2.21E-05	6.37E-02	2.21E-05	0.00E+00	2.21E-05	0.00E+00	2.21E-05	3.55E+02	235.6	5.2	-	-	AMBIENT	-	4.8	4.8	20.5	598744.2	4920343.9
VOLUME	BST2	2-10B	Biosolids Storage Tank 2	2.21E-05	6.37E-02	2.21E-05	0.00E+00	2.21E-05	0.00E+00	2.21E-05	1.21E+02	236.0	5.2	-	-	AMBIENT	-	4.8	4.8	20.5	598757.5	4920324.3

Source Type	Modelling Source ID	Source ID	Description	Emission Rates								Base Elevation	Release Height Above Grade	Stack Inner Diameter	Exit Velocity	Stack Exit Temperature	Stack Release Type	Initial Lateral Dimension	Initial Vertical Dimension	Length of Side	X Coordinate	Y Coordinate
				Hydrogen Sulphide	Ammonia	Total Reduced Sulphur	Nitrogen Oxides	Hydrogen Sulphide	Nitrogen Oxides	Total Reduced Sulphur	Odour											
				(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(OU/s)	m	m	m	m/s	K		m	m	m	m	m
Averaging Period				24 hr	24 hr	24 hr	24 hr	1 hr	1 hr	1 hr	1 hr	m	m	m	m/s	K		m	m	m	m	m
Comfort Heating																						
VOLUME	CHHDW	3-1	Comfort Heating - Headworks Building	0.00E+00	0.00E+00	0.00E+00	8.95E-03	0.00E+00	8.95E-03	0.00E+00	0.00E+00	239.0	5.5	-	-	AMBIENT	-	5.5	5.1	23.7	598857.4	4920248.5
VOLUME	CHSUB	3-3	Comfort Heating - Substation	0.00E+00	0.00E+00	0.00E+00	8.03E-04	0.00E+00	8.03E-04	0.00E+00	0.00E+00	236.0	2.2	-	-	AMBIENT	-	2.8	2.0	12.0	598752.7	4920264.2
VOLUME	CHSEC	3-2	Comfort Heating - Secondary Treatment Building	0.00E+00	0.00E+00	0.00E+00	1.25E-02	0.00E+00	1.25E-02	0.00E+00	0.00E+00	237.0	1.8	-	-	AMBIENT	-	8.7	0.8	37.6	598796.6	4920284.5
VOLUME	CHTER	3-4	Comfort Heating - Tertiary Treatment Building	0.00E+00	0.00E+00	0.00E+00	1.54E-02	0.00E+00	1.54E-02	0.00E+00	0.00E+00	237.5	5.3	-	-	AMBIENT	-	8.1	4.9	35.0	598830.8	4920232.7
VOLUME	CHTCK	3-5	Comfort Heating - Thickener Building	0.00E+00	0.00E+00	0.00E+00	4.23E-02	0.00E+00	4.23E-02	0.00E+00	0.00E+00	236.7	4.0	-	-	AMBIENT	-	5.7	3.7	24.4	598792.9	4920365.2
VOLUME	CHATD	3-6	Comfort Heating - ATAD Building	0.00E+00	0.00E+00	0.00E+00	8.66E-03	0.00E+00	8.66E-03	0.00E+00	0.00E+00	236.0	6.6	-	-	AMBIENT	-	5.6	3.0	24.1	598767.1	4920349.4
Water Treatment Plant - Emergency Generator Testing																						
POINT	EGEN1	1-4	Emergency Generator	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.38E-01	0.00E+00	0.00E+00	235.0	2.0	0.2	54.2	804.3	HORIZONTAL	-	-	-	598731.5	4920173.2

- Base elevations were extracted from AERMAP.
- All sources are elevated (Release Height > 0).

7 RESULTS

The Emission Summary Table (Table 5) shows the predicted maximum POI concentrations from all sources compared to the standards and guidelines in the Ministry Air Contaminants Benchmark (ACB) List, dated April 2023.

NO_x emissions from maintenance testing of the emergency generator were modelled using the Ministry approved U.S. EPA AERMOD dispersion model. The maximum POI concentration at the closest receptor was compared to the Ministry's POI limit set out in the Ministry Emergency Generator Checklist.

As shown in the Table 5, all contaminants are below their respective applicable limits at the Facility's property line, the nearby existing sensitive receptors, and the proposed nearby residential subdivision.

With respect to odour, following the Ministry's Methodology, the maximum 99.5th percentile concentrations were determined at the closest off-site existing and proposed sensitive receptors, at heights of 1.5 metres and 4 metres above grade.

As shown in Table 6, the maximum 99.5th percentile 10-minute odour concentrations are no greater than 1 OU/m^3 at any of the offsite existing and proposed sensitive receptors.

Table 5: Emission Summary Table

Contaminant	CAS No	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m^3)	Averaging Period Emission Rate	Averaging Period POI Concentration	Ministry POI Limit (µg/m^3)	Limiting Effect	Regulation Schedule #	Percentage of Ministry POI Limit (%)
Scenario 1 - Treatment Operations										
Hydrogen Sulphide	7783-06-4	6.63E-05	AERMOD	1.62E-07	1 hr	10 min	13	Odour	3	0.0%
Hydrogen Sulphide	7783-06-4	6.63E-05	AERMOD	4.05E-08	24 hr	24 hr	7	Health	3	0.0%
Ammonia	7664-41-7	1.91E-01	AERMOD	1.17E-04	24 hr	24 hr	100	Health	3	0.00%
Total Reduced Sulphur	TRS	6.63E-05	AERMOD	1.62E-07	1 hr	10 min	13	Odour	3	0.0%
Total Reduced Sulphur	TRS	6.63E-05	AERMOD	4.05E-08	24 hr	24 hr	7	Health	3	0.0%
Odour [(2)]	-	4.98E+03	AERMOD	6.65E-01	1 hr	10 min	1	Odour	Guideline	66.5%
Nitrogen Oxides	10102-44-0	8.86E-02	AERMOD	9.90E+01	1 hr	1 hr	400	Health	3	24.8%
Nitrogen Oxides	10102-44-0	8.86E-02	AERMOD	3.48E+01	24 hr	24 hr	200	Health	3	17.4%
Scenario 2 - Emergency Generator Testing [(1)]										
Nitrogen Oxides	10102-44-0	8.38E+00	AERMOD	3.05E+02	1 hr	1/2 hr	1880	Health	Other	16.2%
Nitrogen Oxides	10102-44-0	8.38E+00	AERMOD	4.18E+01	1 hr	1/2 hr	500	Health	Other	8.4%

[(1)] Other - The modelling results at the non-sensitive receptors (houses, commercial plazas) were compared to the 1/2-hour screening level of 1880 µg/m^3. The modelling results of sensitive receptors (places of worship, schools, daycares) were compared to the 1/2-hour screening level of 500 µg/m^3 for the sensitive receptors outlined in the Ministry Emergency Generator Checklist, Supplement to Application for Approval, s.9.

[(2)] The maximum concentration for odour was calculated in OU/m^3. The odour concentration is based on the maximum 99.5th percentile result from AERMOD after removing the top 0.5% results for all offsite receptors.

Table 6: Odour Modelling Results for Discrete Receptors

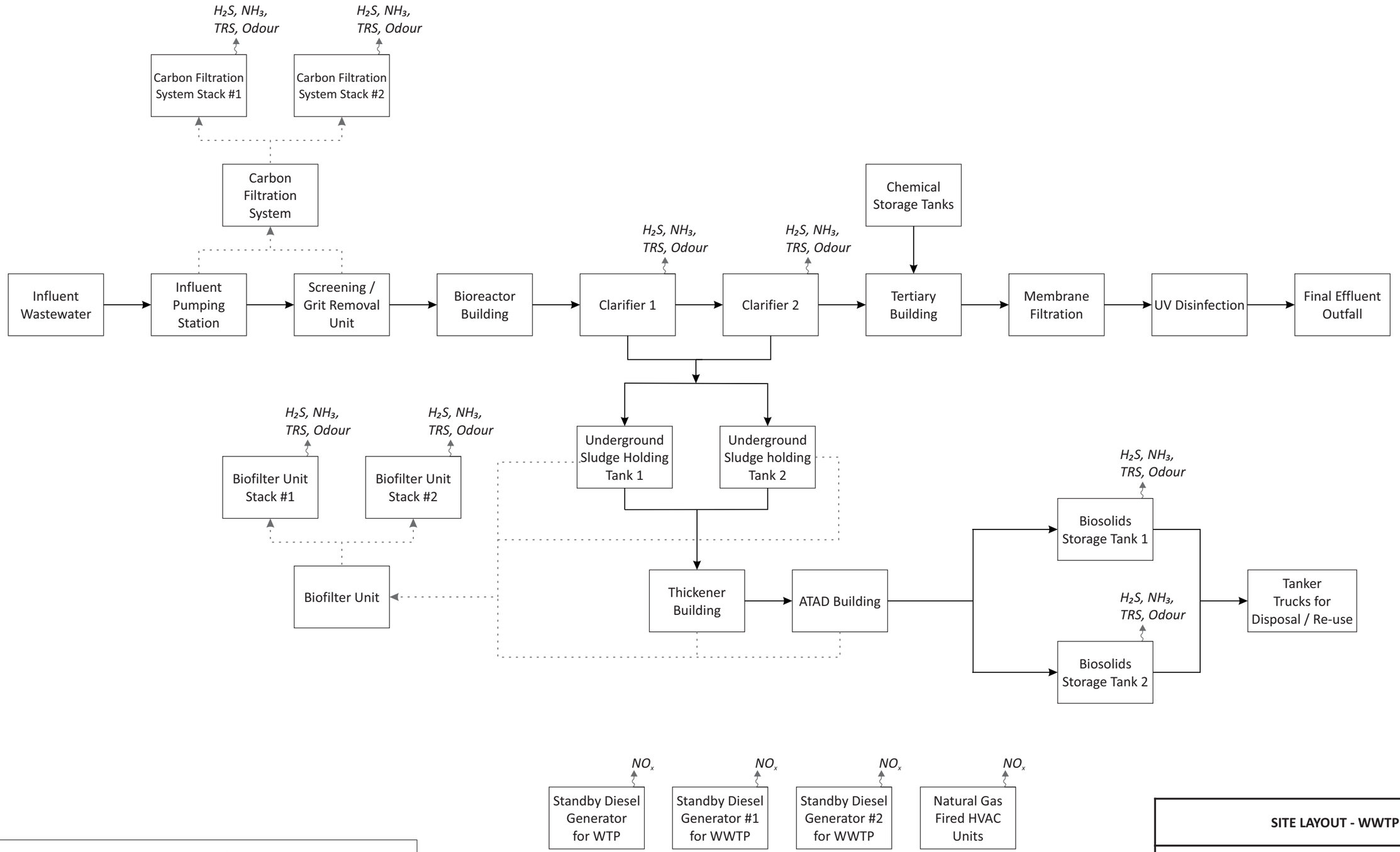
Contaminant					Odour	
Total Facility Emission Rate (OU/s)					4.98E+03	
Air Dispersion Model Used					AERMOD	
Total Number of Hours Modelled					43848	
Averaging Period					10 min	
Ministry POI Standard (OU/m^3)					1	
Receptor Number	Receptor Description	Distance from Facility to Receptor[(1)] (m)	UTM Coordinates (m)		Maximum Concentration of 99.5th Percentile (OU/m^3)	
			Easting	Northing	1.5 metres flagpole receptor	6 metres flagpole receptor
R1	Golf Course Entrance	706	598503.2	4919678.6	0.16058	0.20298
R2	Existing Residence	534	598395.6	4920074.6	0.66721	0.67369
R3	Existing Residence	535	598414.8	4920027.7	0.56414	0.58554
R4	Existing Residence	536	598432.6	4919994.4	0.49307	0.53725
R5	Existing Residence	639	598641.3	4919680.4	0.19791	0.22298
R6	Proposed Residence	420	598832.4	4919852.4	0.34622	0.36294
R7	Proposed Residence	412	598841.0	4919858.6	0.34581	0.37434
R8	Proposed Residence	405	598850.4	4919865.0	0.36155	0.38256
R9	Proposed Residence	398	598859.4	4919871.4	0.36885	0.39246
R10	Proposed Residence	391	598868.6	4919877.9	0.37263	0.39665
R11	Proposed Residence	384	598877.4	4919883.9	0.36505	0.38308
R12	Proposed Residence	377	598886.4	4919890.4	0.36642	0.38912
R13	Proposed Residence	371	598895.3	4919896.3	0.37506	0.39592
R14	Proposed Residence	365	598905.1	4919903.1	0.38567	0.40679
R15	Proposed Residence	359	598914.2	4919909.8	0.40432	0.42531
R16	Proposed Residence	353	598923.8	4919916.4	0.43006	0.44682
R17	Proposed Residence	339	598947.2	4919933.2	0.47425	0.48916
R18	Proposed Residence	334	598955.8	4919939.5	0.48995	0.50513
R19	Proposed Residence	330	598964.8	4919945.4	0.50014	0.50566
R20	Proposed Residence	326	598973.5	4919951.5	0.50404	0.51307
R21	Proposed Residence	323	598982.3	4919957.4	0.50551	0.50738
R22	Proposed Residence	320	598991.6	4919963.7	0.49354	0.49072
R23	Proposed Residence	316	598999.9	4919970.0	0.48757	0.48219
R24	Proposed Residence	314	599008.8	4919976.2	0.47259	0.46497
R25	Proposed Residence	311	599018.3	4919982.5	0.43577	0.44667
R26	Proposed Residence	310	599027.5	4919988.5	0.43488	0.43784
R27	Proposed Residence	308	599036.2	4919994.8	0.43297	0.43673
R28	Proposed Residence	307	599045.5	4920001.8	0.43088	0.43348
R29	Proposed Residence	306	599054.8	4920007.8	0.42524	0.42673
R30	Proposed Residence	312	599075.3	4920015.0	0.38091	0.37328
R31	Proposed Residence	327	599084.1	4920002.6	0.36564	0.35456
R32	Proposed Residence	341	599090.1	4919988.7	0.35569	0.34748
R33	Proposed Residence	356	599096.0	4919974.7	0.34398	0.33958
R34	Proposed Residence	308	599114.7	4920054.4	0.32519	0.32018
R35	Proposed Residence	323	599123.6	4920042.0	0.31235	0.30629
R36	Proposed Residence	337	599129.5	4920028.1	0.30704	0.30491
R37	Proposed Residence	351	599135.5	4920014.1	0.2974	0.29511
R38	Existing Residence	781	598112.8	4920244.7	0.20972	0.21344
R39	Existing Residence	769	598126.4	4920209.0	0.21173	0.2149
R40	Existing Residence	755	598144.3	4920175.7	0.22719	0.23066
R41	Snowmobile Club	471	599346.4	4920397.3	0.55831	0.55159
R42	Existing Residence	654	599502.9	4920504.2	0.54882	0.54678
R43	Existing Residence	775	599319.5	4920914.9	0.3975	0.43487
R44	Provincial Park	1019	598507.2	4921210.5	0.58984	0.59651
R45	Existing Residence	421	598718.9	4919884.9	0.51402	0.54076

[(1)] Measured from the WWTP Biofiltration Unit

[(2)] Per the Ministry's *Methodology for Modelling Assessments of Contaminants with 10-Minute Average Standards and Guidelines under O.Reg. 419-5 (September 2016)* , if the modelled number of exceedences at a human receptor are below the odour guideline 0.5% of the time on an annual basis, then the facility is deemed, for assessment purposes, to meet the standard/guideline.

Appendix A

Figures and Zoning Map



LEGEND

H_2S	Hydrogen Sulphide	TRS	Total Reduced Sulphur
NH_3	Ammonia	NO_x	Nitrogen Oxides
		⇢	Emission Flow
		→	Material Flow

SITE LAYOUT - WWTP

MIDHURST LANDOWNER'S GROUP
1432 Snow Valley Road, Springwater, Ontario, L0L 1Y3

BCX

ENVIRONMENTAL COMPLIANCE APPROVAL APPLICATION (AIR & NOISE)

File No.: 1365-01.02
Date: March 2023
Dwg.: 1365-01.02_1
Drawn By: KL
FIGURE 1

LEGEND

- Main Entrance
- SP1 — Emission Sources
- Property Line
- Roads

ATAD Building

Thickener Building

BF2

CHTCK

BF1

BST1

CHATD

CLF2

BST2

WWTP Ultimate Phase 1

Secondary Treatment Building

CLF1

EGEN23_1

EGEN23_2

CHSUB

CHSEC

CHHDW

Headworks Building

Substation

CF1

CF2

BIOH

CHTER

Tertiary Building

EGEN1

Water Treatment Plant

Main Entrance
(598985 m E, 4920208 m N)

WILSON DR

WILSON DR

SNOW VALLEY ROAD

0 m 100 m 200 m

N

SITE LAYOUT

MIDHURST LANDOWNER'S GROUP
1432 Snow Valley Road, Springwater, Ontario, L0L 1Y3

BCX

EMISSIONS SUMMARY AND DISPERSION MODELLING REPORT

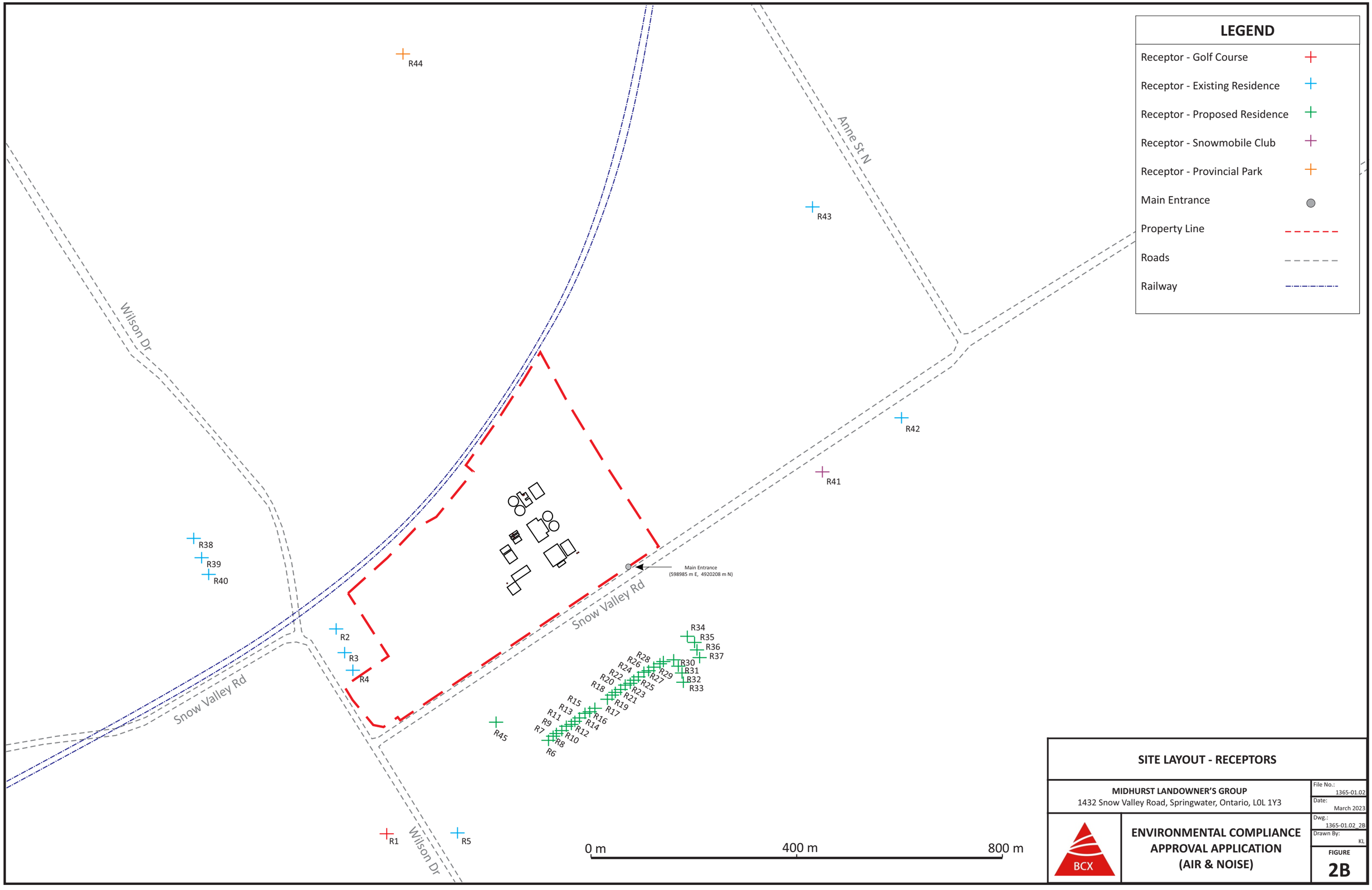
File No.: 1365-01.02

Date: March 2023

Dwg.: 1365-01.02_2A

Drawn By: KL

FIGURE **2A**



SITE LAYOUT - RECEPTORS

MIDHURST LANDOWNER'S GROUP
1432 Snow Valley Road, Springwater, Ontario, L0L 1Y3

BCX

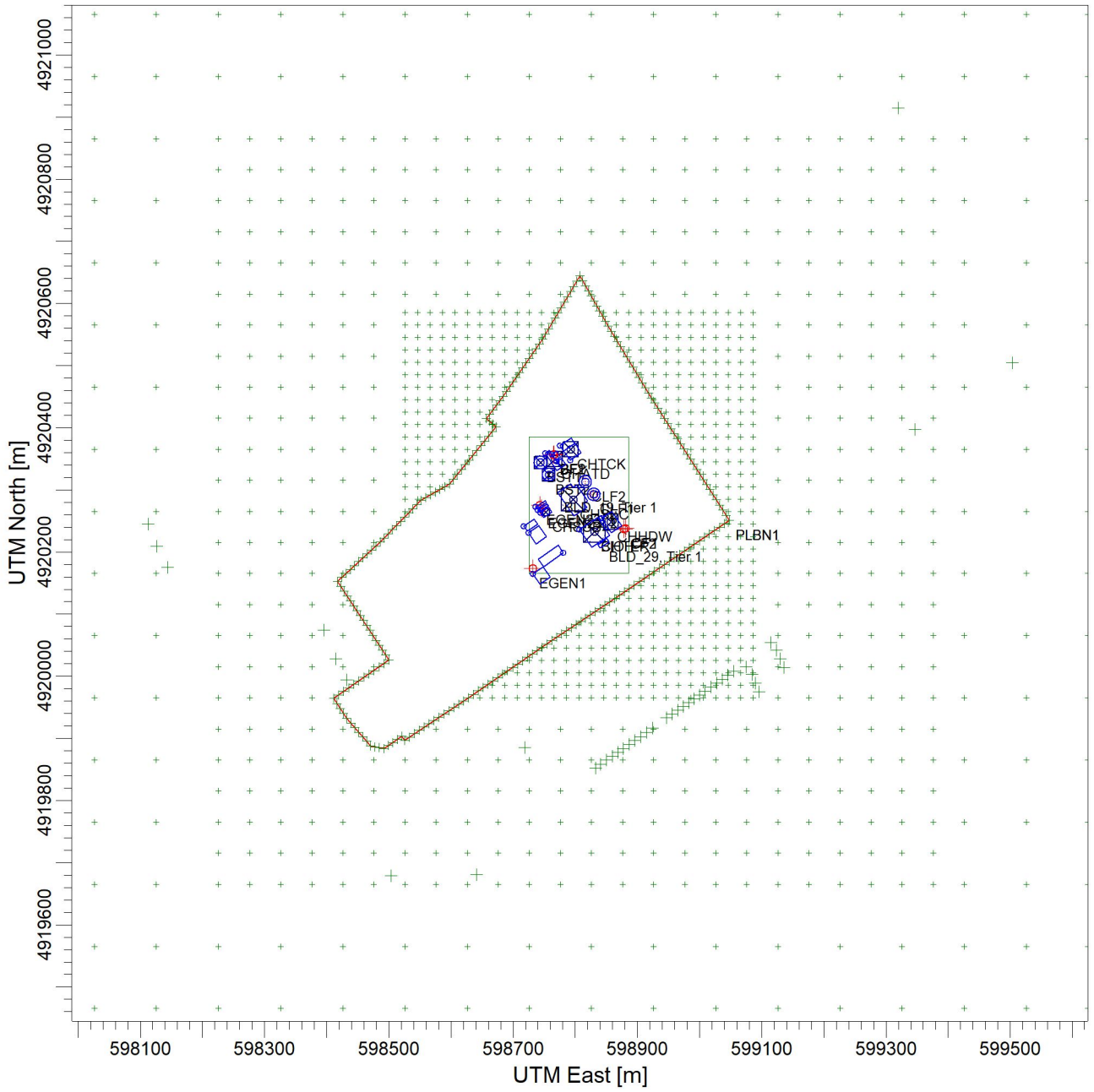
ENVIRONMENTAL COMPLIANCE APPROVAL APPLICATION (AIR & NOISE)

File No.: 1365-01.02
Date: March 2023
Dwg.: 1365-01.02_2B
Drawn By: KL

FIGURE 2B

PROJECT TITLE:

Figure 3A: Dispersion Modelling Configuration



COMMENTS: Midhurst Facility 1432 Snow Valley Road Springwater, Ontario L0L 1Y3	SOURCES: **18**	COMPANY NAME: **BCX Environmental Consulting**	
	RECEPTORS: **2064**	MODELER: **KL**	
		SCALE: 1:10,285 0 — 0.3 km	
		DATE: **2023-03-13**	PROJECT NO.: **1365-01.02**

AERMOD View - Lakes Environmental Software

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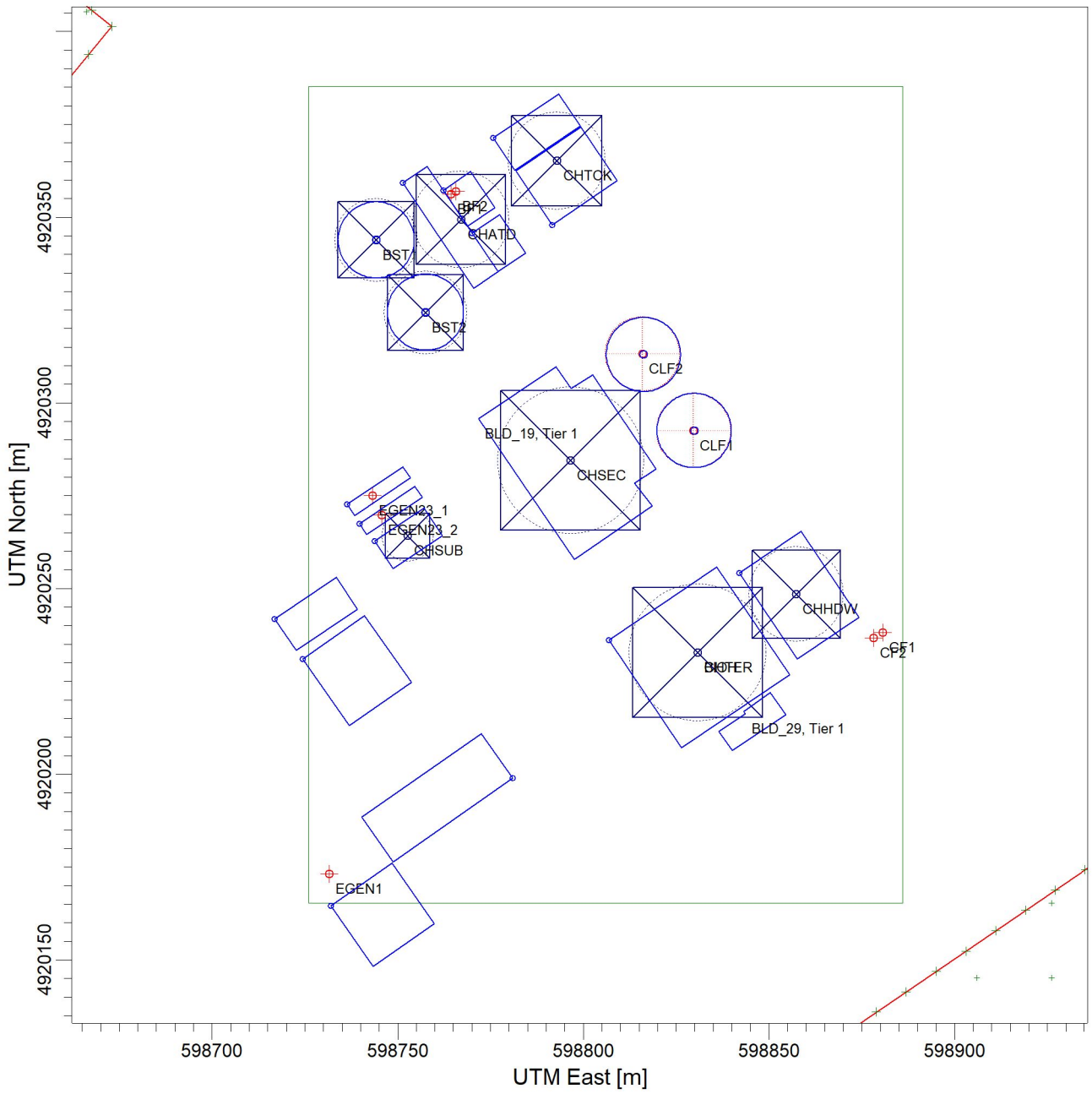
PROJECT TITLE:

Figure 3B: Dispersion Modelling Configuration



COMMENTS: Midhurst Facility 1432 Snow Valley Road Springwater, Ontario L0L 1Y3	SOURCES: **18**	COMPANY NAME: **BCX Environmental Consulting**	
	RECEPTORS: **2064**	MODELER: **KL**	
		SCALE: 1:1,721 0 0.05 km	
		DATE: **2023-03-13**	PROJECT NO.: **1365-01.02**

AERMOD View - Lakes Environmental Software

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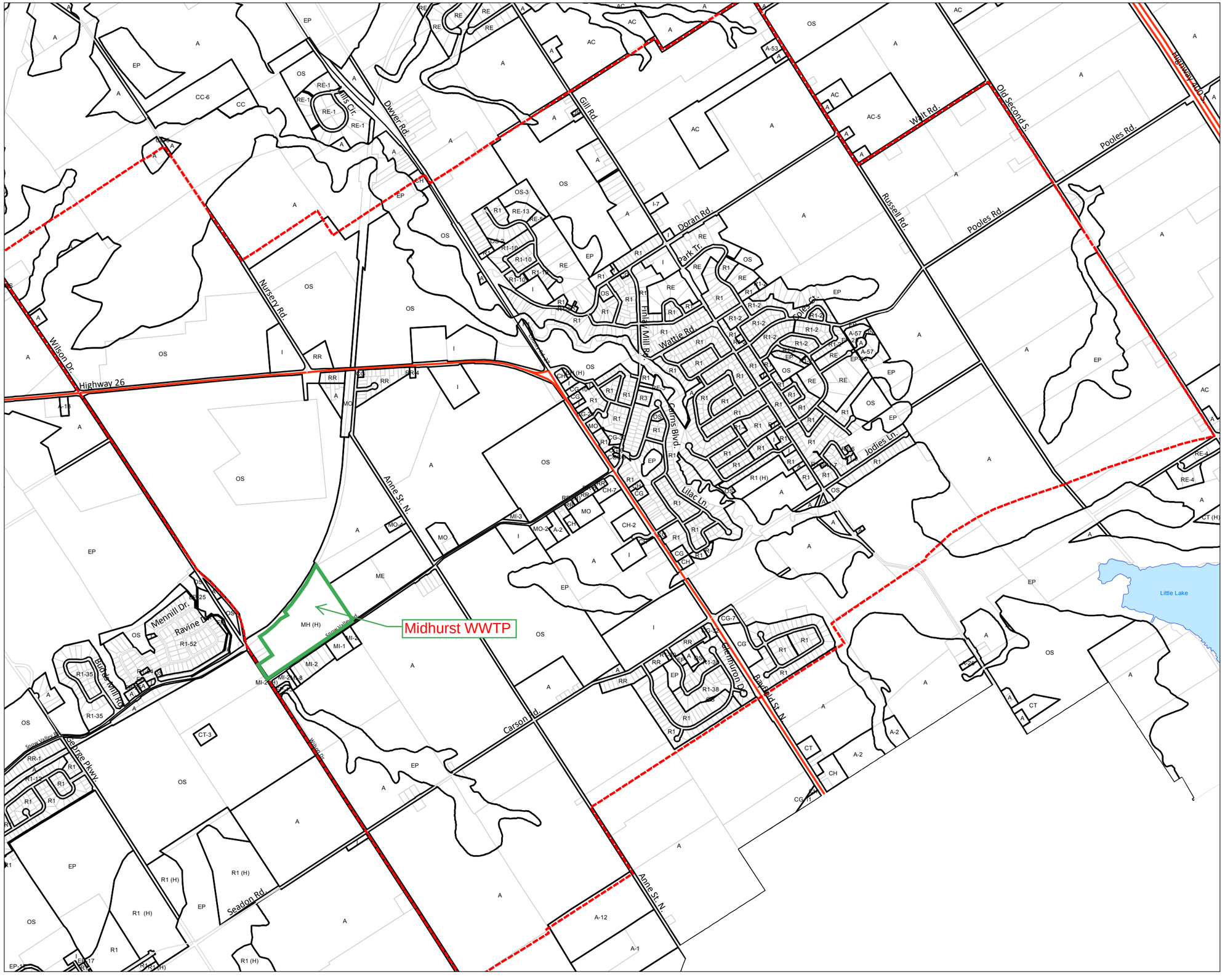

Township of Springwater

Midhurst

N

Legend

- County Road
- Local Road
- Private Road
- Provincial Road
- Settlement Area Boundary
- Zone Boundary
- Lakes
- Parcels

A - Agricultural Zone
CG - General Commercial Zone
CH - Highway Commercial Zone
CT - Tourist Commercial Zone
EP - Environmental Protection Zone
I - Institutional Zone
MI - General Industrial Inside Storage Zone
MH -
MO - General Industrial Outside Storage Zone
R - Residential Zone

Disclaimer - This map is provided in draft form for reference only. Due to the scale and detail of the map, some site specific zoning labels may not be visible. For further clarification on any mapping discrepencies, please contact the Township of Springwater Planning Department.

0 250 500 1,000 Meters

Appendix B

Emission Calculations

Calculation Sheet 1
Emission Rates - Operations

Odour emission rates are calculated using source testing results completed on the screen building and equilibrium tanks of a similar membrane bioreactor (MBR) WWTP facility (Newterra), prorated to the Midhurst WWTP maximum capacity. It was assumed that emissions from the Midhurst Influent Pumping Station are the same as those from the Comparable WWTP Equalization Tank. The Comparable WWTP is configured such that the equalization tank precedes the screen building and is, therefore, most representative of odour from raw wastewater.

The emission rate for potential odour-causing compounds (hydrogen sulphide, dimethyl sulphide, carbon disulphide) were estimated by prorating the hydrogen sulphide emission rate from similar sources at another WWTP (Duffin Creek Air Emissions Study Report, Earth Tech Canada Inc., May 2006). Emission rates from the other compounds were calculated using a ratio of concentrations from the headworks operations at an anerobic wastewater treatment plant (Odor Control - Solutions for Managing Emissions from Wastewater Treatment Facilities by Simon, Alix and Arrebola, January 2010). The inlet concentrations for the headworks in this reference study: H2S = 39,000 ppbv, Methyl Mercaptan = 310 ppbv, Dimethyl Sulphide = 10 ppbv, Carbonyl Disulphide = 4 ppbv. Total reduced sulphur emissions are calculated to be the sum of hydrogen sulphide, methyl mercaptan, dimethyl sulphide and carbonyl disulphide.

As confirmed by TYLin, odour control equipment will be designed to have a minimum of 90% removal efficiency for all assessed contaminants. As such, a control efficiency of 90% was applied to sources controlled by the odour control equipment. (TYLin, 2023)

Midhurst Emission Rate (Odour) (OU/s) = Comparable WWTP Odour Emission Rate, Uncontrolled (OU/s) / (1-Estimated Control Efficiency) (%) x (Midhurst WWTP Capacity (m^3/day)/Comparable WWTP Capacity (m^3/day)) x (1 - Additional Control Efficiency (%))

Midhurst Emission Rate (Hydrogen Sulphide) (g/s) = Comparable WWTP H_2S Emission Rate, Uncontrolled (g/s) / (1-Estimated Control Efficiency) (%) x (Midhurst WWTP Capacity (m^3/day)/Comparable WWTP Capacity (m^3/day)) x (1 - Additional Control Efficiency (%))

Midhurst Emission Rate (Ammonia) (g/s) = Comparable WWTP NH_3 Emission Rate, Uncontrolled (g/s) / (1-Estimated Control Efficiency) (%) x (Midhurst WWTP Capacity (m^3/day)/Comparable WWTP Capacity (m^3/day)) x (1 - Additional Control Efficiency (%))

Source ID	Source Description	Contaminant	CAS#	Comparable WWTP (Odour Study)						Midhurst WWTP							Data Quality	Emission Technique
				Emission Rate, Controlled		Estimated Control Efficiency	Emission Rate, Uncontrolled		Maximum Capacity	Maximum Capacity	Prorated Emission Rate, Uncontrolled		Additional Control Efficiency	Prorated Emission Rate, Controlled				
				(g/s)	(OU/s)	(%)	(g/s)	(OU/s)	(m^3/day)	(m^3/day)	Value	Unit	(%)	Value	Unit			
Wastewater Treatment Plant																		
2-1	Influent Pumping Station, venting through the carbon filtration system (CF)	Hydrogen Sulphide	7789-06-4	9.45E-08	-	90%	9.45E-07	-	14370.0	6450.0	4.24E-07	g/s	90%	4.24E-08	g/s	Average	EC
		Ammonia	7664-41-7	4.50E-09	-	90%	4.50E-08	-	14370.0	6450.0	2.02E-08	g/s	90%	2.02E-09	g/s	Average	EC
		Total Reduced Sulphur	TRS	1.80E-08	-	90%	1.80E-07	-	14370.0	6450.0	8.08E-08	g/s	90%	8.08E-09	g/s	Average	EC
		Odour	-	-	7.30E+02	90%	-	7.30E+03	14370.0	6450.0	3.28E+03	OU/s	90%	3.28E+02	OU/s	Average	EC
2-2	Headworks Building (inc. screening/grit removal unit), venting through the carbon filtration system (CF)	Hydrogen Sulphide	7789-06-4	9.45E-08	-	90%	9.45E-07	-	14370.0	6450.0	4.24E-07	g/s	90%	4.24E-08	g/s	Average	EC
		Ammonia	7664-41-7	4.50E-09	-	90%	4.50E-08	-	14370.0	6450.0	2.02E-08	g/s	90%	2.02E-09	g/s	Average	EC
		Total Reduced Sulphur	TRS	1.80E-08	-	90%	1.80E-07	-	14370.0	6450.0	8.08E-08	g/s	90%	8.08E-09	g/s	Average	EC
		Odour	-	-	7.30E+02	90%	-	7.30E+03	14370.0	6450.0	3.28E+03	OU/s	90%	3.28E+02	OU/s	Average	EC
2-4A	Clarifier 1	Hydrogen Sulphide	7789-06-4	1.42E-10	-	90%	1.42E-09	-	14370.0	6450.0	6.37E-10	g/s	90%	6.37E-11	g/s	Average	EC
		Ammonia	7664-41-7	1.42E-09	-	90%	1.42E-08	-	14370.0	6450.0	6.37E-09	g/s	90%	6.37E-10	g/s	Average	EC
		Total Reduced Sulphur	TRS	1.42E-10	-	90%	1.42E-09	-	14370.0	6450.0	6.37E-10	g/s	90%	6.37E-11	g/s	Average	EC
		Odour	-	-	2.08E+02	90%	-	2.08E+03	14370.0	6450.0	9.34E+02	OU/s	90%	9.34E+01	OU/s	Average	EC
2-4B	Clarifier 2	Hydrogen Sulphide	7789-06-4	1.42E-10	-	90%	1.42E-09	-	14370.0	6450.0	6.37E-10	g/s	90%	6.37E-11	g/s	Average	EC
		Ammonia	7664-41-7	1.42E-09	-	90%	1.42E-08	-	14370.0	6450.0	6.37E-09	g/s	90%	6.37E-10	g/s	Average	EC
		Total Reduced Sulphur	TRS	1.42E-10	-	90%	1.42E-09	-	14370.0	6450.0	6.37E-10	g/s	90%	6.37E-11	g/s	Average	EC
		Odour	-	-	2.08E+02	90%	-	2.08E+03	14370.0	6450.0	9.34E+02	OU/s	90%	9.34E+01	OU/s	Average	EC
2-5	Teriary Building (incl. membrane filteration, UV disinfection and chemical storage tanks)	Hydrogen Sulphide	7789-06-4	0.00E+00	-	90%	0.00E+00	-	14370.0	6450.0	0.00E+00	g/s	90%	0.00E+00	g/s	Average	EC
		Ammonia	7664-41-7	0.00E+00	-	90%	0.00E+00	-	14370.0	6450.0	0.00E+00	g/s	90%	0.00E+00	g/s	Average	EC
		Total Reduced Sulphur	TRS	0.00E+00	-	90%	0.00E+00	-	14370.0	6450.0	0.00E+00	g/s	90%	0.00E+00	g/s	Average	EC
		Odour	-	-	0.00E+00	90%	-	0.00E+00	14370.0	6450.0	0.00E+00	OU/s	90%	0.00E+00	OU/s	Average	EC
2-6	Thickener Building venting through the biofilter unit (BF)	Hydrogen Sulphide	7789-06-4	9.25E-09	-	90%	9.25E-08	-	14370.0	6450.0	4.15E-08	g/s	90%	4.15E-09	g/s	Average	EC
		Ammonia	7664-41-7	4.63E-08	-	90%	4.63E-07	-	14370.0	6450.0	2.08E-07	g/s	90%	2.08E-08	g/s	Average	EC
		Total Reduced Sulphur	TRS	9.25E-09	-	90%	9.25E-08	-	14370.0	6450.0	4.15E-08	g/s	90%	4.15E-09	g/s	Average	EC
		Odour	-	-	6.83E+03	90%	-	6.83E+04	14370.0	6450.0	3.07E+04	OU/s	90%	3.07E+03	OU/s	Average	EC
2-7	ATAD Building venting through the biofilter unit (BF)	Hydrogen Sulphide	7789-06-4	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Ammonia	7664-41-7	1.42E-01	-	90%	1.42E+00	-	14370.0	6450.0	6.37E-01	g/s	90%	6.37E-02	g/s	Average	EC
		Total Reduced Sulphur	TRS	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Odour	-	-	7.92E+02	90%	-	7.92E+03	14370.0	6450.0	3.55E+03	OU/s	90%	3.55E+02	OU/s	Average	EC
2-8A	Underground Sludge Holding Tank 1 venting through the biofilter unit (BF)	Hydrogen Sulphide	7789-06-4	5.06E-10	-	90%	5.06E-09	-	14370.0	6450.0	2.27E-09	g/s	90%	2.27E-10	g/s	Average	EC
		Ammonia	7664-41-7	5.06E-09	-	90%	5.06E-08	-	14370.0	6450.0	2.27E-08	g/s	90%	2.27E-09	g/s	Average	EC
		Total Reduced Sulphur	TRS	5.06E-10	-	90%	5.06E-09	-	14370.0	6450.0	2.27E-09	g/s	90%	2.27E-10	g/s	Average	EC
		Odour	-	-	2.69E+02	90%	-	2.69E+03	14370.0	6450.0	1.21E+03	OU/s	90%	1.21E+02	OU/s	Average	EC
2-8B	Underground Sludge Holding Tank 2 venting through the biofilter unit (BF)	Hydrogen Sulphide	7789-06-4	5.06E-10	-	90%	5.06E-09	-	14370.0	6450.0	2.27E-09	g/s	90%	2.27E-10	g/s	Average	EC
		Ammonia	7664-41-7	5.06E-09	-	90%	5.06E-08	-	14370.0	6450.0	2.27E-08	g/s	90%	2.27E-09	g/s	Average	EC
		Total Reduced Sulphur	TRS	5.06E-10	-	90%	5.06E-09	-	14370.0	6450.0	2.27E-09	g/s	90%	2.27E-10	g/s	Average	EC
		Odour	-	-	2.69E+02	90%	-	2.69E+03	14370.0	6450.0	1.21E+03	OU/s	90%	1.21E+02	OU/s	Average	EC
2-10A	Biosolids Storage Tank 1	Hydrogen Sulphide	7789-06-4	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Ammonia	7664-41-7	1.42E-01	-	90%	1.42E+00	-	14370.0	6450.0	6.37E-01	g/s	90%	6.37E-02	g/s	Average	EC
		Total Reduced Sulphur	TRS	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Odour	-	-	7.92E+02	90%	-	7.92E+03	14370.0	6450.0	3.55E+03	OU/s	90%	3.55E+02	OU/s	Average	EC
2-10B	Biosolids Storage Tank 2	Hydrogen Sulphide	7789-06-4	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Ammonia	7664-41-7	1.42E-01	-	90%	1.42E+00	-	14370.0	6450.0	6.37E-01	g/s	90%	6.37E-02	g/s	Average	EC
		Total Reduced Sulphur	TRS	4.92E-05	-	90%	4.92E-04	-	14370.0	6450.0	2.21E-04	g/s	90%	2.21E-05	g/s	Average	EC
		Odour	-	-	2.69E+02	90%	-	2.69E+03	14370.0	6450.0	1.21E+03	OU/s	90%	1.21E+02	OU/s	Average	EC

Hydrogen Sulphide Sample Calculation - Influent Pumping Station

Midhurst WWTP Emission Rate (g/s) = Comparable WWTP H_2S Emission Rate, Uncontrolled (OU/s) x (Midhurst WWTP Capacity (m^3/day)/Comparable WWTP Capacity (m^3/day)) x (1 - Additional Control Efficiency (%))

$$= \frac{9.45E\text{-}08\ g/s}{} \Big/ (1 - 90\%) \times \frac{6450.0\ m^3/day}{1\ day} \times \frac{1\ day}{14370.0\ m^3} \times (1 - 90\%) \times = \frac{4.24E\text{-}08\ g}{s}$$

Odour Sample Calculation - Influent Pumping Station

Midhurst WWTP Emission Rate (OU/s) = Comparable WWTP Odour Emission Rate, Controlled (OU/s) / (1 - Additional Control Efficiency, Comparable WWTP (%)) x (Midhurst WWTP Capacity (m^3/day)/Comparable WWTP Capacity (m^3/day)) x (1 - Additional Control Efficiency (%))

$$= \frac{7.30E+02\ OU/s}{} \Big/ (1 - 90\%) \times \frac{6450.0\ m^3/day}{1\ day} \times \frac{1\ day}{14370.0\ m^3} \times (1 - 90\%) \times = \frac{3.28E+03\ g}{s}$$

Calculation Sheet 2
Emission Rates - Engines

Emission factors for NOX, CO and PM for diesel combustion were taken from U.S. EPA Emission Standards for a Tier 2 Engine. Emission factors for SO2 and BaP were taken from U.S. EPA, AP-42 Section 3.4, Table 3.4-4 for engines over 600 HP. The diesel fuel sulphur content was assumed to be 0.1% as per Sulphur in Diesel Fuel Regulations (SOR/2002-254), Environment Canada.

The heat input is calculated using an engine efficiency of 36.2%, which is calculated using the fuel input and power output emission factors listed in the U.S. EPA AP-42 Section 3.3.

Engine Efficiency (%) = Power Output (lb/hp-hr) / Fuel Input (lb/MMBtu) x (1 MMBTU / 393.0148 hp-hr)

Annual Emissions (g/s) = Fuel Input Emission Factor (lb/MMBTU) x Heat Input (MMBTU/hr) x (g/0.0022 lb) x (1 hr/3600 s) x (operating hours per day/24 hours per day) x (operating months per year/12 months per year)

Daily Emissions (g/s) = Emission Factor (lb/hp-hr) x Power Rate (kW) x (1hp/0.746kW) x (g/0.0022 lb) x (1hr/3600s) x (operating hours per day/24 hours per day)

Hourly Emissions (g/s) = Emission Factor (lb/hp-hr) x Power Rate (kW) x (1hp/0.746kW) x (g/0.0022 lb) x (1hr/3600s)

Hourly Emissions (g/s) = Emission Factor (g/kW-hr) x Power Rate (kW) x (1hr/3600s)

Source I.D.	Source Description	Contaminant	CAS #	Averaging Period	Hours of Operation	Months of Operation	U.S. EPA Tier	Power Rate		Emission Factors		Emissions (g/s)	U.S. EPA AP-42 Data Quality	ESDM Data Quality	Estimation Technique
								Value	Units	Value	Units				
Water Treatment Plant															
1-4	Standby Diesel Generator for WTP	NO_X	10102-44-0	1 hr	24	12	2	500.0	kW	6.03E+00	g/kW-hr	8.38E-01	A	Above Average	EF
Wastewater Treatment Plant															
2-9A	Standby Diesel Generator #1 for WWTP	NO_X	10102-44-0	24 hr	24	12	2	2250.0	kW	6.03E+00	g/kW-hr	3.77E+00	A	Above Average	EF
2-9B	Standby Diesel Generator #2 for WWTP	NO_X	10102-44-0	24 hr	24	12	2	2250.0	kW	6.03E+00	g/kW-hr	3.77E+00	A	Above Average	EF

Sample calculation - Particulate Matter from 1-4

Daily Emission rate (g/s) = $\frac{2.00E\text{-}01\ g}{kW\text{-}hr} \times 2250\ kW \times \frac{24\ \text{operating hours}}{24\ \text{hours per day}} \times \frac{1\ hr}{3600\ s} = 1.25E\text{-}01\ \frac{g}{s}$

Sample calculation - Sulphur Dioxide (24hr) from 1-4

Daily Emission rate (g/s) = $\frac{8.09E\text{-}04\ lb}{hp\text{-}hr} \times 2250\ kW \times \frac{1\ hp}{0.746\ kW} \times \frac{24\ \text{operating hours}}{24\ \text{hours per day}} \times \frac{1\ g}{0.0022\ lb} \times \frac{1\ hr}{3600\ s} = 3.08E\text{-}01\ \frac{g}{s}$

Calculation Sheet 3
Emission Rates - Heaters

For combustion of natural gas, only emissions of NOx were estimated (Ministry Procedure for Preparing an ESDM Report, Section 7.1.1, September 2016). The emission factor (EF) used was taken from U.S. EPA, AP-42, Section 1.4 "Natural Gas Combustion," July 1998, Table 1.4-1 for a boiler <100 MMBTU/hr.

A natural gas heating value of 1020 BTU/scf was used to convert lb/106scf to lb/MMBTU (from AP42 Section 1.4 "Natural Gas Combustion" (July 1998), Table 1.4-1, Note A).

Emissions (g/s) = Emission Factor (lb/10^6scf) x Fuel Consumption (MMBTU/hr) x (10^6scf/1020MMBTU) x (kg/2.2lb) x (1000g/kg) x (1hr/3600s)

Source ID	Source Description	Contaminants	CAS #	Averaging Period	Fuel Consumption		Emission Factors		Emission Rate (g/s)	U.S. EPA AP-42 Data Quality	ESDM Data Quality	Estimation Technique
					Value	Units	Value	Units				
RMC Plant												
3-1	Comfort Heating - Headworks Building	NO_X	10102-44-0	24 hr	0.72	MMBTU/hr	100	lb/10^6 scf	8.95E-03	B	Above Average	EF
		NO_X	10102-44-0	1 hr			100	lb/10^6 scf	8.95E-03	B	Above Average	EF
3-2	Comfort Heating - Secondary Treatment Building	NO_X	10102-44-0	24 hr	1.01	MMBTU/hr	100	lb/10^6 scf	1.25E-02	B	Above Average	EF
		NO_X	10102-44-0	1 hr			100	lb/10^6 scf	1.25E-02	B	Above Average	EF
3-3	Comfort Heating - Substation	NO_X	10102-44-0	24 hr	0.069	MMBTU/hr	94	lb/10^6 scf	8.03E-04	B	Above Average	EF
		NO_X	10102-44-0	1 hr			94	lb/10^6 scf	8.03E-04	B	Above Average	EF
3-4	Comfort Heating - Tertiary Treatment Building	NO_X	10102-44-0	24 hr	1.24	MMBTU/hr	100	lb/10^6 scf	1.54E-02	B	Above Average	EF
		NO_X	10102-44-0	1 hr			100	lb/10^6 scf	1.54E-02	B	Above Average	EF
3-5	Comfort Heating - Thickener Building	NO_X	10102-44-0	24 hr	3.42	MMBTU/hr	100	lb/10^6 scf	4.23E-02	B	Above Average	EF
		NO_X	10102-44-0	1 hr			100	lb/10^6 scf	4.23E-02	B	Above Average	EF
3-6	Comfort Heating - ATAD Building	NO_X	10102-44-0	24 hr	0.70	MMBTU/hr	100	lb/10^6 scf	8.66E-03	B	Above Average	EF
		NO_X	10102-44-0	1 hr			100	lb/10^6 scf	8.66E-03	B	Above Average	EF

Appendix C

Equipment Specifications

Tich Truong

From: Bill Mullin <bmullin@biorem.biz>
Sent: Tuesday, January 24, 2023 2:04 PM
To: Tich Truong
Cc: John Morris; Nitya Shah; Geoff Coate
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit Biofilter Option
Attachments: BASYS Generic GAs.pdf; BIOREM XLD Media.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Tich:

The BASYS 32 drawing can be found in the attached drawing (see BASYS 32).

The BIOREM XLD Data Sheet is attached.
It will get 90% odour removal or 600 OU (whichever is less stringent)
99% H2S removal or 0.1 ppm (whichever is less stringent)

Stack will be about 150" off grade. It will discharge vertically up through a no loss rain cap. We can adjust the diameter a bit. What velocity are you looking for?

I will look for the fan acoustical data.

Thanks,
Bill

From: Tich Truong <tich.truong@tylin.com>
Sent: January 24, 2023 1:52 PM
To: Bill Mullin <bmullin@biorem.biz>
Cc: John Morris <john.morris@tylin.com>; Nitya Shah <nitya.shah@tylin.com>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit Biofilter Option

Hi Bill,

Did you have a chance to take a look at this?

We are looking for the following information

1. Specification sheets (including the control efficiency), stack dimensions, locations, and types (e.g. vertical, horizontal, or capped)
2. Acoustical data

Tich

Tich Truong, P.ENG., MASC.

PROJECT ENGINEER
TYLin

From: Bill Mullin <bmullin@biorem.biz>
Sent: Tuesday, January 17, 2023 12:08 PM
To: Tich Truong <tich.truong@tylin.com>
Cc: John Morris <john.morris@tylin.com>; Nitya Shah <nitya.shah@tylin.com>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit Biofilter Option

Hello Tich:

I am on the road but I will look at this tonight.

Regards,
Bill

From: Tich Truong <tich.truong@tylin.com>
Sent: January 17, 2023 8:50 AM
To: Bill Mullin <bmullin@biorem.biz>
Cc: John Morris <john.morris@tylin.com>; Nitya Shah <nitya.shah@tylin.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit Biofilter Option

Good morning Bill,

Can you provide some additional information on your proposed unit in order to complete preliminary odour control and air & noise modelling?

We are looking for the following information

1. Specification sheets (including the control efficiency), stack dimensions, locations, and types (e.g. vertical, horizontal, or capped)
2. Acoustical data

Tich

Tich Truong, P.ENG., MASC.
PROJECT ENGINEER
TYLin

From: Bill Mullin <bmullin@biorem.biz>
Sent: Tuesday, March 8, 2022 2:04 PM
To: Nathaly Villada <NVillada@tmig.ca>
Cc: Brian Edwards <BEdwards@tmig.ca>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit Biofilter Option

Hi Nathaly:

For design purposes I have assumed 5,000 m3/h at 10 ppm H2S for both options.

I have selected a BASYS 32 biofilter system c/w

- Inorganic biofilter media (should last 20 years +)
- Biofilter vessel in FRP or stainless steel
- 7.5 HP Fan
- 2 HP Pump (for humidifier)
- 30 kW Heater (to heat the air in the winter if it drops below 10 C)
- Control Panel
- Local Read Instruments
- Freight to Site

BUDGET PRICE……..$475,000 CDN
Taxes: Extra
Pricing based on March 2022 raw materials costs

The biofilter system will operated up to 20ppm H2S without the need for a biotrickling filter to reduce H2S levels. This media should last 20 years +

See the BASYS 32 drawing attached for additional information.

Regards,
Bill

Bill Mullin, P.Eng., CPA, CMA
Business Development Manager

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From: Nathaly Villada <NVillada@tmig.ca>
Sent: March 8, 2022 7:00 AM
To: Bill Mullin <bmullin@biorem.biz>
Cc: Brian Edwards <BEdwards@tmig.ca>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit

Good morning,

I would like to follow up on the RFQ for the Odour Control Unit. Would you be able to provide something before Wednesday?

Thank you,

Nathaly Villada, P.Eng.
Electrical Engineer

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a T.Y. Lin International Company

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tmig.ca | tylin.com

From: Nathaly Villada
Sent: Friday, March 4, 2022 12:21 PM
To: Bill Mullin <bmullin@biorem.biz>
Cc: Brian Edwards <BEdwards@tmig.ca>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit

Hi Bill and Geoff,

Thank you for looking after this request.

Further to my previous criteria, please note the following design updates:

The project will be in two phases, max airflow for both phases will be **5000m3/hr** as mentioned before.

- Phase 1: Gravity sewer flow. H2S concentration 5-10ppm.
- Phase 2: Pumped sewage flow introduced. H2S > 10ppm

The phase sewage flow split is 50:50

On this basis we are considering a biofilter in Phase 1 with an upstream Biotrickling filter added in Phase 2.

Please let me know if you require further information and also a timeline to receive the quote(s).

Thank you,

Nathaly Villada, P.Eng.
Electrical Engineer

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From: Bill Mullin <bmullin@biorem.biz>
Sent: Thursday, March 3, 2022 2:47 PM
To: Nathaly Villada <NVillada@tmig.ca>
Cc: Brian Edwards <BEdwards@tmig.ca>; Geoff Coate <gcoate@h2flow.com>
Subject: RE: Midhurst WWTP - QUOTE for Odour Control Unit

Hi Nathaly:

Thanks for the inquiry.

We can provide all three but I would not recommend a biotrickling filter for this application. The hydrogen sulfide levels are too low. We would suggest inorganic media biofilter or Activated Carbon.

Activated carbon will have a smaller footprint and lower capital cost but your customer will have to change the media every 1-2 years,
A biofilter will have a larger footprint but a lower operating cost as the media will last 20 years. It will also need some water for operation.

Do you have a preference between a biofilter and carbon?

Thanks,
Bill

Bill Mullin, P.Eng., CPA, CMA
Business Development Manager

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From: Nathaly Villada <NVillada@tmig.ca>
Sent: March 3, 2022 2:34 PM
To: Bill Mullin <bmullin@biorem.biz>
Cc: Brian Edwards <BEdwards@tmig.ca>
Subject: Midhurst WWTP - QUOTE for Odour Control Unit

Hi Bill,

I am looking to get a quote for an Odour Control Unit for the Headworks Building at the Midhurst WWTP in Barrie.

These are the design parameters:

- This unit must be capable to meet the air flow rate of 5000m3/hr with contaminant loads as shown in the table below.

PARAMETER CONCENTRATION	DESIGN (mg/m^3)
Design H_2S	3.0
Design Ammonia (NH_3)	1.0
Design Reduced Sulphur Compounds (RSC)	0.1

- The unit has to use one of the following treatment technologies:
  - Inorganic Biofilter
  - Biotrickling Filters
  - Granular Activated Carbon (GAC)
- The unit will be located outdoor adjacent to the Headworks building (indoor space is limited) as shown in the attached photo
- If you provide more than 1 of the treatment technologies, could you please advise which one do you propose for this application?

Could you please advise if you have the equipment that meets the above requirements and include in your quote the following information:

- Sizing and footprint
- Performance (in terms of %removal of contaminants)
- Media replacement and/or maintenance
- Required Accessories for being an outdoor unit (enclosures, insulation, humidifier, heat tracing, etc.)
- Budget cost.

Feel free to give me a call to discuss.

Thank you,

Nathaly Villada, P.Eng.
Electrical Engineer

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Cat® 3516C
Diesel Generator Sets

Image shown may not reflect actual configuration

Bore – mm (in)	170 (6.69)
Stroke – mm (in)	215 (8.46)
Displacement – L (in^3)	78 (4764.73)
Compression Ratio	14.7:1
Aspiration	TA
Fuel System	EUI
Governor Type	ADEM™ A3

Standby 60 Hz ekW (kVA)	Mission Critical 60 Hz ekW (kVA)	Prime 60 Hz ekW (kVA)	Continuous 60 Hz ekW (kVA)	Emissions Performance
2500 (3125)	2500 (3125)	2250 (2812)	2050 (2562)	U.S. EPA Stationary Emergency Use Only (Tier 2)

Features

Cat® Diesel Engine
- Meets U.S. EPA Stationary Emergency Use Only (Tier 2) emission standards
- Reliable performance proven in thousands of applications worldwide

Generator Set Package
- Accepts 100% block load in one step and meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 G3 load acceptance requirements
- Reliability verified through torsional vibration, fuel consumption, oil consumption, transient performance, and endurance testing

Alternators
- Superior motor starting capability minimizes need for oversizing generator
- Designed to match performance and output characteristics of Cat diesel engines

Cooling System
- Cooling systems available to operate in ambient temperatures up to 50°C (122°F)
- Tested to ensure proper generator set cooling

EMCP 4 Control Panels
- User-friendly interface and navigation
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site specific programming for specific customer requirements

Warranty
- 24 months/1000-hour warranty for standby and mission critical ratings
- 12 months/unlimited hour warranty for prime and continuous ratings
- Extended service protection is available to provide extended coverage options

Worldwide Product Support
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- Your local Cat dealer provides extensive post-sale support, including maintenance and repair agreements

Financing
- Caterpillar offers an array of financial products to help you succeed through financial service excellence
- Options include loans, finance lease, operating lease, working capital, and revolving line of credit
- Contact your local Cat dealer for availability in your region

Standard and Optional Equipment

Engine

Air Cleaner
- ❑ Single element
- ❑ Dual element

Muffler
- ❑ Industrial grade (15 dB)

Starting
- ❑ Standard batteries
- ❑ Oversized batteries
- ❑ Standard electric starter(s)
- ❑ Heavy duty electric starter(s)
- ❑ Air starter(s)
- ❑ Jacket water heater

Alternator

Output voltage
- ❑ 380V ❑ 6300V
- ❑ 440V ❑ 6600V
- ❑ 480V ❑ 6900V
- ❑ 600V ❑ 12470V
- ❑ 2400V ❑ 13200V
- ❑ 4160V ❑ 13800V

Temperature Rise (over 40°C ambient)
- ❑ 150°C
- ❑ 125°C/130°C
- ❑ 105°C
- ❑ 80°C

Winding type
- ❑ Random wound
- ❑ Form wound

Excitation
- ❑ Internal excitation (IE)
- ❑ Permanent magnet (PM)

Attachments
- ❑ Anti-condensation heater
- ❑ Stator and bearing temperature monitoring and protection

Power Termination

Type
- ❑ Bus bar
- ❑ Circuit breaker
- ❑ 1600A ❑ 2000A
- ❑ 2500A ❑ 3000A
- ❑ 3200A ❑ 4000A
- ❑ 5000A
- ❑ IEC ❑ UL
- ❑ 3-pole ❑ 4-pole
- ❑ Manually operated
- ❑ Electrically operated

Trip Unit
- ❑ LSI ❑ LSI-G
- ❑ LSIG-P

Control System

Controller
- ❑ EMCP 4.2B
- ❑ EMCP 4.3
- ❑ EMCP 4.4

Attachments
- ❑ Local annunciator module
- ❑ Remote annunciator module
- ❑ Expansion I/O module
- ❑ Remote monitoring software

Charging
- ❑ Battery charger – 10A
- ❑ Battery charger – 20A
- ❑ Battery charger – 35A

Vibration Isolators
- ❑ Rubber
- ❑ Spring
- ❑ Seismic rated

Cat Connect

Connectivity
- ❑ Ethernet
- ❑ Cellular

Extended Service Options

Terms
- ❑ 2 year (prime)
- ❑ 3 year
- ❑ 5 year
- ❑ 10 year

Coverage
- ❑ Silver
- ❑ Gold
- ❑ Platinum
- ❑ Platinum Plus

Ancillary Equipment
- ❑ Automatic transfer switch (ATS)
- ❑ Paralleling switchgear
- ❑ Paralleling controls

Certifications
- ❑ UL 2200 Listed
- ❑ CSA
- ❑ IBC seismic certification
- ❑ OSHPD pre-approval

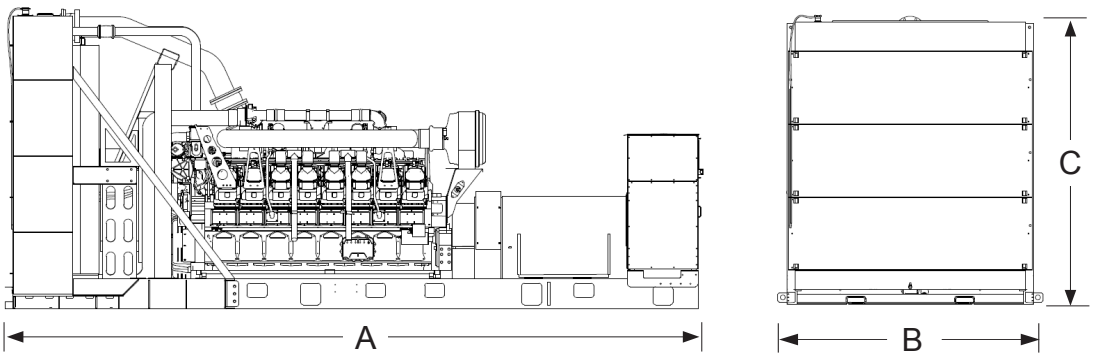
Note: *Some options may not be available on all models. Certifications may not be available with all model configurations. Consult factory for availability.*

Package Performance

Performance	Standby		Mission Critical		Prime		Continuous	
Frequency	60 Hz		60 Hz		60 Hz		60 Hz	
Gen set power rating with fan	2500 ekW		2500 ekW		2250 ekW		2050 ekW	
Gen set power rating with fan @ 0.8 power factor	3125 kVA		3125 kVA		2812 kVA		2562 kVA	
Emissions	EPA ESE (TIER 2)		EPA ESE (TIER 2)		EPA ESE (TIER 2)		EPA ESE (TIER 2)	
Performance number	EM1894-01		EM1895-02		DM8447-04		DM8268-03	
Fuel Consumption								
100% load with fan – L/hr (gal/hr)	656.8	(175.3)	656.8	(175.3)	593.0	(156.6)	549.3	(145.1)
75% load with fan – L/hr (gal/hr)	510.8	(134.9)	510.8	(134.9)	467.8	(123.6)	435.6	(115.1)
50% load with fan – L/hr (gal/hr)	372.4	(98.4)	372.4	(98.4)	341.9	(90.3)	316.8	(83.7)
25% load with fan – L/hr (gal/hr)	219.3	(57.9)	219.3	(57.9)	203.0	(53.6)	188.9	(49.9)
Cooling System								
Radiator air flow restriction (system) – kPa (in. water)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)	0.12	(0.48)
Radiator air flow – m^3/min (cfm)	2356	(83201)	2356	(83201)	2356	(83201)	2356	(83201)
Engine coolant capacity – L (gal)	233.0	(61.6)	233.0	(61.6)	233.0	(61.6)	233.0	(61.6)
Radiator coolant capacity – L (gal)	180.0	(47.6)	180.0	(47.6)	180.0	(47.6)	180.0	(47.6)
Total coolant capacity – L (gal)	413.0	(109.2)	413.0	(109.2)	413.0	(109.2)	413.0	(109.2)
Inlet Air								
Combustion air inlet flow rate – m^3/min (cfm)	242.2	(7212.2)	242.2	(7212.2)	193.1	(6819.8)	183.8	(6491.7)
Exhaust System								
Exhaust stack gas temperature – °C (°F)	490.7	(915.2)	490.7	(915.2)	471.3	(880.4)	463.6	(866.5)
Exhaust gas flow rate – m^3/min (cfm)	554.5	(19578.8)	554.5	(19578.8)	507.9	(17935.1)	476.5	(16826.7)
Exhaust system backpressure (maximum allowable) – kPa (in. water)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)	6.7	(27.0)
Heat Rejection								
Heat rejection to jacket water – kW (Btu/min)	826	(46992)	826	(46992)	777	(44160)	739	(42021)
Heat rejection to exhaust (total) – kW (Btu/min)	2502	(142265)	2502	(142265)	2243	(127532)	2092	(118949)
Heat rejection to aftercooler – kW (Btu/min)	786	(44723)	786	(44723)	690	(39224)	619	(35176)
Heat rejection to atmosphere from engine – kW (Btu/min)	161	(9146)	161	(9146)	150	(8542)	145	(8229)
Heat rejection from alternator – kW (Btu/min)	121	(6853)	121	(6853)	99	(5607)	94	(5368)
Emissions* (Nominal)								
NOx mg/Nm^3 (g/hp-h)	2349.1	(5.32)	2349.1	(5.32)	2206.7	(4.95)	2038.1	(4.62)
CO mg/Nm^3 (g/hp-h)	195.4	(0.42)	195.4	(0.42)	141.2	(0.30)	124.8	(0.27)
HC mg/Nm^3 (g/hp-h)	42.1	(0.10)	42.1	(0.10)	44.4	(0.11)	49.2	(0.12)
PM mg/Nm^3 (g/hp-h)	14.1	(0.04)	14.1	(0.04)	10.9	(0.03)	11.0	(0.03)
Emissions* (Potential Site Variation)								
NOx mg/Nm^3 (g/hp-h)	2818.9	(6.38)	2818.9	(6.38)	2648.0	(5.94)	2445.8	(5.55)
CO mg/Nm^3 (g/hp-h)	351.8	(0.76)	351.8	(0.76)	254.2	(0.55)	224.6	(0.49)
HC mg/Nm^3 (g/hp-h)	55.9	(0.14)	55.9	(0.14)	59.1	(0.15)	65.5	(0.16)
PM mg/Nm^3 (g/hp-h)	19.7	(0.05)	19.7	(0.05)	15.2	(0.04)	15.3	(0.04)

**mg/Nm^3 levels are corrected to 5% O_2. Contact your local Cat dealer for further information.*

Weights and Dimensions



Dim "A" mm (in)	Dim "B" mm (in)	Dim "C" mm (in)	Dry Weight kg (lb)
6800 (267.7)	2339 (92.1)	2997 (118.0)	17 590 (38,780)

Note: *For reference only. Do not use for installation design. Contact your local Cat dealer for precise weights and dimensions.*

Ratings Definitions

Standby
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Mission Critical
Output available with varying load for the duration of the interruption of the normal source power. Average power output is 85% of the mission critical power rating. Typical peak demand up to 100% of rated power for up to 5% of the operating time. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime
Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Continuous
Output available with non-varying load for an unlimited time. Average power output is 70-100% of the continuous power rating. Typical peak demand is 100% of continuous rated kW for 100% of the operating hours.

Applicable Codes and Standards
AS 1359, CSA C22.2 No. 100-04, UL 142, UL 489, UL 869, UL 2200, IBC, IEC 60034-1, ISO 3046, ISO 8528, NEMA MG1-22, NEMA MG1-33, 2014/35/EU, 2006/42/EC, 2014/30/EU and facilitates compliance to NFPA 37, NFPA 70, NFPA 99, NFPA 110.

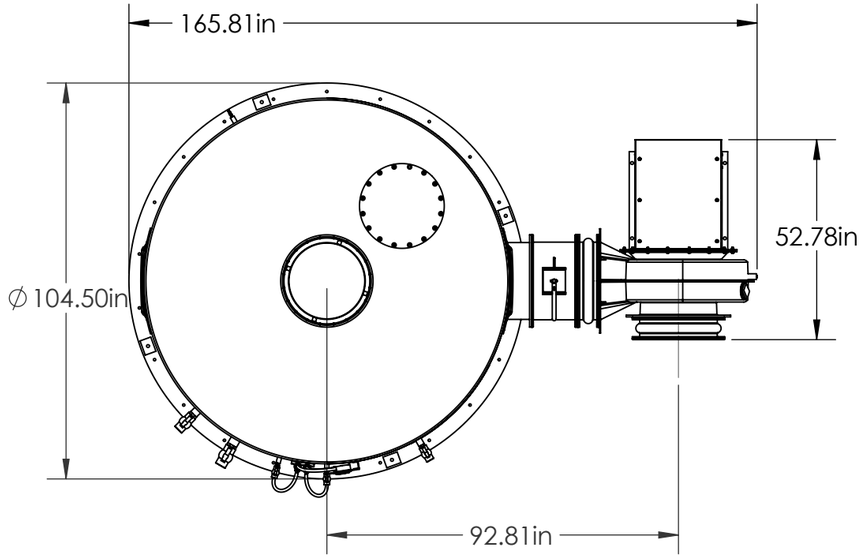
Note: Codes may not be available in all model configurations. Please consult your local Cat dealer for availability.

Data Center Applications

- ISO 8528-1 Data Center Power (DCP) compliant per DCP application of Cat diesel generator set prime power rating.
- All ratings Tier III/Tier IV compliant per Uptime Institute requirements.
- All ratings ANSI/TIA-942 compliant for Rated-1 through Rated-4 data centers.

Fuel Rates
Fuel rates are based on fuel oil of 35º API [16°C (60ºF)] gravity having an LHV of 42,780 kJ/kg (18,390 Btu/lb) when used at 29ºC (85ºF) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.)

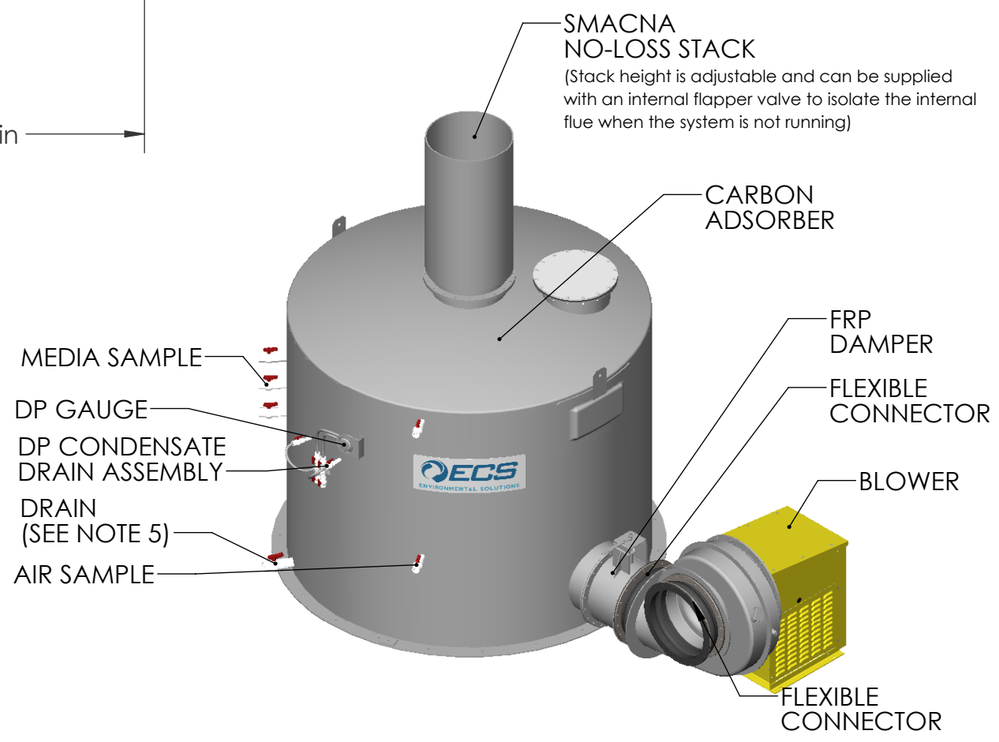
3516 PGFL
LEHE1377-05 (03/20)

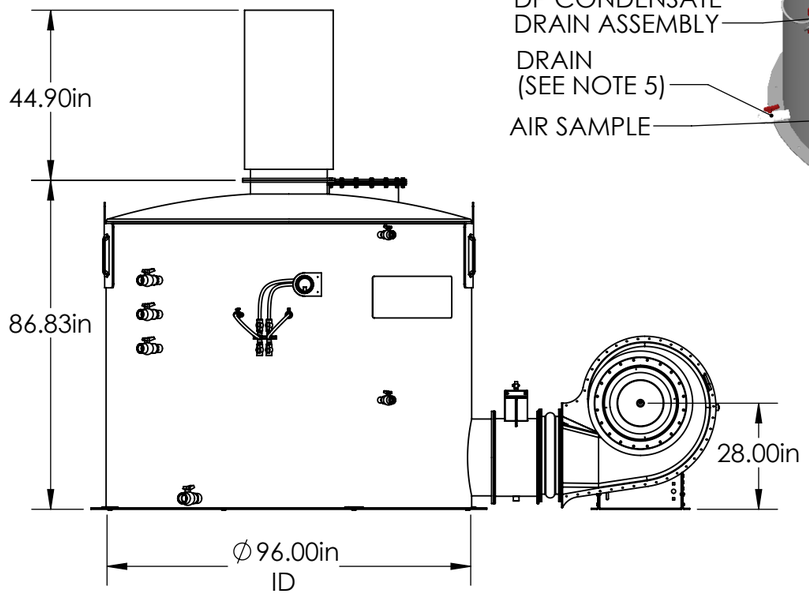


BASE SYSTEM SHOWN, INCLUDES:

- FRP VESSEL
- SMACNA NO-LOSS EXHAUST STACK
- ISOLATION / BALANCING DAMPER
- FRP BLOWER WITH INLET & OUTLET EXPANION JOINTS
- DWYER MAGNEHELIC DP GAUGE
- MOTOR STARTER
  (SHIPPED LOOSE, MOUNTED 3' FROM AIRSTREAM)

ECS V1 CARBON ADSORBER SYSTEM	
MODEL:	60 SERIES V1-96-3000
CARBON CAPACITY:	151 FT^3 (3' BED DEPTH)
BED VELOCITY:	60 FPM
EBRT:	3.02 SECONDS
SYSTEM PRESSURE DROP:	4.8" W.C.*
FAN DATA	
MODEL:	NYB RFE500
DESIGN:	3000 CFM @ 10" W.C.
MOTOR:	3-60-230/460V; 10 HP; FLA 14 AMPS





NOTES:

1. ALL FLANGES PER PS 15-69 UNLESS OTHERWISE NOTED

2. VESSEL CONSTRUCTION IS FRP
   -RESIN SYSTEM IS A CLASS 1 FLAME RESISTANT VINYL ESTER
   -ALL INTERNAL SURFACES HAVE A 100-MIL COROSION BARRIER
   -EXTERIOR SURFACES TO HAVE UV-INHIBITOR APPLIED

3. NOZZLE ORIENTATIONS ARE PLACED FOR CLARITY AND CAN BE CHANGED TO FIT SITE CONDITIONS

4. NEMA 4X MOTOR STARTER MOUNTED 3' FROM AIR STREAM.

5. DRAIN PORT MAY HAVE A CONSTANT DRIP AND SHOULD BE PLUMBED AWAY FROM THE SYSTEM WITH SIX-INCH WATER TRAP. IF FREEZING CONDITIONS MAY EXIST, THIS EXTERNAL PIPING SHOULD BE INSULATED AND HEAT TRACED (EXTREME CONDITIONS)

6. IF THE ODOR CONTROL SYSTEM IS INSTALLED OUSIDE INA COLD CLIMATE, AND THE INFLUENT AIR IS WARM / MOIST, A 2" THICK FACTORY APPLIED INSULATION SYSTEM IS RECOMMENED

7. COLORS OPTIONS ARE GRAY, WHITE, OR TAN.

8. CONSULT ECS FOR MEDIA SELECTION. DIFFERENT CARBONS OR POLISHING AGENTS ARE OFFERED BASED ON TREATMENT OBJECTIVES AND CONCENTRATIONS WITH THE INTENT TO OPTIMIZE MEDIA LIFE

ESTIMATED ASSEMBLED WEIGHTS:

EMPTY: 2789#
FLOODED: 27758#
OPERATING: 7615#

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	D Tagtow	11/4/2015
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

ECS ENVIRONMENTAL SOLUTIONS

File: 60S V1-96-3000 V1 System Pad Asy

TITLE:

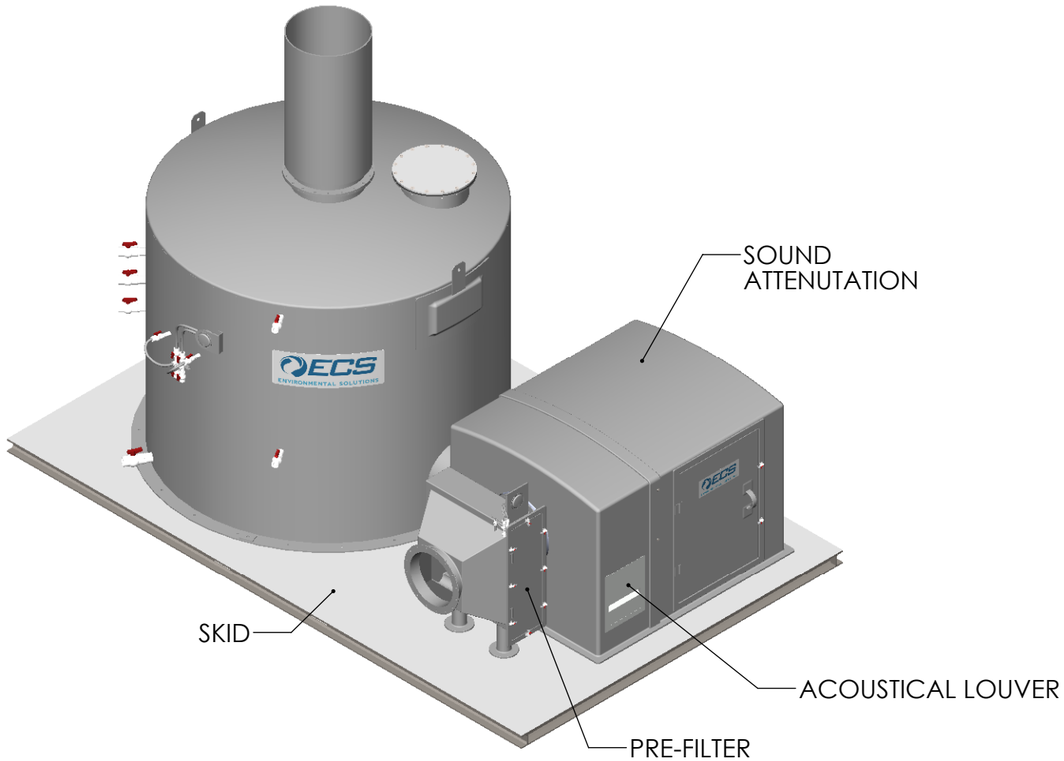
V1-96 3000 CFM

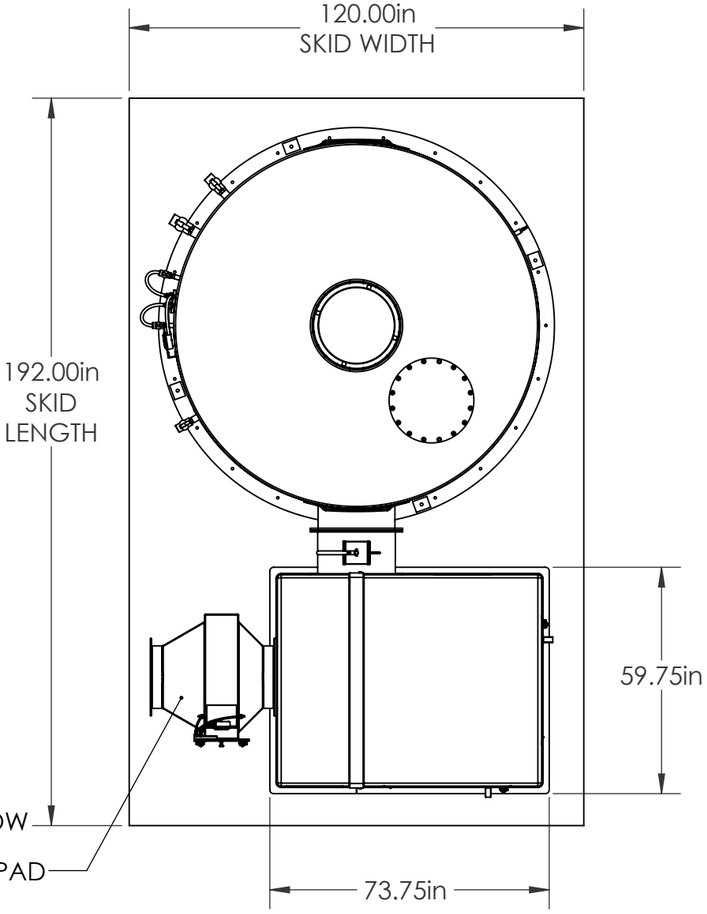
SIZE	DWG. NO.	REV
B	V1-96	A

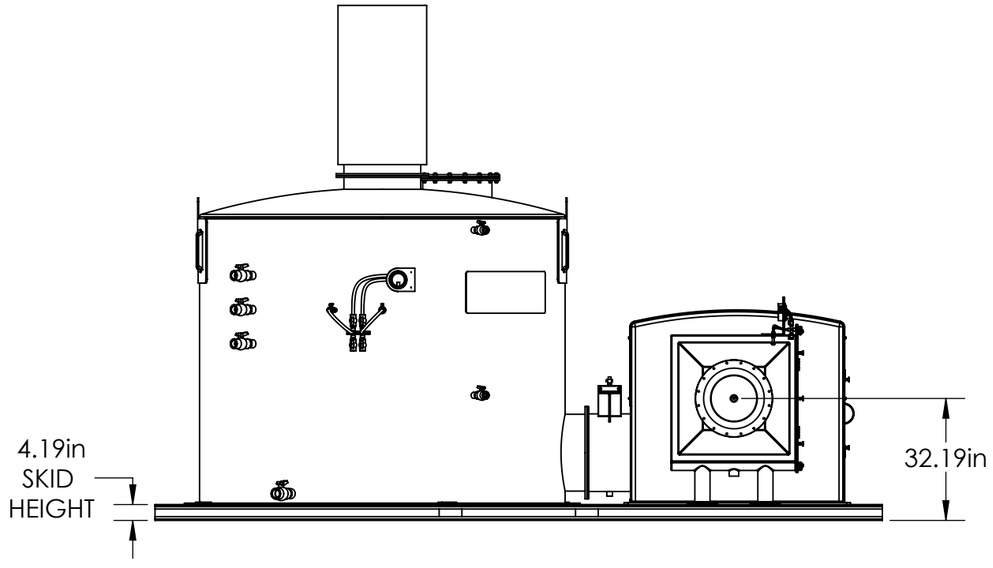
SCALE: 1:40 | SHEET 1 OF 5

OPTIONAL ACCESSORIES:

- ECS SOUND ABSORB ENCLOSURE
- ECS GUARDIAN PRE-FILTER
- EPOXY COATED STEEL SKID







UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN	D Tagtow	11/4/2015
	CHECKED		
	ENG APPR.		
	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			

ENVIRONMENTAL SOLUTIONS

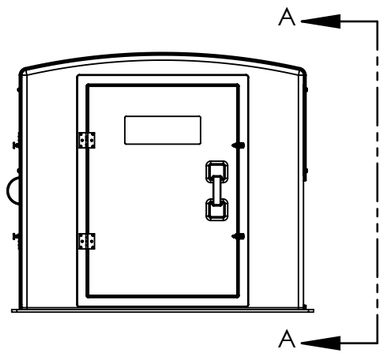
File: 60S V1-96-3000 V1 System Pad Asy

TITLE:

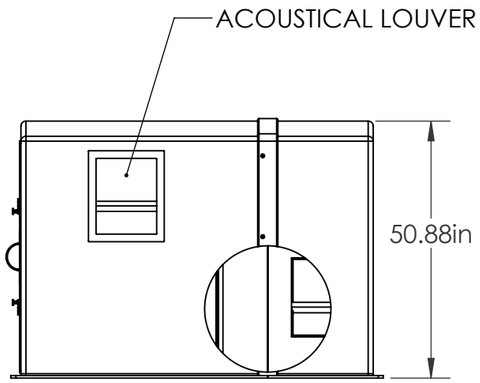
V1-96 3000 CFM

SIZE	DWG. NO.	REV
B	V1-96	A
SCALE: 1:40		SHEET 2 OF 5

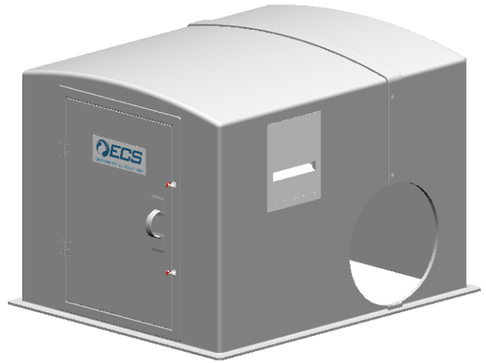
TRANSMISSION LOSS						
2 - 125	3 - 250	4 - 500	5 - 1000	6 - 2000	7 - 4000	OCT
26	29	33	44	52	60	DB



MOTOR SIDE

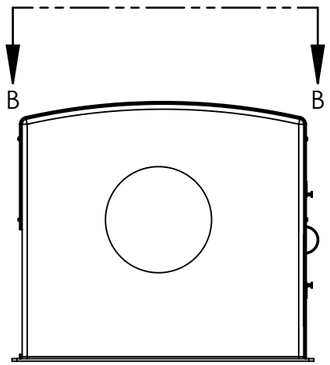


SECTION A-A

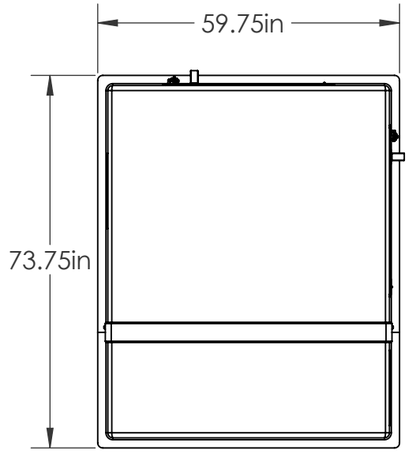


GENERAL NOTES:

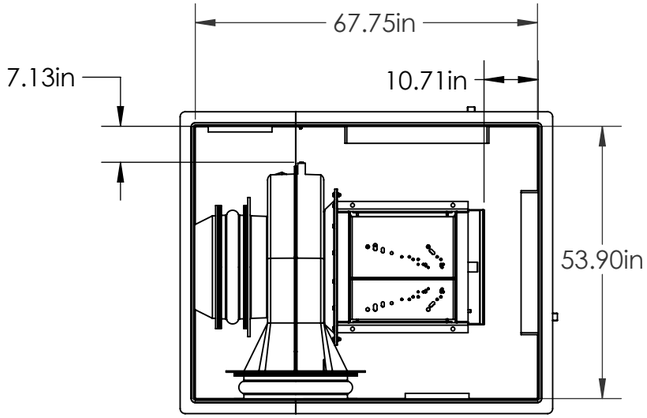
- **CONSTRUCTION**
  - WALLS VACUUM-FORMED WITH TWO LAYERS OF FRP OVER A HONEY-COMB CORE
  - RESIN, LINER, AND COLOR TO MATCH V1 CONSTRUCTION
  - SPLIT LINE TO BE CENTERED ON FAN HOUSING
  - 2" OF ECS SOUND-ABSORB LINING ON ALL INTERNAL SURFACES
  -
- **STANDER FEATURES:**
  - TWO HINGED ACCESS DOORS WITH TOGGLE CLAMPS
  - TWO ACOUSTICAL LOUVERS
- **OPTIONAL FEATURES**
  - CLASS 1 DIV 1 EXHAUST FAN
  - TEMPERATURE SWITCH
  - INTERNAL LIGHTE (AVAILABLE ON LARGER ENCLOSURES)

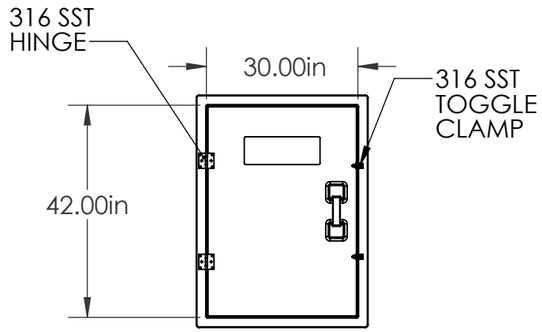


AIR INLET SIDE



SECTION B-B





ACCESS DOOR
DETAIL

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN	D Tagtow	11/4/2015
	CHECKED		
	ENG APPR.		
	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			

ECS ENVIRONMENTAL SOLUTIONS

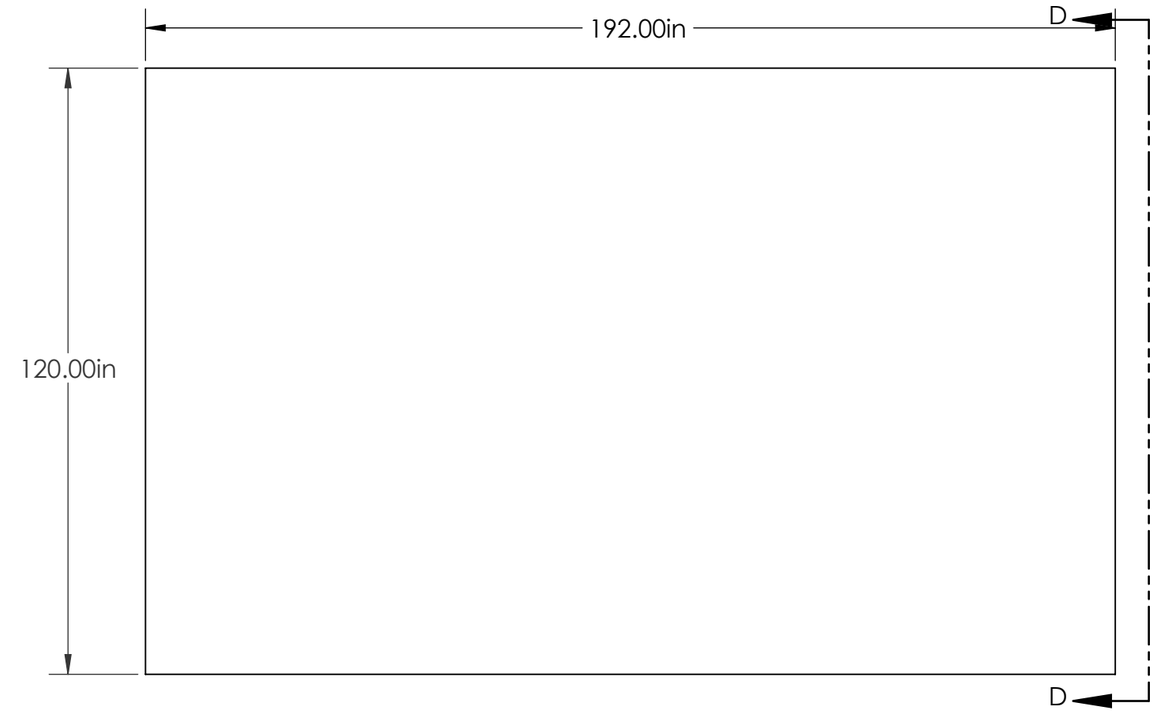
File: 60S V1-96-3000 Sound Enclosure

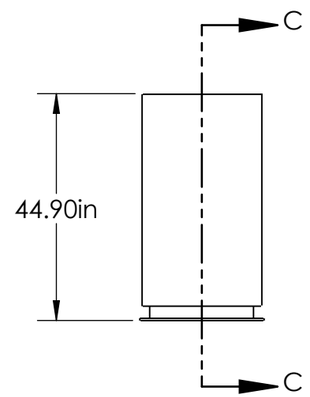
TITLE:

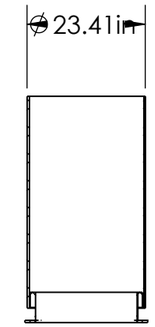
Sound Enclosure

SIZE	DWG. NO.	REV
B	SE-01	A

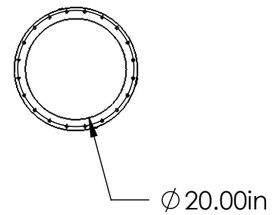
SCALE: 1:30 | SHEET 3 OF 5

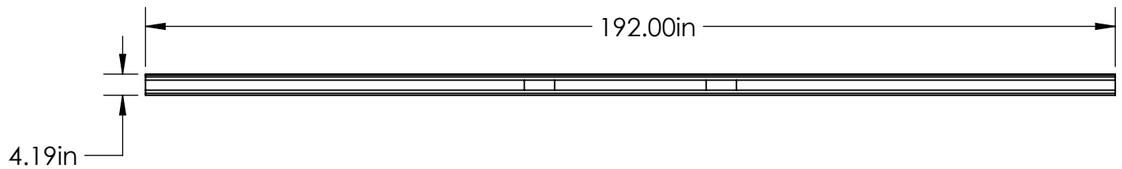


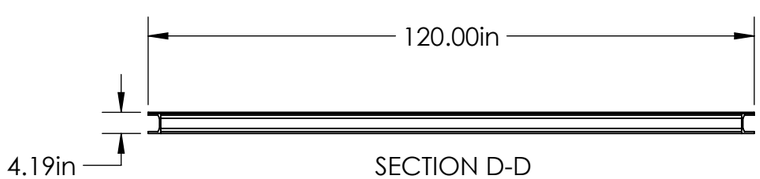




SECTION C-C







SECTION D-D

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN INCHES TOLERANCES: TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005	DRAWN	D Tagtow	11/4/2015
	CHECKED		
	ENG APPR.		
	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			

ECS ENVIRONMENTAL SOLUTIONS

File: 60S V1-96-3000 Skid

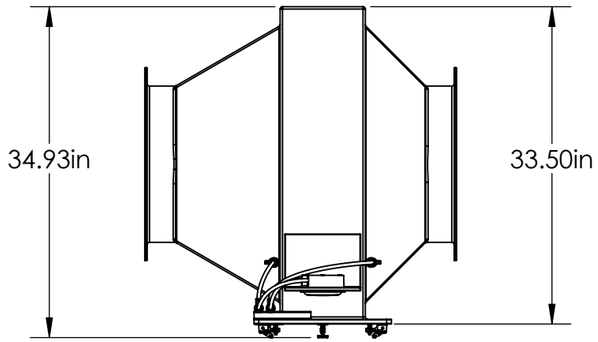
TITLE: **Epoxy Coated Steel Skid, No Loss Stack**

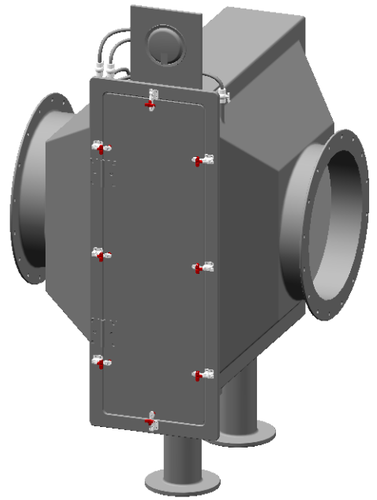
SIZE	DWG. NO.	REV
B	SKD-01	A

SCALE: 1:30 | SHEET 4 OF 5

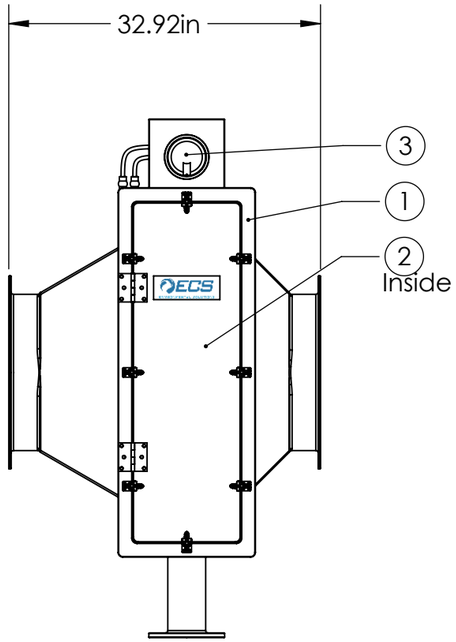
Item	Part	Part Number	Qty
1	Housing	ECS-GUARD-3000	1
2	Combination Pad	ECS-GFME-3000-33x33	1
3	Differential Pressure Gauge	ECS-DP-2015	1

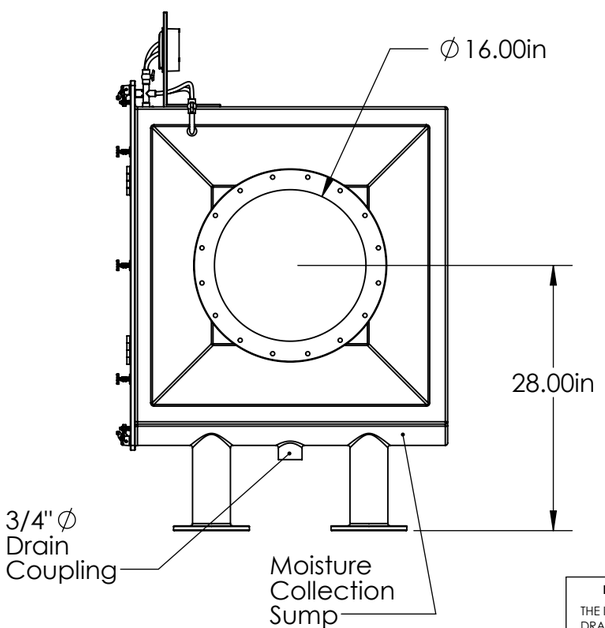
REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
-	A	Initial Release	8/18/2015	J Jones





GUARDIAN® PREFILTER





General Notes
1. Operating Weight: 163 lbs
2. Standard end connections are sized per ASTM 3982 / NBS PS 15-169 Table 2 parameters. If alternate connection sizes are necessary please specify when ordering.
3. ECS Guardian prefilters come standard with a mechanical differential pressure indicator.
4. Pressure drop with clean pad at the design airflow will be .5" w.c.
5. Pressure drop with dirty pad at the design airflow will be 1.25" w.c.
6. Performance: 99% removal of particles 10 micron or larger
7. For applications where moisture removal is not desired an alternative particulate / grease removal pad can be supplied. Contact ECS technical service for additional information.
8. Base drain connection should be piped away from the unit
9. Effluent piping should include a water trap to prevent hold-up of liquid due to negative pressure in the prefilter housing. If freezing conditions exist this piping should be heat traced and insulated.
10. FRP housing is manufactured using a vinyl ester resin system with a class 1 flame spread rating. All interior surfaces have a 100-mil corrosion liner, exterior surfaces are gelcoated and contain a UV inhibitor. Standard colors are grey, white or tan. Please specify when ordering.
11. Client to advise Inlet CL height when ordering
12. 40" of clearance required at access door for pad removal

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULAR: MACH ± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL See Notes
FINISH See Notes
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	D Tagtow	8/18/2015
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		

ECS ENVIRONMENTAL SOLUTIONS

CAD File: ECS-GFME-3000-33x33 Asy

TITLE:

Prefilter - 3000 cfm

SIZE	DWG. NO.	REV
B		A

SCALE: 1:16 | WEIGHT: 58.76 | SHEET 5 OF 5

VENTILATION (HVAC)

- AIR FLOW ARROW
- 18"x12" — 18"x12" — RECTANGULAR DUCT AND SIZE*
- 18"ø — 18"ø — ROUND DUCT AND SIZE*
- 18"x12"ø — 18"x12"ø — FLAT OVAL DUCT AND SIZE*
- 18"x12" — EXTERIOR DUCT TREATMENT*
- 18"x12" — 18"x12" — RECTANGULAR DUCT WITH ACOUSTIC LINING*
- 30"x12" — DUCT SECTION, SUPPLY AIR. SIZE* IS HORIZONTAL DIM. x VERTICAL DIM. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL
- FLEXIBLE DUCT
- ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, OUTSIDE AIR DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, RETURN DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, EXHAUST DOWN. APPLIES TO RECT., ROUND AND OVAL
- UP — CHANGE IN DUCT ELEVATION RISING IN DIRECTION INDICATED
- DN — CHANGE IN DUCT ELEVATION DROPPING IN DIRECTION INDICATED
- END CAP
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITH SPLITTER VANES (0.25 R/W DEFAULT)
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT)
- ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT)
- MITERED ELBOW, RECTANGULAR, WITH TURNING VANES
- RECTANGULAR TO ROUND TRANSITION
- AD — AD AD — DUCT ACCESS DOOR (TOP, SIDE, BOTTOM)
- FC — FLEXIBLE CONNECTION
- BDD — BACKDRAFT DAMPER
- MANUAL DAMPER
- M — MOTORIZED DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- SMOKE AND FIRE DAMPER
- DUCT SILENCER
- X — CONTROL DEVICE (REFER TO CONTROLS LEGEND)
- AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND)
- QUANTITY / TYPE / SIZE (IN.) / VOLUME (CFM) — AIR OUTLET OR INLET TAG (REFER TO SCHEDULE)
- RECTANGULAR DIFFUSER, SUPPLY. OPTIONAL ARROWS SHOW THE FLOW DIRECTION.
- RECTANGULAR REGISTER OR GRILLE, RETURN
- RECTANGULAR REGISTER OR GRILLE, EXHAUST
- ROUND DIFFUSER, SUPPLY
- LINEAR DIFFUSER
- SIDEWALL REGISTER OR GRILLE, SUPPLY
- SIDEWALL GRILLE, RETURN OR EXHAUST
- UC — UNDERCUT DOOR
- DOOR GRILLE OR LOUVER
- TRANSFER GRILLE OR LOUVER
- COIL (REFER TO CONTROLS LEGEND)
- ID-# — EQUIPMENT TAG
- QUANTITY / TYPE / LENGTH (FT.) / CAPACITY (MBH) — RADIATION HEATING TAG (REFER TO SCHEDULE)

* NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS (ALWAYS WIDTH X HEIGHT IN FLOOR PLAN AND SECTION)

CONTROLS

- PG — AIR PRESSURE GAGE
- S — AIR SAMPLING POINT
- CO2 — CARBON DIOXIDE SENSOR
- CO — CARBON MONOXIDE SENSOR
- CG — COMBUSTIBLE GAS SENSOR
- CT — CURRENT SENSOR
- CT — CURRENT TRANSMITTER WITH LEAD
- D — DEWPOINT SENSOR
- DPS — DIFFERENTIAL PRESSURE SENSOR
- DPT — DIFFERENTIAL PRESSURE TRANSMITTER
- FM — FLOW METER
- FS — FLOW SWITCH
- FT — FLOW TRANSMITTER
- FZ — FREEZE STAT
- HOA — HAND SWITCH
- H — HUMIDITY SENSOR
- LC — LEVEL CONTROL
- LS — LIMIT SWITCH
- LPI — LOOP POWERED INDICATOR
- Nox — NITROGEN OXIDE SENSOR
- O — OCCUPANCY SENSOR
- O2 — OXYGEN SENSOR
- PI — POSITION INDICATOR
- PS — PRESSURE SENSOR
- R — REFRIGERANT SENSOR
- RH — RELATIVE HUMIDITY SENSOR
- R — RELAY
- H — ROOM HUMIDITY SENSOR
- SP — STATIC PRESSURE SENSOR
- TS — TEMPERATURE SENSOR
- T — THERMOSTAT
- TVO — TOTAL VOLATILE ORGANIC COMPOUND SENSOR
- VIB — VIBRATION SENSOR
- AFS — AIR FLOW SWITCH
- I / P — CURRENT TO PRESSURE
- E / P — ELECTRIC / PNEUMATIC
- SCR — SILICON CONTROLLED RECTIFIER
- TCP — TEMPERATURE CONTROL PANEL
- TEC — TERMINAL EQUIPMENT CONTROLLER
- SENSOR WELL
- ALARM HORN
- ALARM BEACON
- AI — ANALOG INPUT
- AO — ANALOG OUTPUT
- DI — DIGITAL INPUT
- DO — DIGITAL OUTPUT
- STR — STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- NON MOTORIZED VALVE
- M — TWO WAY MOTORIZED VALVE
- M — THREE WAY MOTORIZED VALVE
- XX — TWO WAY SOLENOID VALVE

CONTROLS

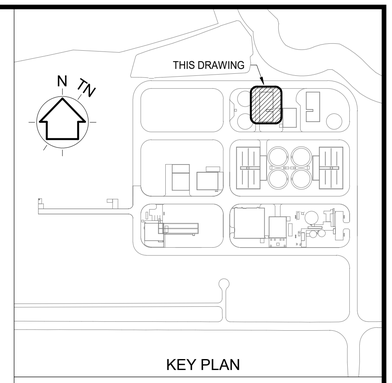
- NC / NO / O — THREE WAY SOLENOID VALVE
- NC / XX — TWO WAY PNEUMATIC VALVE
- NC / NO / O — THREE WAY PNEUMATIC VALVE
- PUMP
- MOTOR
- S — DUCT SMOKE DETECTOR
- H — DUCT SMOKE DETECTOR
- AIR VALVE
- H / C — UNITARY HEATING COIL
- C / C — UNITARY COOLING COIL
- H / R — UNITARY HEAT RECOVERY COIL
- FILTER
- AIR BLENDER
- ENERGY WHEEL
- PLATE ENERGY RECOVERY COIL
- AIR FLOW MEASURING STATION
- AIR FLOW PROBE
- BACKDRAFT DAMPER
- MOTORIZED DAMPER - PARALLEL BLADE
- MOTORIZED DAMPER - OPPOSED BLADE
- NC — DAMPER ACTUATOR - ELECTRIC
- NC — DAMPER ACTUATOR - ELECTRIC
- CENTRIFUGAL FAN
- PROP FAN
- PLENUM FAN
- HUMIDIFIER
- ENERGY CORE (+ -) — ENERGY CORE
- ETHERNET CONNECTION
- CONTACT
- DDC_XXX — DDC PANEL
- COMPUTER

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
4. CONTRACTOR SHALL CONFIRM AND COORDINATE THE LOCATION AND ROUTE OF ALL EQUIPMENT, PIPING, AND DUCTWORK ON SITE AND WITH OTHER TRADES.
5. ALL DIFFUSERS AND GRILLES SHALL HAVE UPSTREAM BALANCING DAMPERS.
6. PROVIDE TURNING VANES IN EACH RECTANGULAR ELBOW. ALL DUCT TAKE-OFFS TO HAVE ENLARGED THROATS WITH LEADING EDGES.
7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
8. COORDINATE THERMOSTAT LOCATIONS WITH FURNITURE, ETC.
9. VARIATIONS FROM SPECIFIED PRODUCTS AND ASSOCIATED WORK REQUIREMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL COMPENSATION WILL NOT BE CONSIDERED BECAUSE OF DIFFERENCES IN INTERPRETATION OF TECHNICAL PROVISIONS.
10. CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGING NEW EQUIPMENT PIPING AND DUCTWORK OVER THE COURSE OF CONSTRUCTION.
11. CONTRACTOR TO PROVIDE DUCTING SUPPORTS.
12. COORDINATE WITH GC ALL REQUIRED ACCESS HATCH/PANELS FOR MECHANICAL EQUIPMENT CONCEALED ABOVE INACCESSIBLE CEILINGS AND WITHIN WALLS. MAKE EFFORT TO LOCATE AND COORDINATE DEVICES REQUIRING ACCESS TO BE IN GROUPED AREAS TO REDUCE THE NUMBER OF ACCESS DOORS REQUIRED. ACCESS DOORS TO BE LOCATED WITH CONSIDERATION ON AND IN ALIGNMENT WITH ARCHITECTURAL DETAILS AND OTHER CEILING/WALL MOUNTED DEVICES TO THE SATISFACTION OF THE ARCHITECT.
13. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND CAPACITIES OF ELECTRIC FORCE FLOW UNITS, BASEBOARDS, AND UNIT HEATERS.

ATAD HVAC DRAWING LIST

Drawing No.	Sheet Name
G-GEN-001	LEGEND AND SYMBOLS
H-ATD-101	H.V.A.C. MAIN FLOOR PLAN
H-ATD-102	MECHANICAL ROOF PLAN
H-ATD-301	SECTIONS & DETAILS
H-ATD-501	TYPICAL DETAILS
H-ATD-502	TYPICAL DETAILS
H-ATD-601	H.V.A.C. SCHEDULES
H-ATD-602	AIR FLOW DIAGRAM
H-ATD-603	SEQUENCE OF OPERATIONS



KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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Approver P. Eng.
Approved By

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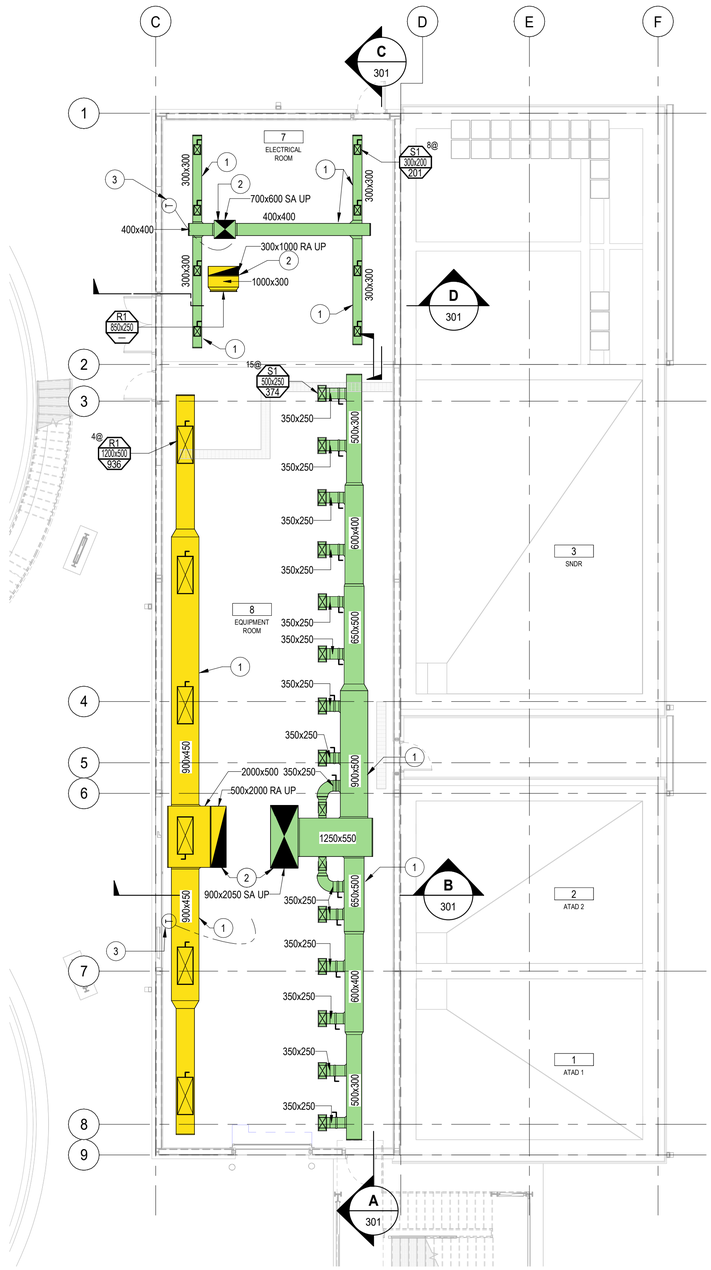
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
LEGEND AND SYMBOLS

GENERAL

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. G-GEN-001
Date: 2022.07.22	
Project No.: 10449	



MAIN FLOOR PLAN - VENTILATION LAYOUT

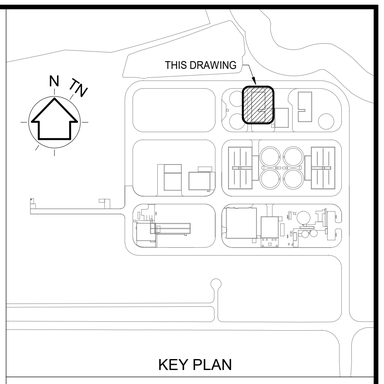
SCALE: 1 : 100

KEYNOTES

1 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

2 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR ABOVE.

3 THE THERMOSTAT TO CONTROL MECHANICAL EQUIPMENT MEETS NEMA 4X REQUIREMENTS AND IS LOCATED ON THE WALL WITH A PROTECTIVE LOCKABLE COVER. COORDINATE PLACEMENT OF THERMOSTATS WITH ALL TRADES AND DISCIPLINES.



KEY PLAN

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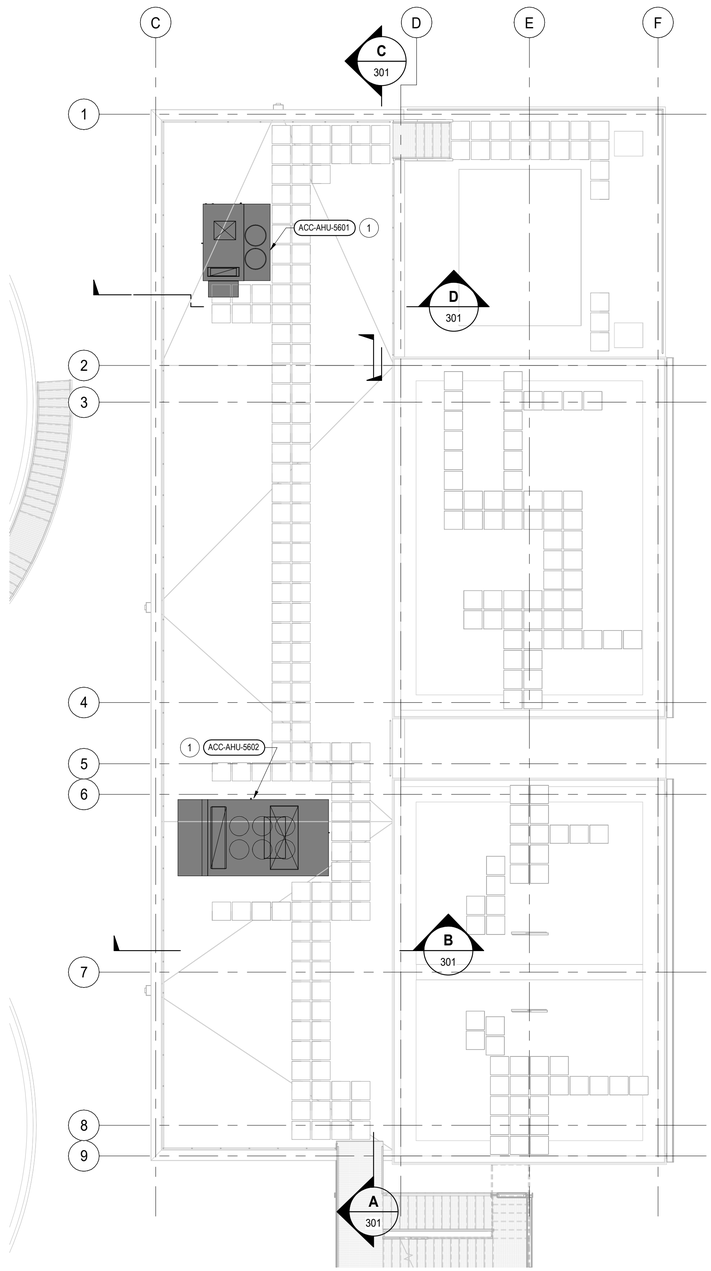
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
H.V.A.C. MAIN FLOOR PLAN

PLANS

Scale: AS INDICATED
Drawn By: JEFF SCHRAUD
Designed By: BRUCE HAUGH
Checked By: BILL DeGAGNE
Date: 2022.07.22
Project No.: 10449

Contract No. #####

Drawing No. H-ATD-101

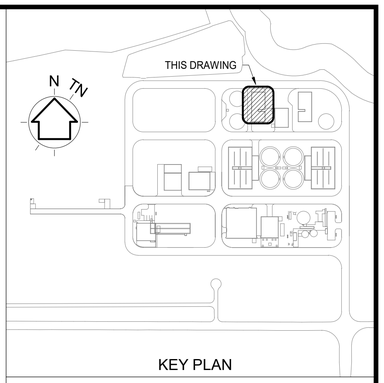


ROOF PLAN - VENTILATION LAYOUT

SCALE: 1 : 100

KEYNOTES

1 MECHANICAL EQUIPMENT TO REST ON ROOF CURB (SUPPLIED BY VENDOR). COORDINATE LOCATION WITH ALL TRADES AND ALL DISCIPLINES INVOLVED IN THIS PROJECT.



KEY PLAN

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MIDHURST WASTEWATER TREATMENT PLANT - PH1 BIO ATAD BUILDING MECHANICAL ROOF PLAN

PLANS

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-102
Date: 2022.07.22	
Project No.: 10449	

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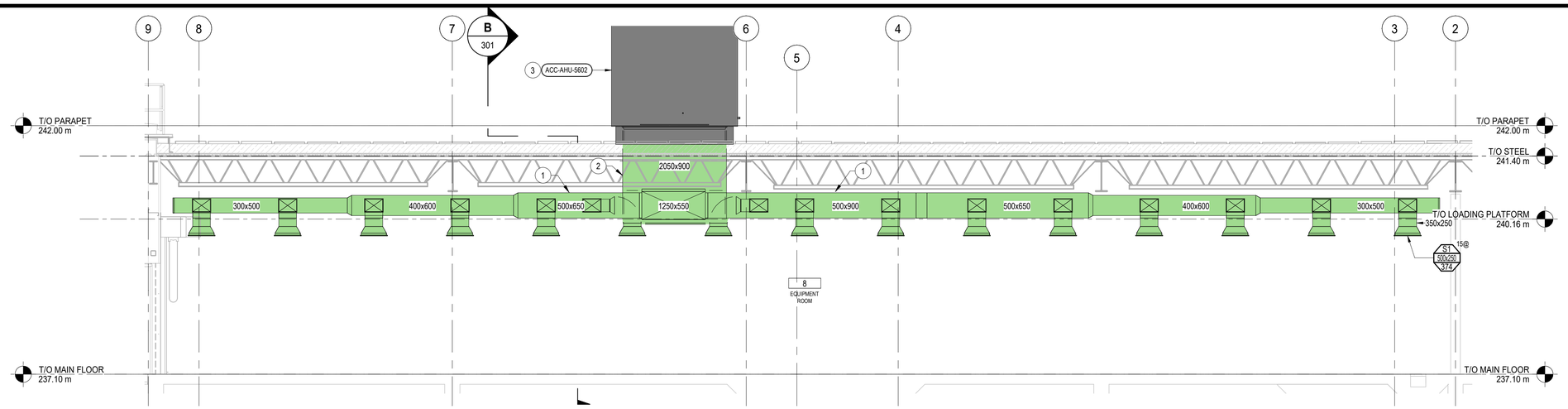
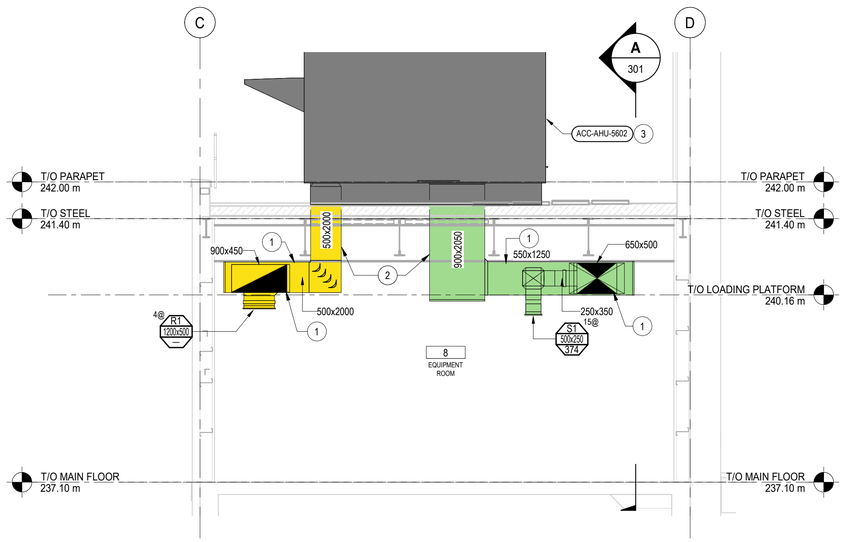


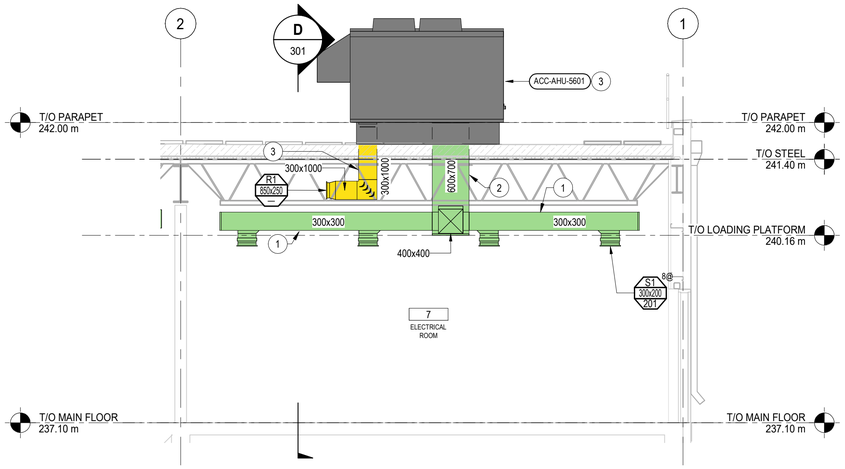
EQUIPMENT ROOM SECTION A

SCALE: 1 : 50



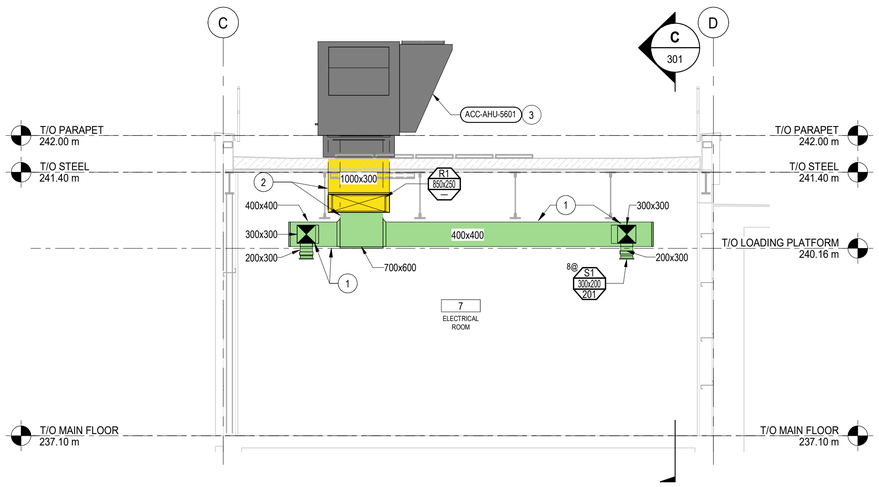
EQUIPMENT ROOM SECTION B

SCALE: 1 : 50



ELECTRICAL ROOM SECTION C

SCALE: 1 : 50



ELECTRICAL ROOM SECTION D

SCALE: 1 : 50

KEYNOTES

1 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

2 DUCTWORK FROM MECHANICAL UNIT TO BE COORDINATED WITH STRUCTURAL MEMBERS AND TO BE INSTALLED USING APPROVED SMACNA METHOD. THE CONTRACTOR IS TO COORDINATE ON-SITE WITH ALL TRADES BEFORE THE INSTALLATION OF DUCTWORK IS TO BEGIN.

3 MECHANICAL EQUIPMENT TO REST ON ROOF CURB (SUPPLIED BY VENDOR). COORDINATE LOCATION WITH ALL TRADES AND ALL DISCIPLINES INVOLVED IN THIS PROJECT.

KEY PLAN

NOTES:

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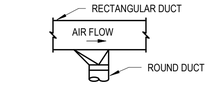
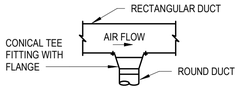
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
SECTIONS & DETAILS

SECTION

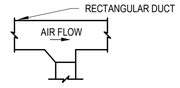
Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-301
Date: 2022.07.22	
Project No.: 10449	



TYPICAL TAKEOFF FROM RECTANGULAR TO ROUND DUCT - SHOE TAP



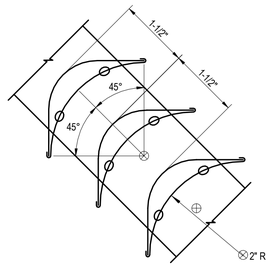
TYPICAL TAKEOFF FROM RECTANGULAR TO ROUND DUCT - BELL MOUTH



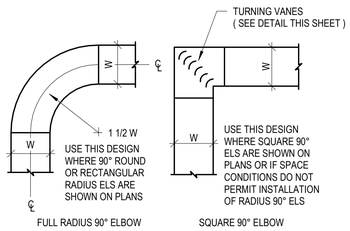
TYPICAL TAKEOFF FROM RECTANGULAR TO RECTANGULAR DUCT - SHOE TAP

NOTES:

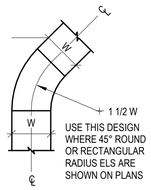
1. HOLE IN RECTANGULAR DUCT SHALL BE CUT LARGE ENOUGH SO THAT ROUGH METAL EDGE SHALL NOT PROJECT INTO AIR STREAM.



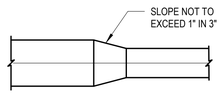
DETAIL OF TURNING VANES



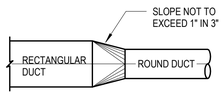
CONSTRUCTION OF 90° ELBOW



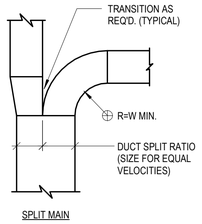
FULL RADIUS 45° ELBOW



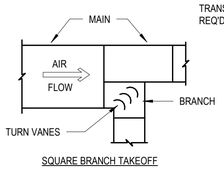
TYPICAL RECTANGULAR TRANSITION



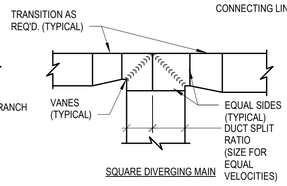
TYPICAL RECTANGULAR TO ROUND TRANSITION



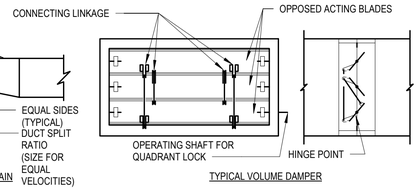
SPLIT MAIN



SQUARE BRANCH TAKEOFF



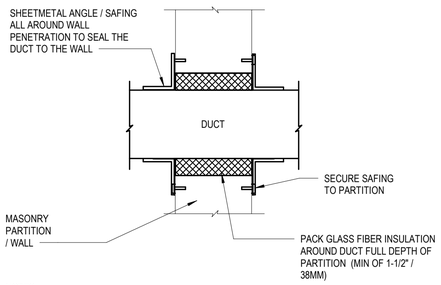
SQUARE DIVERGING MAIN



TYPICAL VOLUME DAMPER

TYPICAL DUCT CONNECTION/ TRANSITION DETAIL

SCALE: N.T.S.

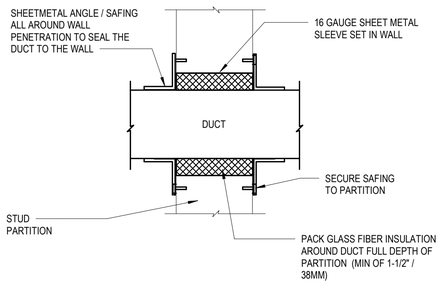


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH MASONRY WALL DETAIL

SCALE: N.T.S.

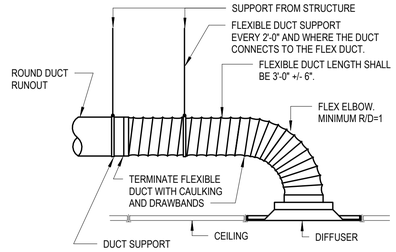


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH STUD WALL PARTITION DETAIL

SCALE: N.T.S.

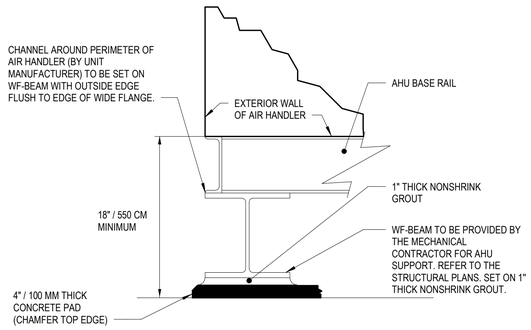


NOTES:

1. PROVIDE INSULATION TO DIFFUSER NECK ON SUPPLY DIFFUSERS.
2. PROVIDE FLEXIBLE DUCT SUPPORTS AT THE ELBOW TO KEEP SMOOTH THE ELBOW SHAPE.

ROUND DIFFUSER TERMINATION DETAIL - FLEX ELBOW

SCALE: N.T.S.



NOTES:

1. INCREASE THE HEIGHT AS REQUIRE TO PROVIDE ENOUGH HEIGHT FOR THE TRAP.

WF SUPPORT BEAM DETAIL

SCALE: N.T.S.

KEY PLAN

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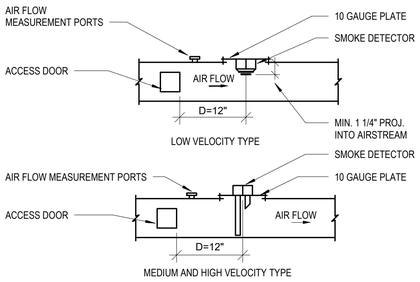
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
TYPICAL DETAILS

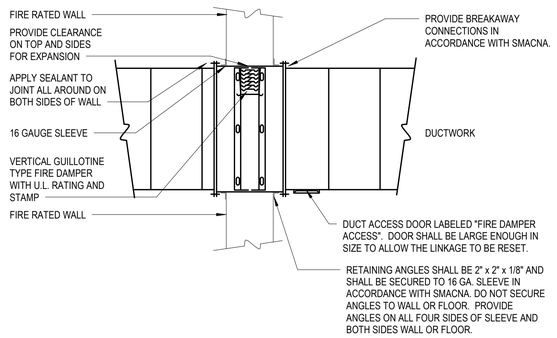
DETAILS

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-501
Date: 2022.07.22	
Project No.: 10449	



SMOKE DETECTOR INSTALLATION DETAIL

SCALE: N.T.S.

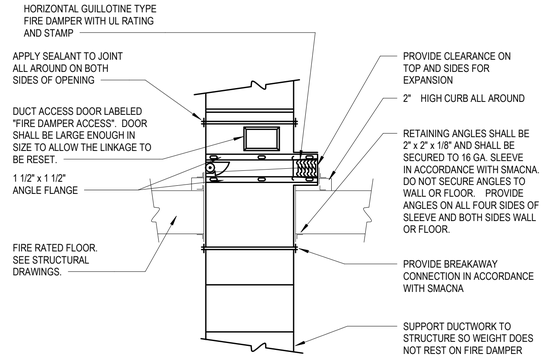


NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' WALL FIRE DAMPER DETAIL

SCALE: N.T.S.



NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' ABOVE FLOOR FIRE DAMPER DETAIL

SCALE: N.T.S.

NOTES:

1. APPLIES TO ALL DUCTED RETURN AND EXHAUST GRILLES EXCEPT FOR WHEN THE CONTRACTOR ELECTS TO USE ANOTHER APPROVED DETAIL

RETURN/EXHAUST GRILLE DETAIL

SCALE: N.T.S.

NOTES:

1. COORDINATE THE LOCATION AND SIZE OF THE EQUIPMENT RAIL BASED ON THE EQUIPMENT.
2. THE PURPOSE OF THE EQUIPMENT RAIL IS TO SUPPORT THE WEIGHT OF THE EQUIPMENT. IT SHALL BE RATED FOR THE OPERATING WEIGHT OF THE EQUIPMENT. FOLLOW VIBRATION / SEISMIC REQUIREMENTS PER THE CONTRACT DOCUMENTS.
3. THE RAIL IS TO BE MOUNTED A MINIMUM OF 18 INCHES / 46 CM ABOVE THE TOP OF THE ROOF UNLESS NOTED OTHERWISE.

SMALL ROOFTOP EQUIPMENT CURB DETAIL

SCALE: N.T.S.

NOTES:

1. COORDINATE SCOPE OF WORK WITH ROOFING CONTRACTOR / OWNER TO NOT VOID ANY WARRANTEES
2. REFER TO THE CONTRACT DOCUMENTS FOR DUCT MATERIAL AND INSULATION REQUIREMENTS.
3. IF THERE IS A CHANGE IN DUCT MATERIAL / INSULATION BETWEEN EXTERIOR AND INTERIOR DUCTWORK, MAKE THE TRANSITION 6"/150MM BELOW THE DECK / SLAB.
4. PROVIDE THE REQUIRED TRANSITION BETWEEN DIFFERENT DUCT MATERIALS IF THERE IS A CHANGE IN DUCT MATERIAL.
5. THE CURB INSULATION SHALL BE EQUAL TO THE ROOF INSULATION RATING

ROOF DUCT CURB DETAIL

SCALE: N.T.S.

NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

SMOKE DAMPER DETAIL

SCALE: N.T.S.

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
TYPICAL DETAILS

DETAILS

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-502
Date: 2022.07.22	
Project No.: 10449	

ROOF TOP UNIT SCHEDULE - PART A

UNIT IDENTIFICATION			AIRFLOW						PHYSICAL CHARACTERISTICS				COMPONENTS												
										MAXIMUM UNIT DIMENSIONS			AIR BLENDER		FILTER			INDIRECT GAS FIRED HEATING SECTION							
TAG	LOCATION	AREA SERVED	MAX SUPPLY AIR (l/s)	MIN SUPPLY AIR (l/s)	MAX RETURN AIR (l/s)	MIN RETURN AIR (l/s)	DESIGN OUTSIDE AIR (l/s)	MIN OUTSIDE AIR (l/s)	UNIT OPERATING WEIGHT (kg)	HEIGHT (mm)	WIDTH (mm)	LENGTH (mm)	QUANTITY OF BLENDERS	MAX APD (Pa)	FILTER TYPE	MERV RATING	MAX APD (Pa)	HEATING AIRFLOW (l/s)	EAT (°C)	LAT (°C)	INPUT RATING (KW)	OUTPUT RATING (KW)	NO OF STAGES	TURN DOWN RATIO	MAX APD (Pa)
ACC-AHU-5601	ROOF	ELEC. ROOM	1,605	1,605	1,133	1,133	472	472	969 + 72	1,529	2,195	3,066	0	-	PRE-FILTER	8	37.50	1,605	4.9	17.0	29.3	23.4	1	16:1	20.67
ACC-AHU-5602	ROOF	EQUIP. ROOM	5,616	5,616	3,964	3,964	1,652	1,652	2456 + 141	2,489	2,489	4,920	0	-	PRE-FILTER	8	52.10	5,616	4.9	25.6	175.8	140.7	2	16:1	30.39

ROOF TOP UNIT SCHEDULE - PART B

UNIT IDENTIFICATION	COMPONENTS									CONDENSER SECTION				FANS							CAPACITY AND PERFORMANCE		ELECTRICAL					MOUNTING SUPPORT STYLE	MANUFACTURER	MODEL NUMBER	NOTES
	DX COOLING COIL							HOT GAS REHEAT		COMPRESSORS			FANS	SUPPLY																	
TAG	TOTAL CAPACITY (kW)	SENSIBLE CAPACITY (kW)	EDB (°C)	EWB (°C)	LDB (°C)	LWB (°C)	MAX APD (Pa)	CAPACITY (KW)	MAX APD (Pa)	NO. OF COMP.	NO. OF STAGES	TYPE OF COMP.	NO. OF FANS	ESP (Pa)	TSP (Pa)	BHP	HP	SPEED (RPM)	NO. OF FANS	NOMINAL CAPACITY (kW)	REFRIG TYPE	VOLTS	PHASE	MCA	MOP	115V SERVICE REQUIRED				
ACC-AHU-5601	20.0	20.0	26.2	18.8	15.9	15.3	27.60	-	-	1	1	INVERTER SCROLL	1	186.8	629.4	2.2	3.00	1,845	1	20.0	R-410A	600	3	14.1	20	NO	CURB	GREENHECK	RV-25-5I-C-A1	1,2,3,4,5
ACC-AHU-5602	95.6	82.8	26.2	18.8	14.0	14.0	83.40	-	-	2	2	INVERTER SCROLL	6	186.8	612.0	3.5	5.00	1,519	2	52.0	R-410A	600	3	55.9	70	NO	CURB	GREENHECK	RV-75-25I-O-A1	1,2,3,4,5

NOTES:
1. FILTERS ARE TO BE PROVIDED WITH A PRE-FILTER. MAXIMUM PRESSURE DROP SHALL BE BASED ON TOTAL PRESSURE DROP ACROSS THE FILTER BANK WITH DIRTY FILTERS.
2. PROVIDE STAINLESS STEEL GAS HEAT EXCHANGER.
3. PROVIDE A FULLY MODULATING GAS VALVE.
4. PROVIDE VARIABLE CAPACITY COMPRESSOR ON LEAD CIRCUIT.
5. WEIGHTS SHOWN ARE UNIT + ROOF CURB

GRILLE, REGISTER, DIFFUSER SCHEDULE

MARK	DIFFUSER FACE SIZE (mm)	DIFFUSER NECK SIZE (mm)	MOUNTING TYPE	MATERIAL	ACCESSORY	MANUFACTURER	MODEL NUMBER	NOTES
S1	REFER TO PLANS	REFER TO PLANS	DUCT	STAINLESS STEEL	-	E.H. PRICE	710	1,2,3,4,
R1	REFER TO PLANS	REFER TO PLANS	DUCT	STAINLESS STEEL	-	E.H. PRICE	710Z	1,3,4

NOTES:
1. REFER TO REFLECTED CEILING PLANS EXACT LOCATION. PROVIDE ALL FRAMES AND ACCESSORIES AS REQUIRED FOR PROPER INSTALLATION.
2. FLEXIBLE DUCTWORK SHALL BE THE SAME SIZE AS THE DIFFUSER NECK OR AN EQUIVALENT ROUND DUCT. FLEXIBLE DUCTWORK SHALL BE SUPPORTED TO PREVENT KINKS OR BENDS.
3. COLOR TO BE SELECTED BY ARCHITECT FROM STANDARD COLORS.
4. REFER TO VENTILATION DRAWINGS FOR SIZE.

KEY PLAN

NOTES:

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B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
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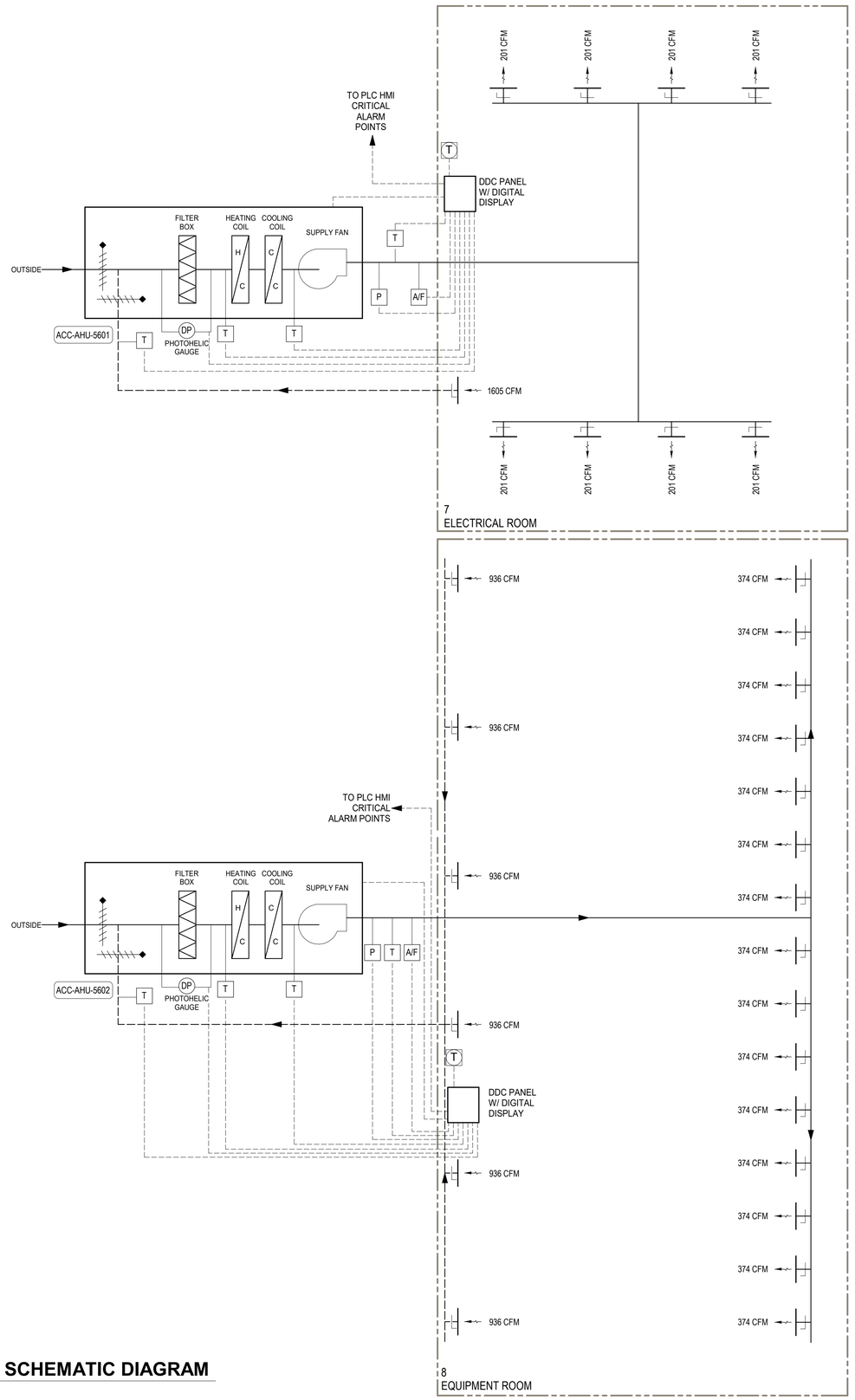
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
H.V.A.C. SCHEDULES

SCHEDULES

Scale:
Drawn By: JEFF SCHRAUD
Designed By: BRUCE HAUGH
Checked By: BILL DeGAGNE
Date: 2022.07.22
Project No.: 10449

Contract No. #####

Drawing No. H-ATD-601



VENTILATION SCHEMATIC DIAGRAM

KEY PLAN

NOTES:

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MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
AIR FLOW DIAGRAM

SCHEDULES

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-602
Date: 2022.07.22	
Project No.: 10449	

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SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 EXECUTION

1.1 General

1.1.1 Provide data base for all hardware points listed for system operation to meet specification operating sequences.

1.1.2 The occupancy schedule (where applicable) shall be user adjustable. A timed override function shall be provided for unscheduled, after-hours occupancy.

1.1.3 Process area HVAC equipment shall run continuously 24 hours a day, 7 days a week.

1.1.4 Control panels shall have touch screen displays for operator interface with equipment.

1.2 Integration With Plant Control Systems

1.2.1 The direct digital control system (DDC) shall have the ability to communicate with the plant SCADA System. Provide EtherNet/IP network communications protocol in the DDC panel for connection to the plant SCADA System.

1.3 ATAD Outdoor Packaged Air Handling Units

1.3.1 ACC-AHU-5601: Packaged Heat-A/C Unit

.1 The packaged air handler unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Electrical Room**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 The packaged air handler shall shut down upon detection of smoke in the airstream.

.4 When the supply air temperature falls to 9°C (adjustable), send a critical alarm to the DDC display panel.

.5 When the differential pressure across the filter gets above 62 Pa (adjustable setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.6 The packaged air handler shall control outside air and return air dampers with a built-in controller to provide additional outside air as follows:

.1 In occupied operating mode, minimum outside air is provided with the outside air intake damper at minimum position (10% outside air – adjustable) and return damper shall be set to match the supply air.

.2 In unoccupied (after hours) operating mode, no outside air is provided with the outside air intake damper at the closed position (0% outside air – adjustable) and return damper shall be set to match the supply air volume.

.3 Whenever outside air temperature is suitable for economizer cooling, the internal controller will modulate the outside air damper open based on maintaining the internal temperature setpoint and modulate the return damper towards the closed position.

.4 Points List:

1.3.1.6.4.1 Monitor:

.1 ACC-AHU-5601 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature

1.3.1.6.4.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Air Temperature below setpoint allowance
.4 Room temperature outside acceptable range (21°C to 24°C, adjustable)

1.3.1.6.4.3 Alarm/Monitor signal to SCADA HMI:

.1 ACC-AHU-5601 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.3.2 ACC-AHU-5602: Packaged Heat-A/C Unit

.1 The rooftop unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Equipment Room**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 The packaged air handler shall shut down upon detection of smoke in the airstream.

.4 When the supply air temperature falls to 9°C (adjustable), send a critical alarm to the DDC display panel.

.5 When the differential pressure across the filter gets above 62 Pa (adjustable setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.6 The packaged air handler shall control outside air and return air dampers with a built-in controller to provide additional outside air as follows:

.1 In occupied operating mode, minimum outside air is provided with the outside air intake damper at minimum position (10% outside air – adjustable) and return damper shall be set to match the supply air volume.

.2 In unoccupied (after hours) operating mode, no outside air is provided with the outside air intake damper at the closed position (0% outside air – adjustable) and return damper shall be set to match the supply air volume.

.3 Whenever outside air temperature is suitable for economizer cooling, the internal controller will modulate the outside air damper open based on maintaining the internal temperature setpoint and modulate the return damper towards the closed position.

.4 Points List:

1.3.2.6.4.1 Monitor:

.1 ACC-AHU-5602 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature

1.3.2.6.4.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Air Temperature below setpoint allowance
.4 Room temperature outside acceptable range (16°C to 35°C, adjustable)

1.3.2.6.4.3 Alarm/Monitor signal to SCADA HMI:

.1 ACC-AHU-5602 operational status
.2 Filter clogged
.3 General AHU Alarm (Any of the alarm points to be investigated)

KEY PLAN

NOTES:

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A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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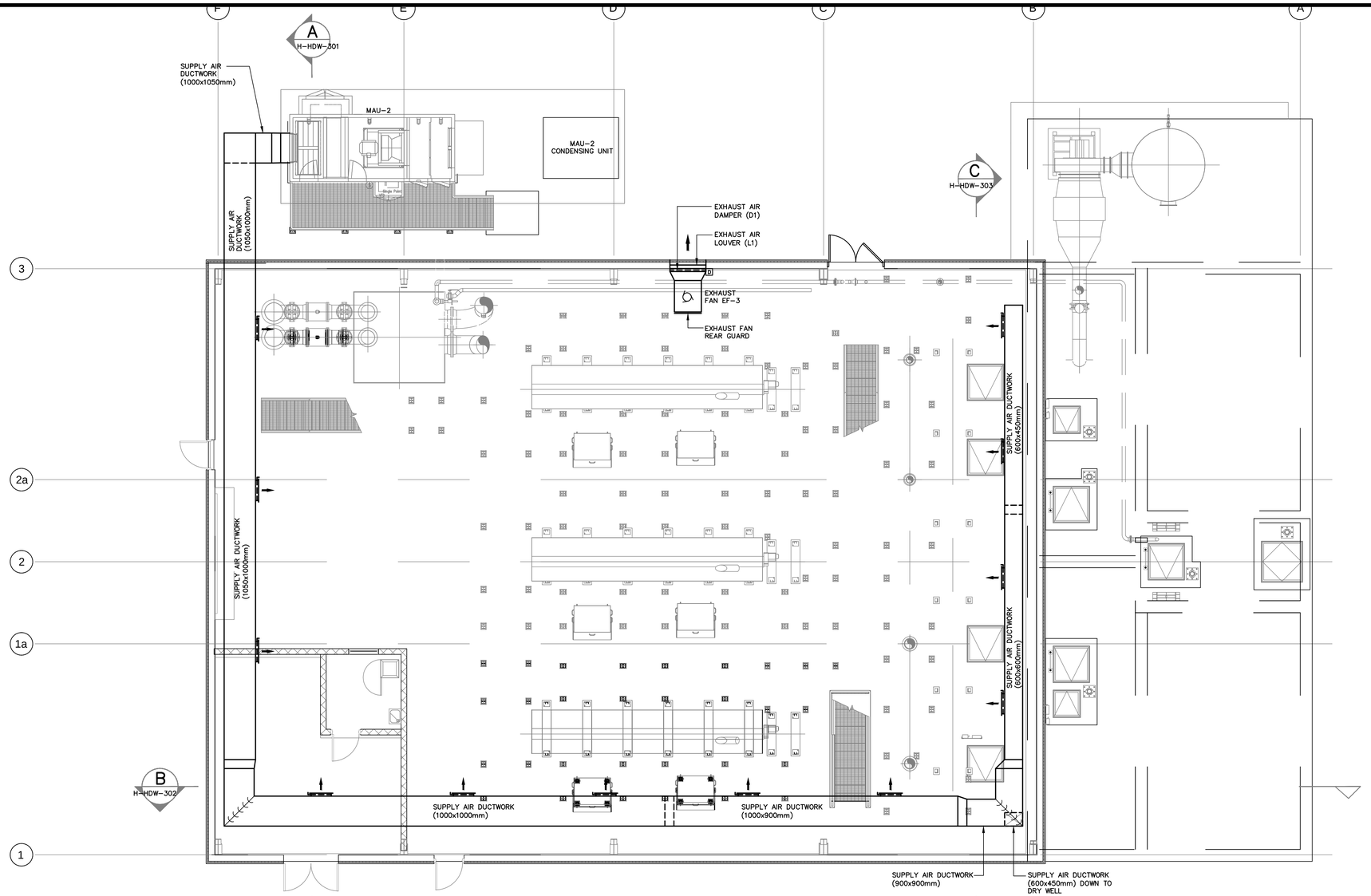
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
ATAD BUILDING
SEQUENCE OF OPERATIONS

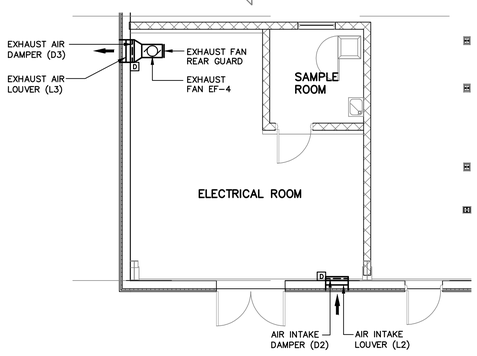
SPECIFICATION

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-ATD-603
Date: 2022.07.22	
Project No.: 10449	



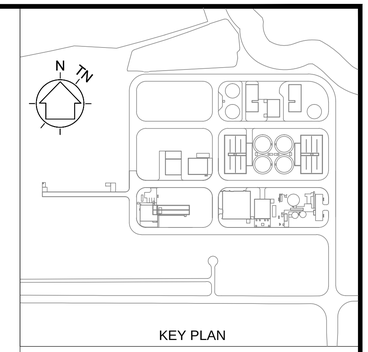
MAIN FLOOR PLAN – HEADWORKS BUILDING

SCALE 1:75



FLOOR PLAN – ELECTRICAL ROOM

SCALE 1:75



Rev	Revisions	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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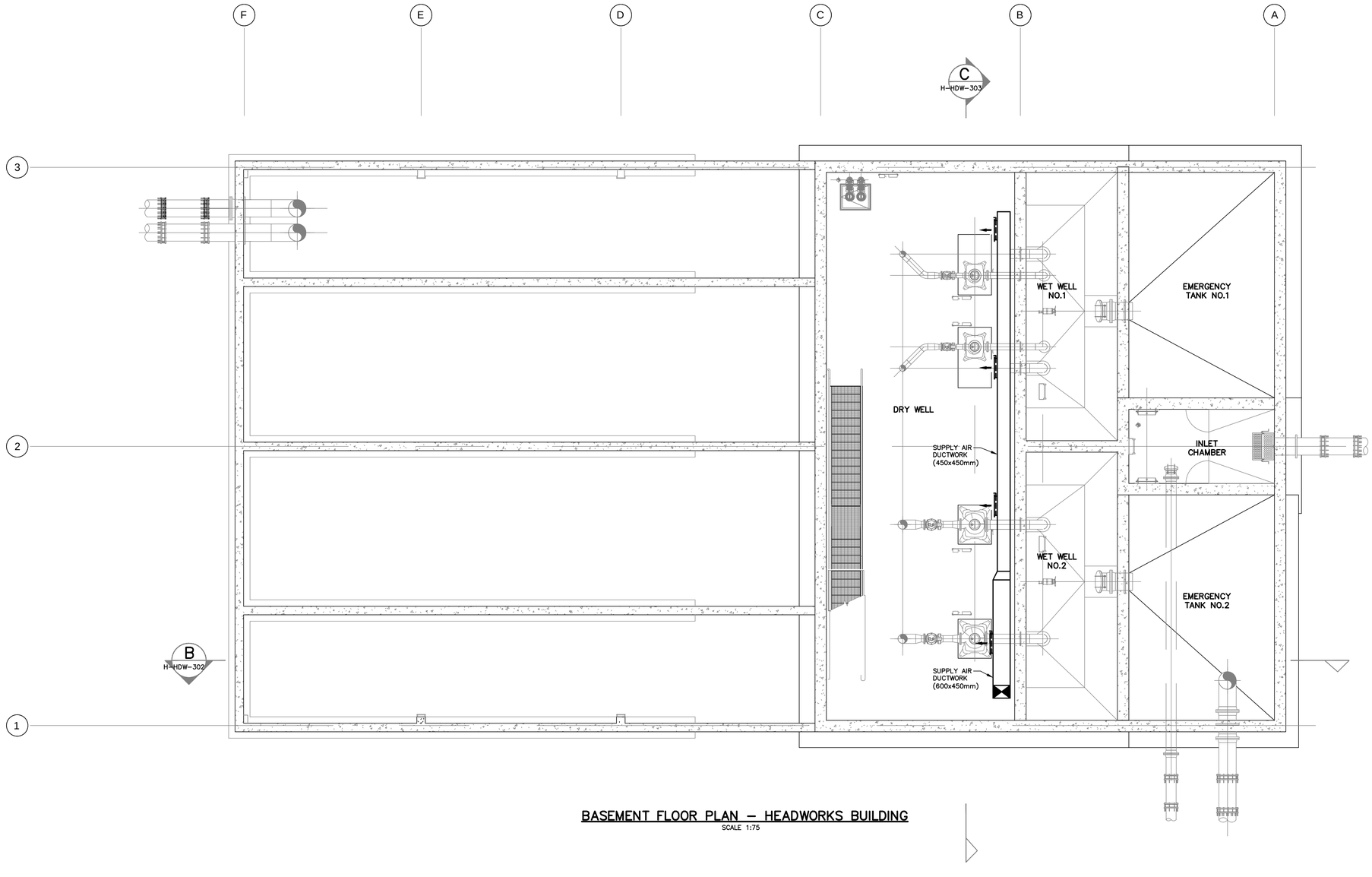
MIDHURST WASTEWATER TREAMENT PLANT - PH1

HEADWORKS MAIN BUILDING VENTILATION SYSTEM LAYOUT 1

HVAC

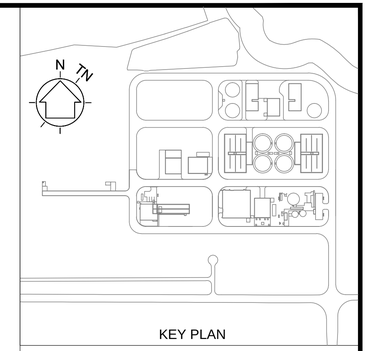
Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-101
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-HDW-101.DWG



BASEMENT FLOOR PLAN – HEADWORKS BUILDING

SCALE 1:75



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST
WASTEWATER TREAMENT PLANT - PH1
HEADWORKS
MAIN BUILDING
VENTILATION SYSTEM LAYOUT 2

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-102
Project No.:	

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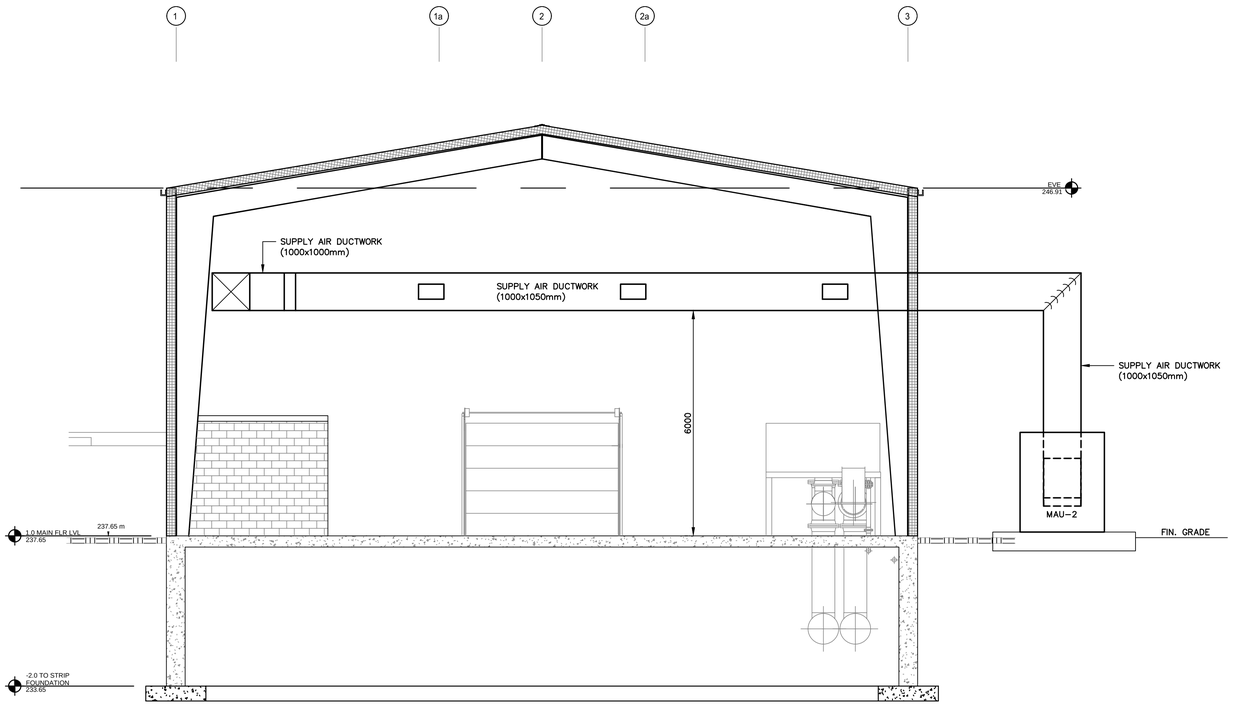

SECTION A
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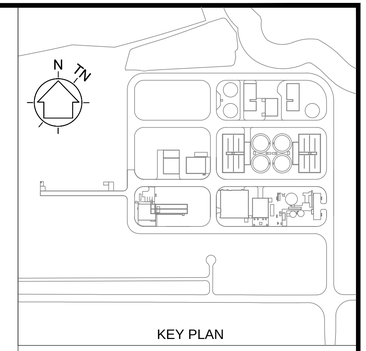
H-HDW-101



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

Approved By

P. Eng.

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MIDHURST
WASTEWATER TREAMENT PLANT - PH1
HEADWORKS
MAIN BUILDING
VENTILATION SYSTEM SECTION 1

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-301
Project No.:	

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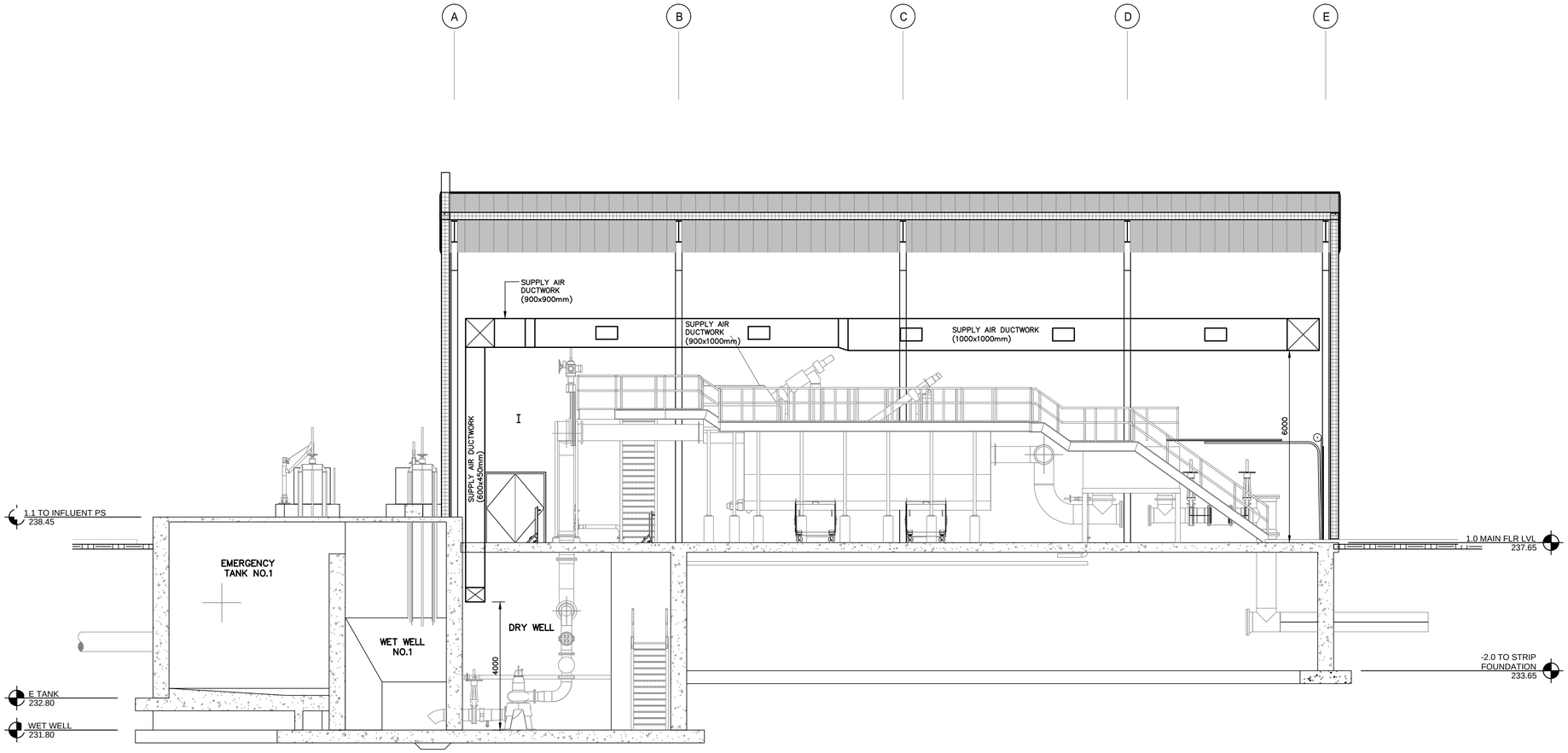
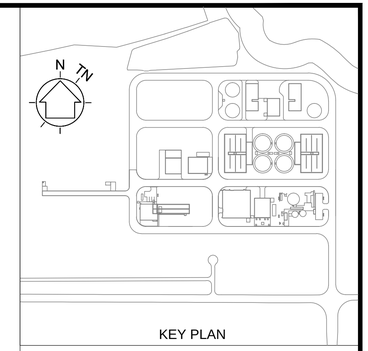


SECTION B
SCALE 1:75
H-HDW-101
H-HDW-102



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

P. Eng
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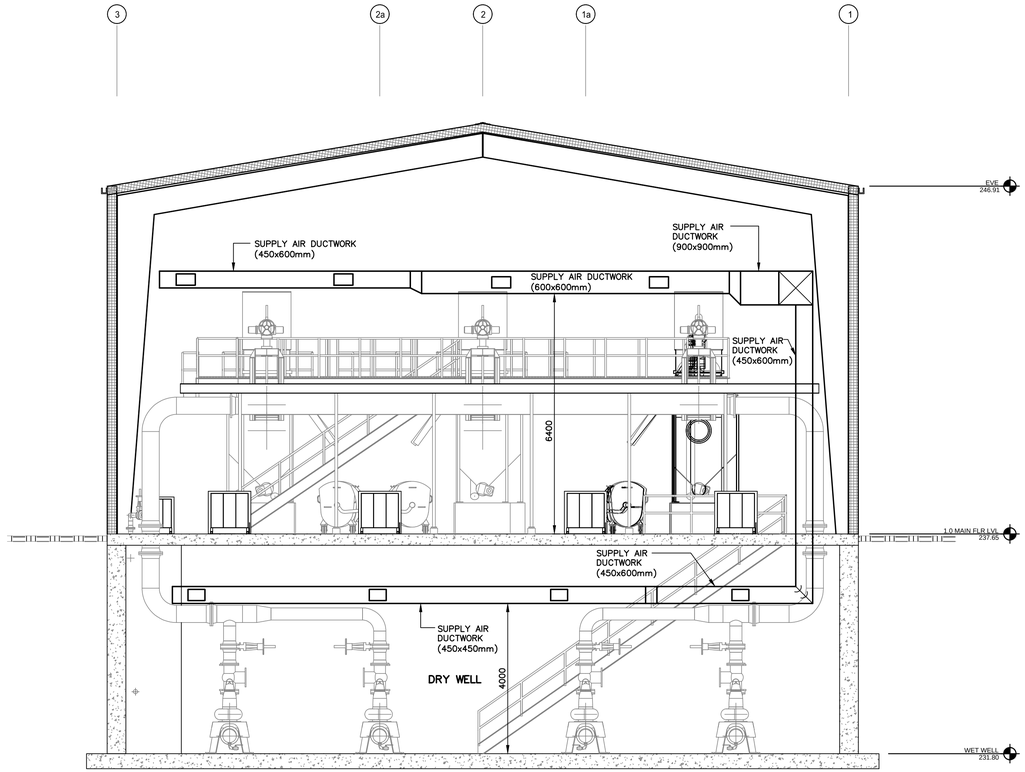
MIDHURST
WASTEWATER TREAMENT PLANT - PH1
HEADWORKS
MAIN BUILDING
VENTILATION SYSTEM SECTION 2

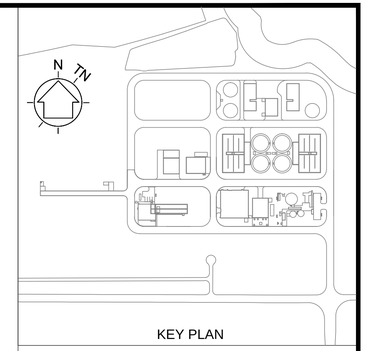
HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-302
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-HDW-302.DWG



SECTION C
SCALE 1:75
H-HDW-101
H-HDW-102



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST
WASTEWATER TREAMENT PLANT - PH1
HEADWORKS
MAIN BUILDING
VENTILATION SYSTEM SECTION 3

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-303
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-HDW-303.DWG

AIR CHANGING SCHEDULE

LOCATION	AIR CHANGES/HR	COMMENTS
HEADWORKS BLDG	3	CONTINUOUS
WET WELL 1/EMERGENCY TANK 1	30	INTERMITTED BASED ON ENTRY
WET WELL 2/EMERGENCY TANK 2	30	INTERMITTED BASED ON ENTRY
INLET CHAMBER	30	INTERMITTED BASED ON ENTRY
OCU – WETWELL	6	CONTINUOUS
OCU – SCREEN	12	CONTINUOUS

FAN SCHEDULE

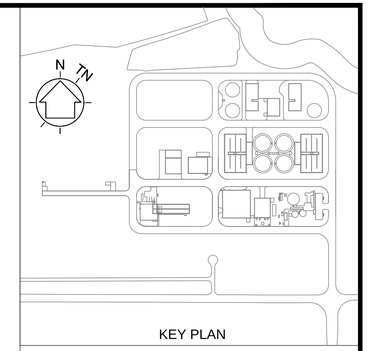
TAG	CFM	HP	VOLTAGE	PH	COMMENTS
EF–3	10,100	2.0	600	3	INTERLOCKED WITH MAU–2
EF–4	260	1/8	120	1	
SF–1	7100				
SF–2	7100				
SF–3	700				

ELECTRIC UNIT HEATER SCHEDULE

TAG	KW	VOLTAGE	PH	CLASSIFICATION	COMMENTS
EUH–1	10.0	600	3	CLASS 1, DIV. 1	CONTROL BY DDC–4
EUH–2	10.0				
EUH–3	10.0				
EUH–4	10.0				
EUH–5	10.0				
EUH–6	10.0				
EUH–7	10.0				
EUH–8	10.0				
EUH–9	1.0	120	1	CLASS 1, DIV. 1	CONTROL BY T–STAT

AIR HANDLING UNIT SCHEDULE

TAG	LOCATION	FLOW (CFM)	HEATING CAPACITY KW (GAS)	ELECTRIC			CLASSIFICATION	AIR CHANGE/HR	COMMENTS
				FLA	VOLTAGE	PH			
MAU–2	HEADWORKS	10,700	212 (723 MBH)		600	3	CLASS 1, DIV. 1	3	CONTROL BY DDC–4



KEY PLAN

LEGEND

D	DAMPER MOTOR
EUH	ELECTRIC UNIT HEATER
EF	EXHAUST FAN
SF	SUPPLY FAN
D	DAMPER
FS	FLOW SWITCH
TS	TEMPERATURE SWITCH
DDC–1	DIGITAL CONTROLLER (HVAC)
TE–01	TEMPERATURE SENSING ELEMENT
----------	CONTROL WIRING
BD	BALANCING DAMPER

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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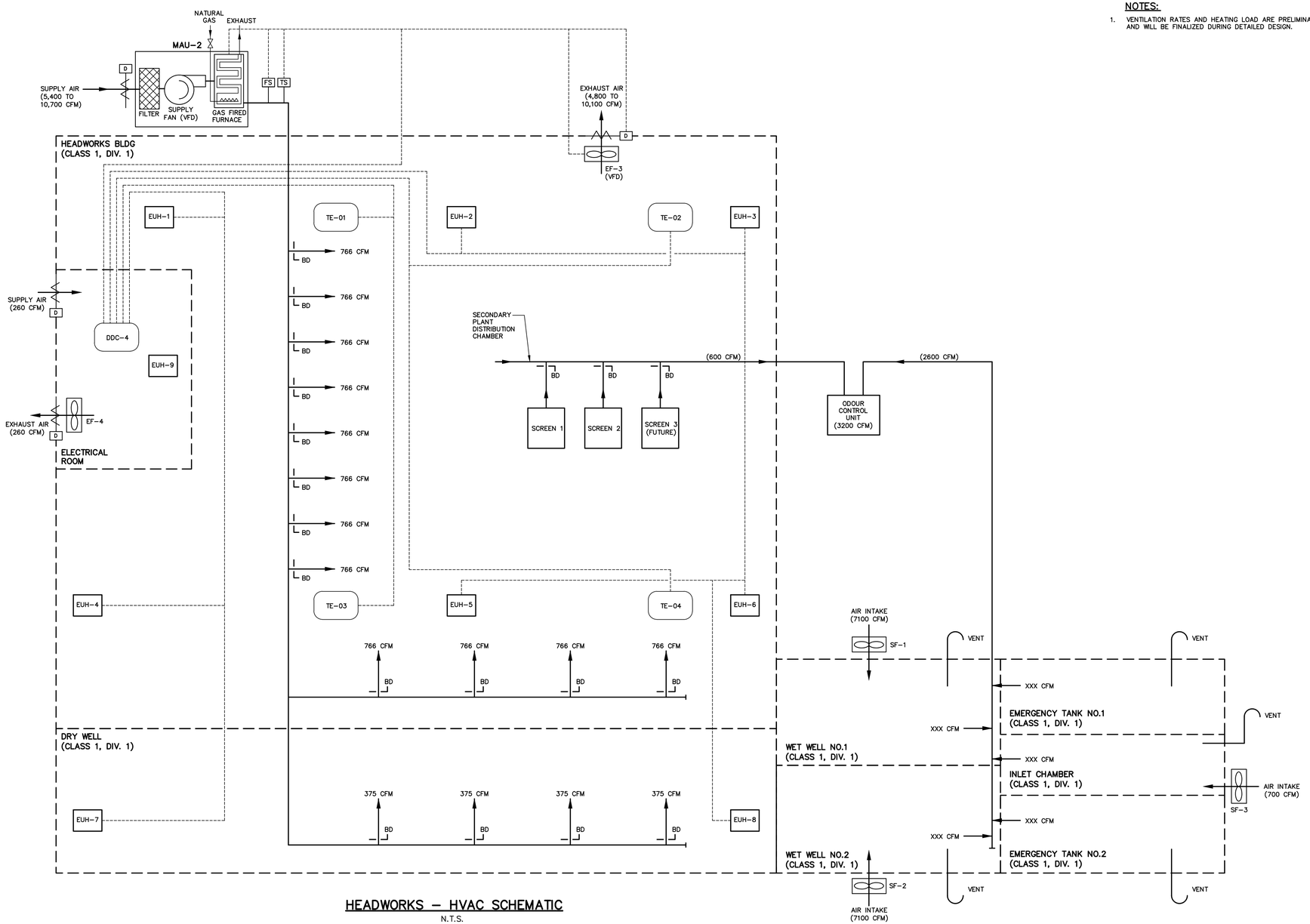
MIDHURST
WASTEWATER TREAMENT PLANT - PH1
HEADWORKS
MAIN BUILDING
HVAC SCHEDULES

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-601
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-HDW-601.DWG

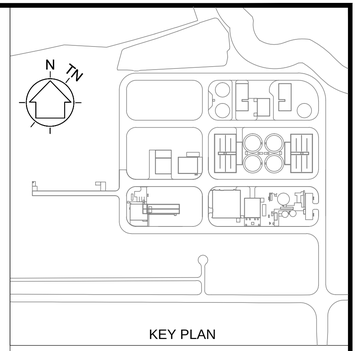


HEADWORKS – HVAC SCHEMATIC

N.T.S.

NOTES:

1. VENTILATION RATES AND HEATING LOAD ARE PRELIMINARY AND WILL BE FINALIZED DURING DETAILED DESIGN.



KEY PLAN

LEGEND

D	DAMPER MOTOR
EUH	ELECTRIC UNIT HEATER
EF	EXHAUST FAN
SF	SUPPLY FAN
D	DAMPER
FS	FLOW SWITCH
TS	TEMPERATURE SWITCH
DDC-1	DIGITAL CONTROLLER (HVAC)
TE-01	TEMPERATURE SENSING ELEMENT
----------	CONTROL WIRING
BD	BALANCING DAMPER

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST WASTEWATER TREAMENT PLANT - PH1

HEADWORKS MAIN BUILDING AIR FLOW DIAGRAM

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-HDW-602
Project No.:	

CAD File LOCATION: Z:\PUBLIC\A-DWG\2021\22120-MIDHURST\22120-H-HDW-602.DWG

VENTILATION (HVAC)

- AIR FLOW ARROW
- 18"x12" — 18"x12" — RECTANGULAR DUCT AND SIZE*
- 18"ø — 18"ø — ROUND DUCT AND SIZE*
- 18"x12"ø — 18"x12"ø — FLAT OVAL DUCT AND SIZE*
- 18"x12" — EXTERIOR DUCT TREATMENT*
- 18"x12" — 18"x12" — RECTANGULAR DUCT WITH ACOUSTIC LINING*
- 30"x12" — DUCT SECTION, SUPPLY AIR. SIZE* IS HORIZONTAL DIM. x VERTICAL DIM. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL
- FLEXIBLE DUCT
- ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, OUTSIDE AIR DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, RETURN DOWN. APPLIES TO RECT., ROUND AND OVAL
- ELBOW TURN, EXHAUST DOWN. APPLIES TO RECT., ROUND AND OVAL
- UP — CHANGE IN DUCT ELEVATION RISING IN DIRECTION INDICATED
- DN — CHANGE IN DUCT ELEVATION DROPPING IN DIRECTION INDICATED
- END CAP
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITH SPLITTER VANES (0.25 R/W DEFAULT)
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT)
- ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT)
- MITERED ELBOW, RECTANGULAR, WITH TURNING VANES
- AD — RECTANGULAR TO ROUND TRANSITION
- AD — AD — AD — DUCT ACCESS DOOR (TOP, SIDE, BOTTOM)
- FC — FLEXIBLE CONNECTION
- BDD — BACKDRAFT DAMPER
- MANUAL DAMPER
- M — MOTORIZED DAMPER
- FIRE DAMPER
- SMOKE DAMPER
- SMOKE AND FIRE DAMPER
- DUCT SILENCER
- X — CONTROL DEVICE (REFER TO CONTROLS LEGEND)
- AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND)
- QUANTITY / TYPE / SIZE (IN.) / VOLUME (CFM) — AIR OUTLET OR INLET TAG (REFER TO SCHEDULE)
- RECTANGULAR DIFFUSER, SUPPLY. OPTIONAL ARROWS SHOW THE FLOW DIRECTION.
- RECTANGULAR REGISTER OR GRILLE, RETURN
- RECTANGULAR REGISTER OR GRILLE, EXHAUST
- ROUND DIFFUSER, SUPPLY
- LINEAR DIFFUSER
- SIDEWALL REGISTER OR GRILLE, SUPPLY
- SIDEWALL GRILLE, RETURN OR EXHAUST
- UC — UNDERCUT DOOR
- DOOR GRILLE OR LOUVER
- TRANSFER GRILLE OR LOUVER
- COIL (REFER TO CONTROLS LEGEND)
- ID-# — EQUIPMENT TAG
- QUANTITY / TYPE / LENGTH (FT) / CAPACITY (MBH) — RADIATION HEATING TAG (REFER TO SCHEDULE)

* NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS (ALWAYS WIDTH X HEIGHT IN FLOOR PLAN AND SECTION)

CONTROLS

- PG — AIR PRESSURE GAGE
- S — AIR SAMPLING POINT
- CO2 — CARBON DIOXIDE SENSOR
- CO — CARBON MONOXIDE SENSOR
- CG — COMBUSTIBLE GAS SENSOR
- CT — CURRENT SENSOR
- CT — CURRENT TRANSMITTER WITH LEAD
- D — DEWPOINT SENSOR
- DPS — DIFFERENTIAL PRESSURE SENSOR
- DPT — DIFFERENTIAL PRESSURE TRANSMITTER
- FM — FLOW METER
- FS — FLOW SWITCH
- FT — FLOW TRANSMITTER
- FZ — FREEZE STAT
- HOA — HAND SWITCH
- H — HUMIDITY SENSOR
- LC — LEVEL CONTROL
- LS — LIMIT SWITCH
- LPI — LOOP POWERED INDICATOR
- Nox — NITROGEN OXIDE SENSOR
- O — OCCUPANCY SENSOR
- O2 — OXYGEN SENSOR
- PI — POSITION INDICATOR
- PS — PRESSURE SENSOR
- R — REFRIGERANT SENSOR
- RH — RELATIVE HUMIDITY SENSOR
- R — RELAY
- H — ROOM HUMIDITY SENSOR
- SP — STATIC PRESSURE SENSOR
- TS — TEMPERATURE SENSOR
- T — THERMOSTAT
- TVO — TOTAL VOLATILE ORGANIC COMPOUND SENSOR
- VIB — VIBRATION SENSOR
- AFS — AIR FLOW SWITCH
- I / P — CURRENT TO PRESSURE
- E / P — ELECTRIC / PNEUMATIC
- SCR — SILICON CONTROLLED RECTIFIER
- TCP — TEMPERATURE CONTROL PANEL
- TEC — TERMINAL EQUIPMENT CONTROLLER
- SENSOR WELL
- ALARM HORN
- ALARM BEACON
- AI — ANALOG INPUT
- AO — ANALOG OUTPUT
- DI — DIGITAL INPUT
- DO — DIGITAL OUTPUT
- STR — STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- NON MOTORIZED VALVE
- M — TWO WAY MOTORIZED VALVE
- M — THREE WAY MOTORIZED VALVE
- XX — TWO WAY SOLENOID VALVE

CONTROLS

- NC / NO — THREE WAY SOLENOID VALVE
- XX — TWO WAY PNEUMATIC VALVE
- NC / NO — THREE WAY PNEUMATIC VALVE
- PUMP
- MOTOR
- S — DUCT SMOKE DETECTOR
- H — DUCT SMOKE DETECTOR
- AIR VALVE
- H / C — UNITARY HEATING COIL
- C / C — UNITARY COOLING COIL
- H / R — UNITARY HEAT RECOVERY COIL
- FILTER
- AIR BLENDER
- ENERGY WHEEL
- PLATE ENERGY RECOVERY COIL
- AIR FLOW MEASURING STATION
- AIR FLOW PROBE
- BACKDRAFT DAMPER
- MOTORIZED DAMPER - PARALLEL BLADE
- MOTORIZED DAMPER - OPPOSED BLADE
- NC — DAMPER ACTUATOR - ELECTRIC
- NC — DAMPER ACTUATOR - ELECTRIC
- CENTRIFUGAL FAN
- PROP FAN
- PLENUM FAN
- HUMIDIFIER
- ENERGY CORE (+ -)
- ETHERNET CONNECTION
- CONTACT
- DDC_XXX — DDC PANEL
- COMPUTER

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
4. CONTRACTOR SHALL CONFIRM AND COORDINATE THE LOCATION AND ROUTE OF ALL EQUIPMENT, PIPING, AND DUCTWORK ON SITE AND WITH OTHER TRADES.
5. ALL DIFFUSERS AND GRILLES SHALL HAVE UPSTREAM BALANCING DAMPERS.
6. PROVIDE TURNING VANES IN EACH RECTANGULAR ELBOW. ALL DUCT TAKE-OFFS TO HAVE ENLARGED THROATS WITH LEADING EDGES.
7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
8. COORDINATE THERMOSTAT LOCATIONS WITH FURNITURE, ETC.
9. VARIATIONS FROM SPECIFIED PRODUCTS AND ASSOCIATED WORK REQUIREMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL COMPENSATION WILL NOT BE CONSIDERED BECAUSE OF DIFFERENCES IN INTERPRETATION OF TECHNICAL PROVISIONS.
10. CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGING NEW EQUIPMENT PIPING AND DUCTWORK OVER THE COURSE OF CONSTRUCTION.
11. CONTRACTOR TO PROVIDE DUCTING SUPPORTS.
12. COORDINATE WITH GC ALL REQUIRED ACCESS HATCH/PANELS FOR MECHANICAL EQUIPMENT CONCEALED ABOVE INACCESSIBLE CEILINGS AND WITHIN WALLS. MAKE EFFORT TO LOCATE AND COORDINATE DEVICES REQUIRING ACCESS TO BE IN GROUPED AREAS TO REDUCE THE NUMBER OF ACCESS DOORS REQUIRED. ACCESS DOORS TO BE LOCATED WITH CONSIDERATION ON AND IN ALIGNMENT WITH ARCHITECTURAL DETAILS AND OTHER CEILING/WALL MOUNTED DEVICES TO THE SATISFACTION OF THE ARCHITECT.
13. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND CAPACITIES OF ELECTRIC FORCE FLOW UNITS, BASEBOARDS, AND UNIT HEATERS.
14. REFER TO THE ELECTRICAL DRAWINGS FOR AVAILABLE SPACE FOR MOUNTING CONTROL CABINETS. WHERE WALL SPACE IS NOT AVAILABLE THE USE OF GALVANIZED UNISTRUT IS PERMITTED. TREAT ALL EXPOSED CUT ENDS.

SEC HVAC DRAWING LIST	
Drawing No.	Sheet Name
G-GEN-001	LEGEND AND SYMBOLS
H-SEC-102	MAIN FLOOR PLAN
H-SEC-103	ROOF PLAN
H-SEC-301	SECTIONS & DETAILS
H-SEC-302	SECTIONS & DETAILS
H-SEC-303	SECTIONS & DETAILS
H-SEC-401	ENLARGED FLOOR PLAN
H-SEC-501	H.V.A.C. TYPICAL DETAILS
H-SEC-502	H.V.A.C. TYPICAL DETAILS
H-SEC-601	H.V.A.C. SCHEDULES
H-SEC-602	H.V.A.C. SCHEMATICS
H-SEC-603	SEQUENCE OF OPERATION

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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Approver P. Eng.
Approved By

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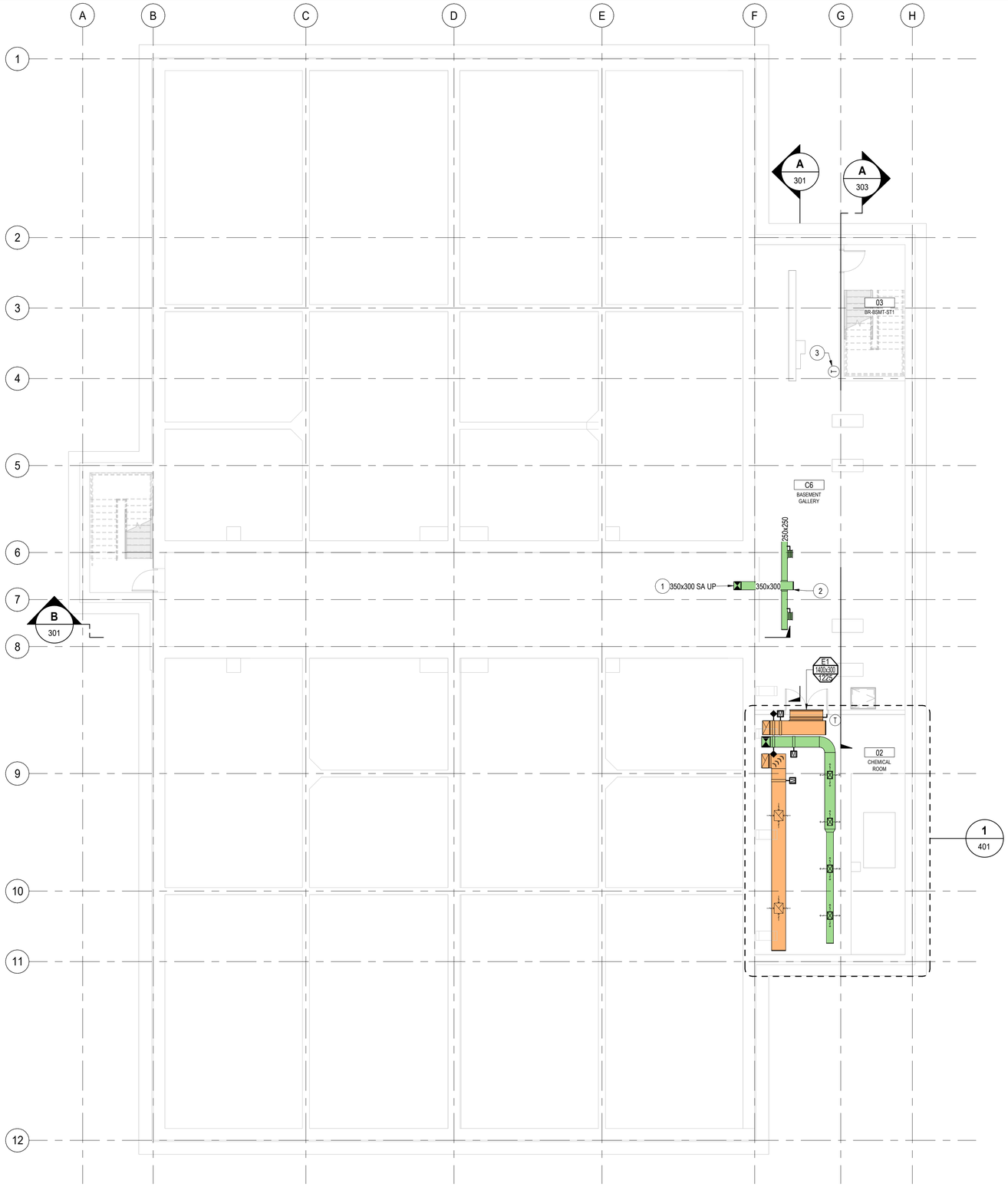
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR BUILDING LEGEND AND SYMBOLS

GENERAL

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. G-GEN-001
Date: 2022.07.26	
Project No.: 10449	



BASEMENT FLOOR PLAN - VENTILATION LAYOUT

SCALE: 1 : 100

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
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5. ALL DIFFUSERS AND GRILLES SHALL HAVE UPSTREAM BALANCING DAMPERS.
6. PROVIDE TURNING VANES IN EACH RECTANGULAR ELBOW. ALL DUCT TAKE-OFFS TO HAVE ENLARGED THROATS WITH LEADING EDGES.
7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
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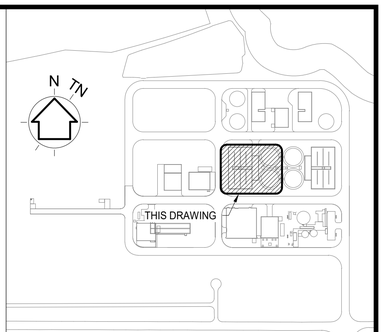
(#) KEYNOTES

1 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR ABOVE.

2 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

3 THE THERMOSTAT TO CONTROL MECHANICAL EQUIPMENT MEETS NEMA 4X REQUIREMENTS AND IS LOCATED ON THE WALL WITH A PROTECTIVE LOCKABLE COVER. COORDINATE PLACEMENT OF THERMOSTATS WITH ALL TRADES AND DISCIPLINES.



KEY PLAN

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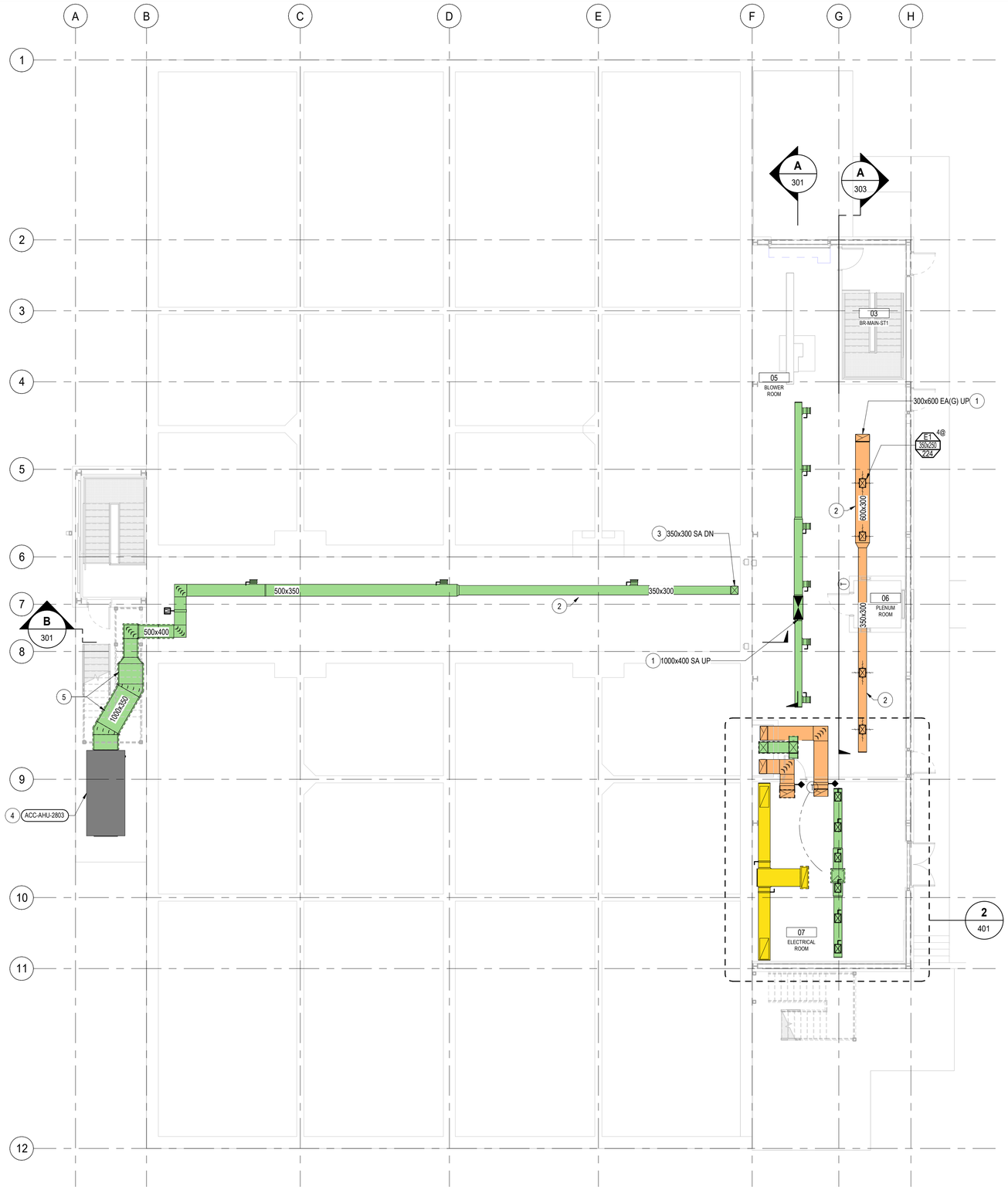
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
SEC
BIOREACTOR
BASEMENT FLOOR PLAN

HVAC

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-101
Date: 2022.07.26	
Project No.: 10449	



MAIN FLOOR PLAN - VENTILATION LAYOUT

SCALE: 1 : 100

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
4. CONTRACTOR SHALL CONFIRM AND COORDINATE THE LOCATION AND ROUTE OF ALL EQUIPMENT, PIPING, AND DUCTWORK ON SITE AND WITH OTHER TRADES.
5. ALL DIFFUSERS AND GRILLES SHALL HAVE UPSTREAM BALANCING DAMPERS.
6. PROVIDE TURNING VANES IN EACH RECTANGULAR ELBOW. ALL DUCT TAKE-OFFS TO HAVE ENLARGED THROATS WITH LEADING EDGES.
7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
8. COORDINATE THERMOSTAT LOCATIONS WITH FURNITURE, ETC.
9. VARIATIONS FROM SPECIFIED PRODUCTS AND ASSOCIATED WORK REQUIREMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL COMPENSATION WILL NOT BE CONSIDERED BECAUSE OF DIFFERENCES IN INTERPRETATION OF TECHNICAL PROVISIONS.
10. CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGING NEW EQUIPMENT PIPING AND DUCTWORK OVER THE COURSE OF CONSTRUCTION.
11. CONTRACTOR TO PROVIDE DUCTING SUPPORTS.
12. COORDINATE WITH GC ALL REQUIRED ACCESS HATCH/PANELS FOR MECHANICAL EQUIPMENT CONCEALED ABOVE INACCESSIBLE CEILINGS AND WITHIN WALLS. MAKE EFFORT TO LOCATE AND COORDINATE DEVICES REQUIRING ACCESS TO BE IN GROUPED AREAS TO REDUCE THE NUMBER OF ACCESS DOORS REQUIRED. ACCESS DOORS TO BE LOCATED WITH CONSIDERATION ON AND IN ALIGNMENT WITH ARCHITECTURAL DETAILS AND OTHER CEILING/WALL MOUNTED DEVICES TO THE SATISFACTION OF THE ARCHITECT.
13. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND CAPACITIES OF ELECTRIC FORCE FLOW UNITS, BASEBOARDS, AND UNIT HEATERS.
14. REFER TO THE ELECTRICAL DRAWINGS FOR AVAILABLE SPACE FOR MOUNTING CONTROL CABINETS. WHERE WALL SPACE IS NOT AVAILABLE THE USE OF GALVANIZED UNISTRUT IS PERMITTED. TREAT ALL EXPOSED CUT ENDS.

(#) KEYNOTES

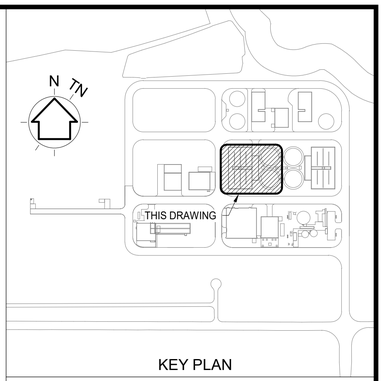
1 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR ABOVE.

2 DUCTWORK FROM MECHANICAL UNIT TO BE SUSPENDED FROM STRUCTURE MEMBERS AND TO BE INSTALLED USING APPROVED SMACNA METHOD. THE CONTRACTOR IS TO COORDINATE ON-SITE WITH ALL TRADES BEFORE THE INSTALLATION OF DUCTWORK IS TO BEGIN.

3 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR BELOW.

4 THE MECHANICAL EQUIPMENT IS TO REST ON RAISED PLATFORM. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON THE RAISED PLATFORM. PLACEMENT OF UNIT TO MEET THE MAINTENANCE CLEARANCE LISTED IN THE MANUFACTURER'S INSTALLATION MANUAL.

5 THE SUPPORT STRUCTURE FOR DUCTWORK IS BY STRUCTURAL. REFER TO THEIR DRAWINGS FOR ADDITIONAL INFORMATION.



KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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Approver P. Eng.
Approved By

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MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR MAIN FLOOR PLAN

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-102
Date: 2022.07.26	
Project No.: 10449	

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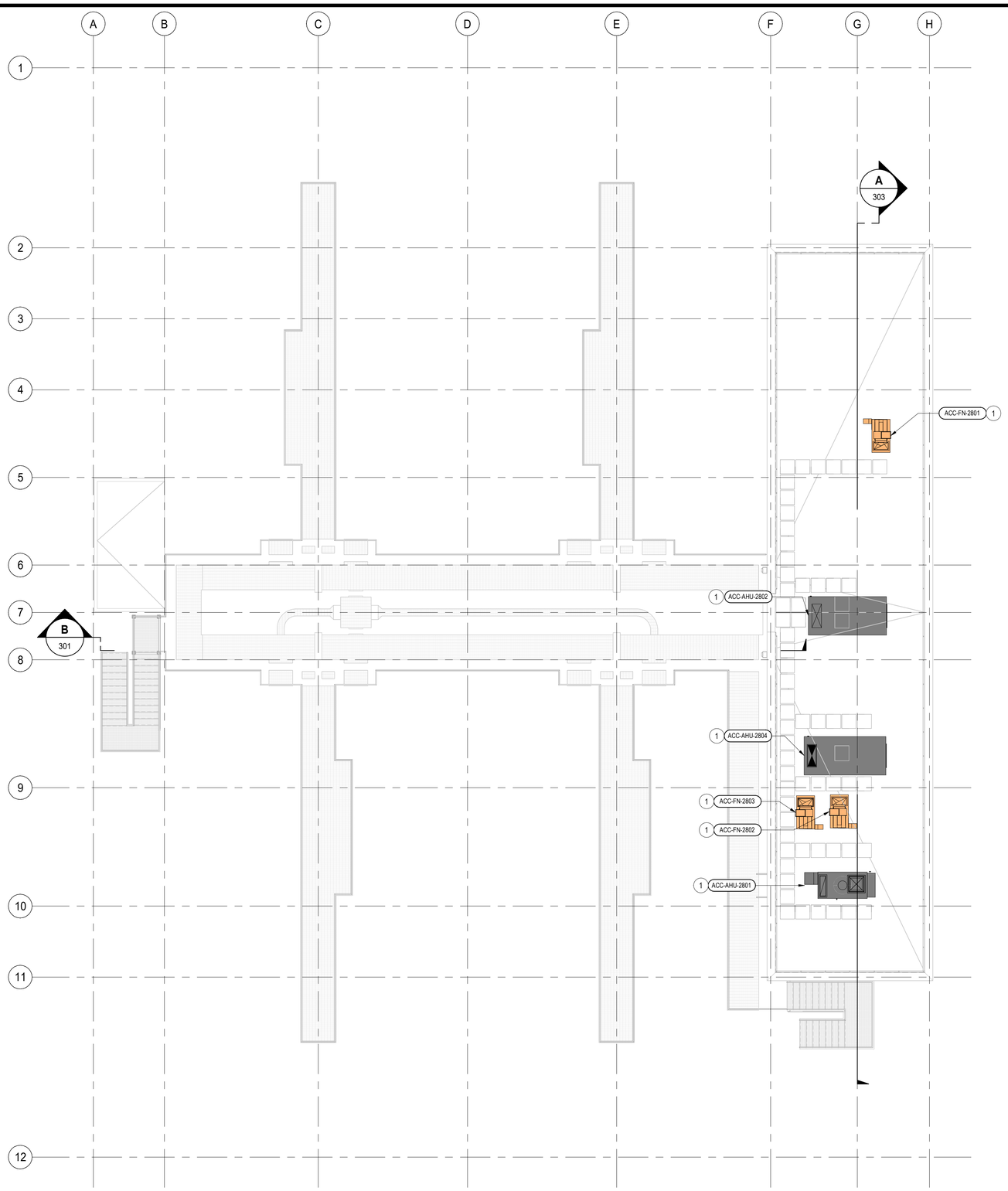
1/26/2023 2:07:43 PM



ROOF PLAN - VENTILATION LAYOUT

SCALE: 1 : 100

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
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7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
8. COORDINATE THERMOSTAT LOCATIONS WITH FURNITURE, ETC.
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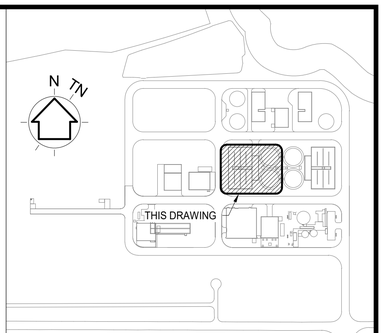
10. CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGING NEW EQUIPMENT PIPING AND DUCTWORK OVER THE COURSE OF CONSTRUCTION.
11. CONTRACTOR TO PROVIDE DUCTING SUPPORTS.
12. COORDINATE WITH GC ALL REQUIRED ACCESS HATCH/PANELS FOR MECHANICAL EQUIPMENT CONCEALED ABOVE INACCESSIBLE CEILINGS AND WITHIN WALLS. MAKE EFFORT TO LOCATE AND COORDINATE DEVICES REQUIRING ACCESS TO BE IN GROUPED AREAS TO REDUCE THE NUMBER OF ACCESS DOORS REQUIRED. ACCESS DOORS TO BE LOCATED WITH CONSIDERATION ON AND IN ALIGNMENT WITH ARCHITECTURAL DETAILS AND OTHER CEILING/WALL MOUNTED DEVICES TO THE SATISFACTION OF THE ARCHITECT.
13. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND CAPACITIES OF ELECTRIC FORCE FLOW UNITS, BASEBOARDS, AND UNIT HEATERS.
14. REFER TO THE ELECTRICAL DRAWINGS FOR AVAILABLE SPACE FOR MOUNTING CONTROL CABINETS. WHERE WALL SPACE IS NOT AVAILABLE THE USE OF GALVANIZED UNISTRUT IS PERMITTED. TREAT ALL EXPOSED CUT ENDS.

KEYNOTES

1 MECHANICAL EQUIPMENT TO REST ON ROOF CURB (SUPPLIED BY VENDOR). COORDINATE LOCATION WITH ALL TRADES AND ALL DISCIPLINES INVOLVED IN THIS PROJECT.



KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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Approved By

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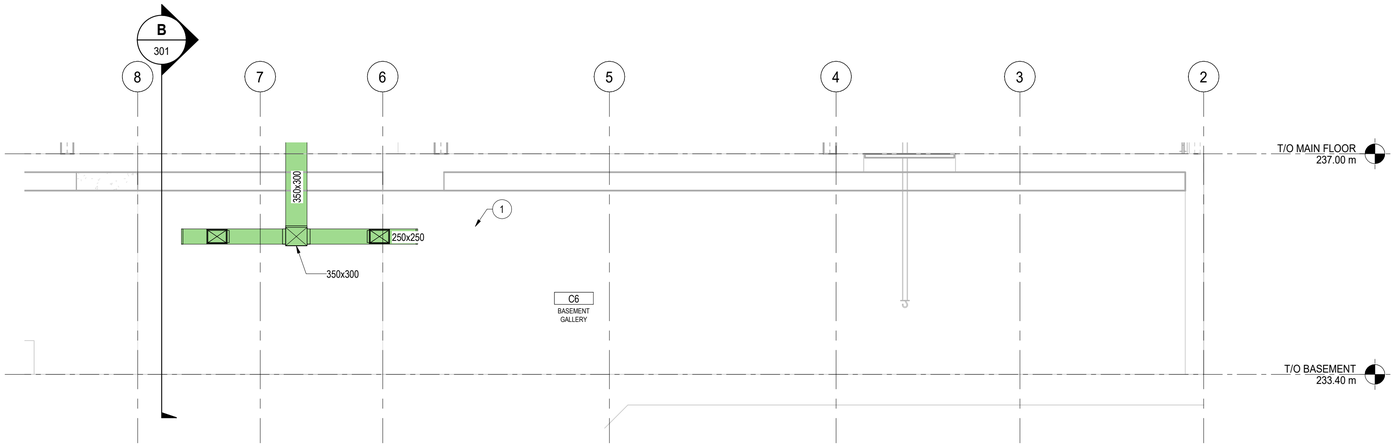
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR ROOF FLOOR PLAN

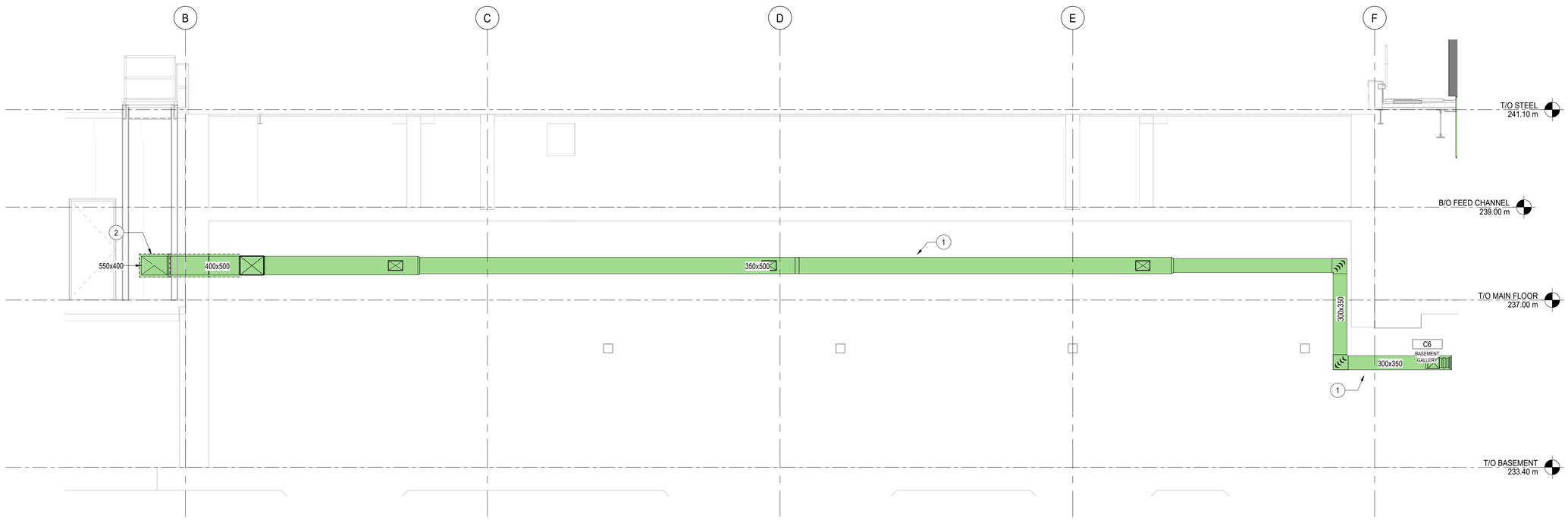
HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-103
Date: 2022.07.26	
Project No.: 10449	



PASS-1 01RM AREA SECTION A

SCALE: 1 : 50



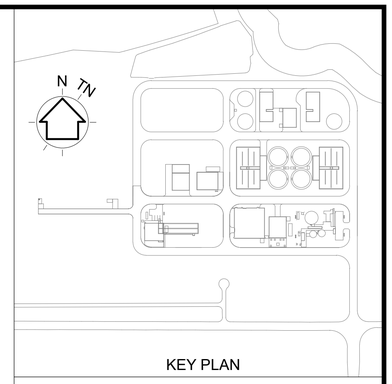
PASS-1 01RM AREA SECTION B

SCALE: 1 : 50

KEYNOTES

1 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

2 THE SUPPORT STRUCTURE FOR DUCTWORK IS BY STRUCTURAL. REFER TO THEIR DRAWINGS FOR ADDITIONAL INFORMATION.



KEY PLAN

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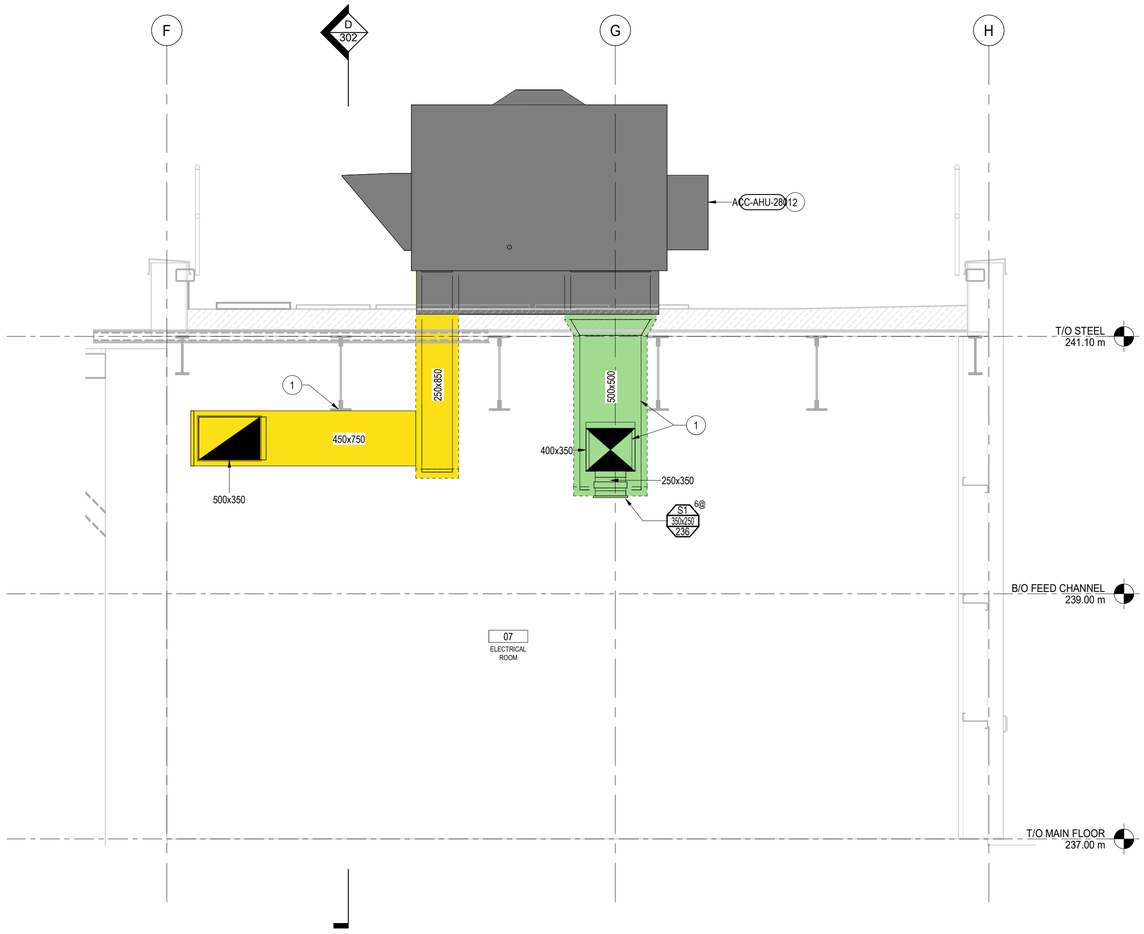
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR SECTIONS & DETAILS

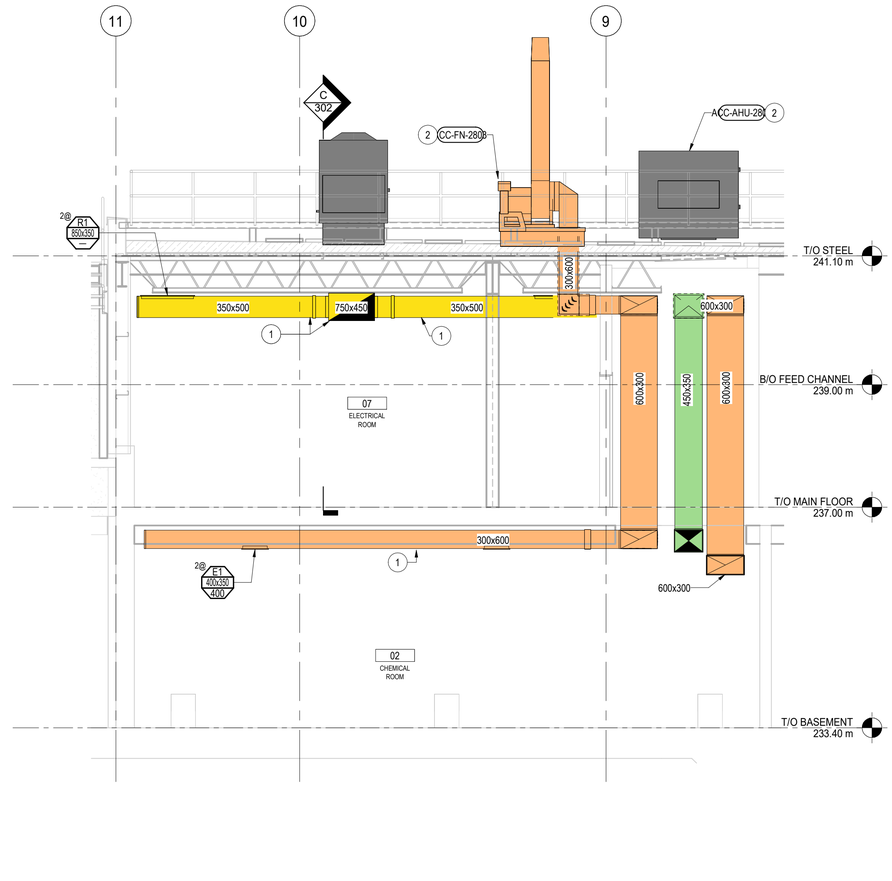
HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-301
Date: 2022.07.26	
Project No.: 10449	



ELECTRICAL ROOM 07 SECTION C

SCALE: 1 : 25



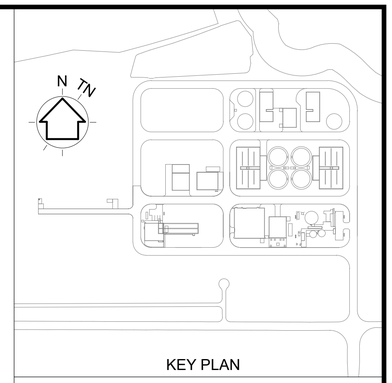
ELECTRICAL & CHEMICAL ROOM SECTION D

SCALE: 1 : 50

KEYNOTES

1 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

2 MECHANICAL EQUIPMENT TO REST ON ROOF CURB (SUPPLIED BY VENDOR). COORDINATE LOCATION WITH ALL TRADES AND ALL DISCIPLINES INVOLVED IN THIS PROJECT.



KEY PLAN

NOTES:

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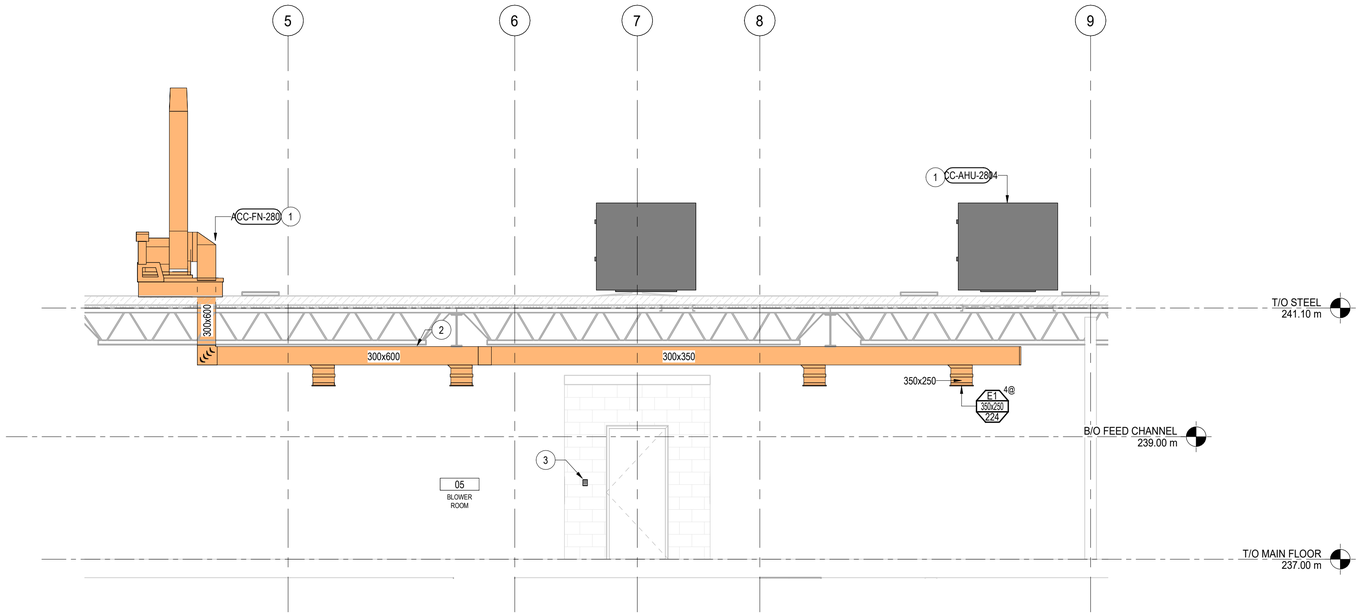
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR SECTIONS & DETAILS

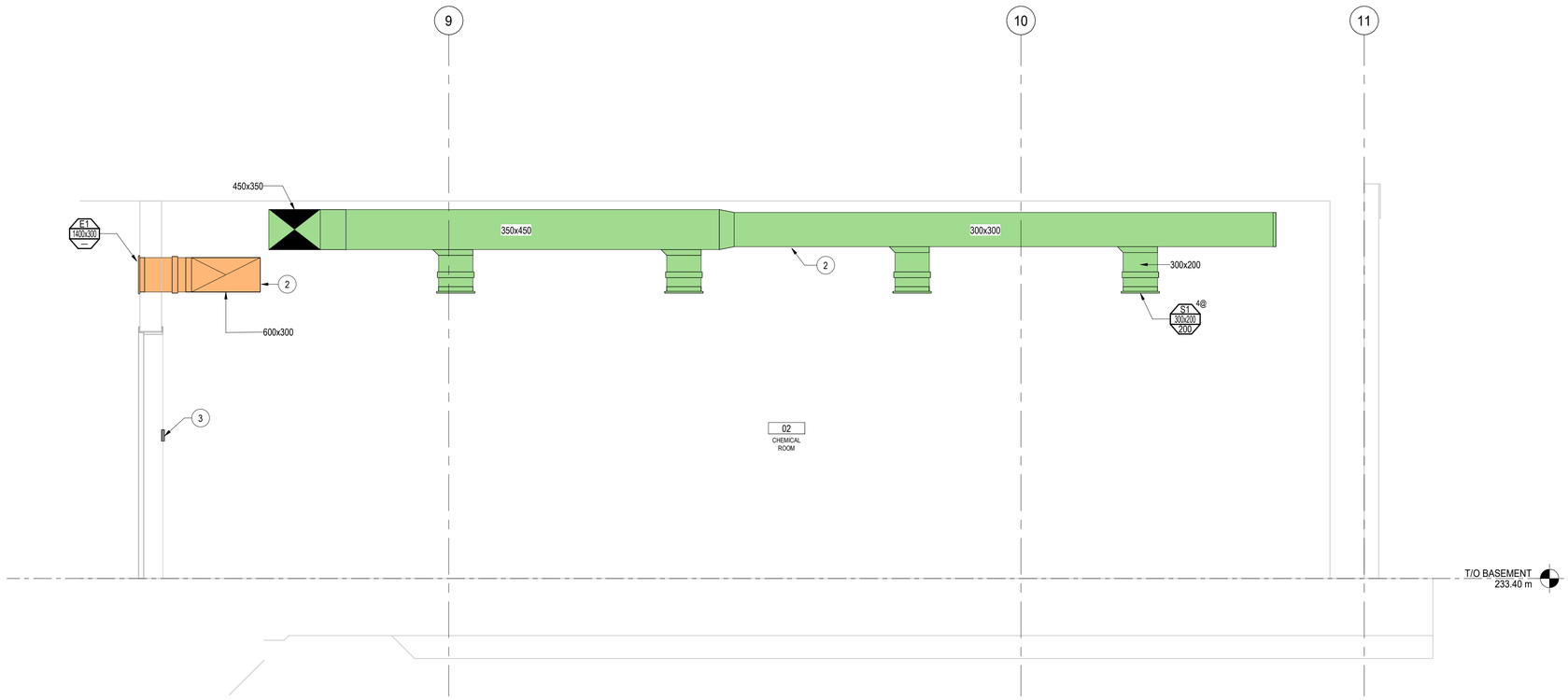
HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-302
Date: 2022.07.26	
Project No.: 10449	



BLOWER ROOM SECTION E

SCALE: 1 : 50



CHEMICAL ROOM 02 SECTION F

SCALE: 1 : 25

KEYNOTES

1 MECHANICAL EQUIPMENT TO REST ON ROOF CURB (SUPPLIED BY VENDOR). COORDINATE LOCATION WITH ALL TRADES AND ALL DISCIPLINES INVOLVED IN THIS PROJECT.

2 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

3 THE THERMOSTAT TO CONTROL MECHANICAL EQUIPMENT MEETS NEMA 4X REQUIREMENTS AND IS LOCATED ON THE WALL WITH A PROTECTIVE LOCKABLE COVER. COORDINATE PLACEMENT OF THERMOSTATS WITH ALL TRADES AND DISCIPLINES.

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
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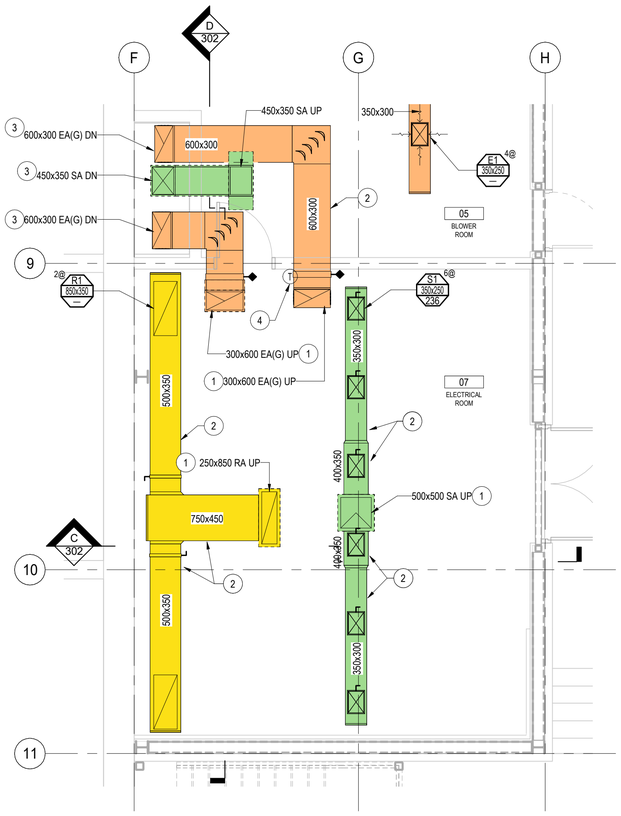
MIDHURST WASTEWATER TREATMENT PLANT - PH1
SEC
BIOREACTOR
SECTIONS & DETAILS

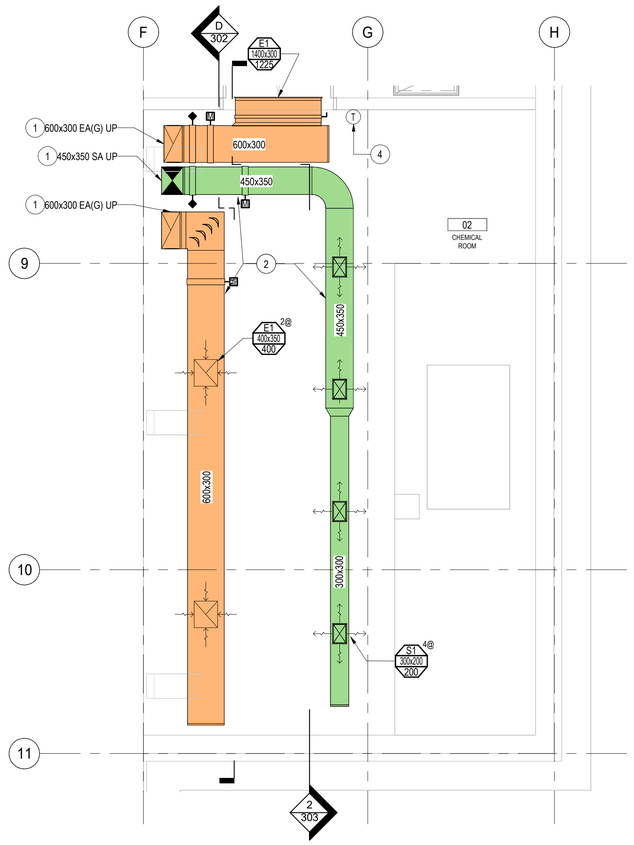
HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-303
Date: 2022.07.26	
Project No.: 10449	



LARGE SCALE ELECTRICAL ROOM

SCALE: 1 : 50



LARGE SCALE CHEMICAL ROOM

SCALE: 1 : 50

KEYNOTES

1 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR ABOVE.
2 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.
3 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR BELOW.
4 THE THERMOSTAT TO CONTROL MECHANICAL EQUIPMENT MEETS NEMA 4X REQUIREMENTS AND IS LOCATED ON THE WALL WITH A PROTECTIVE LOCKABLE COVER. COORDINATE PLACEMENT OF THERMOSTATS WITH ALL TRADES AND DISCIPLINES.

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
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A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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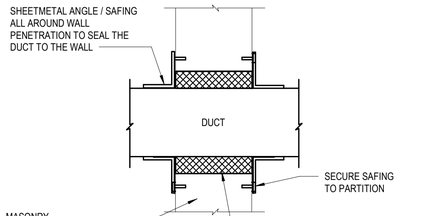
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR ENLARGED FLOOR PLAN

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-401
Date: 2022.07.26	
Project No.: 10449	

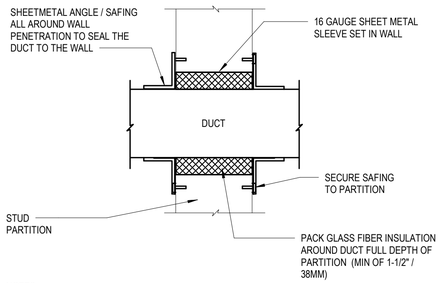


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH MASONRY WALL DETAIL

SCALE: N.T.S.

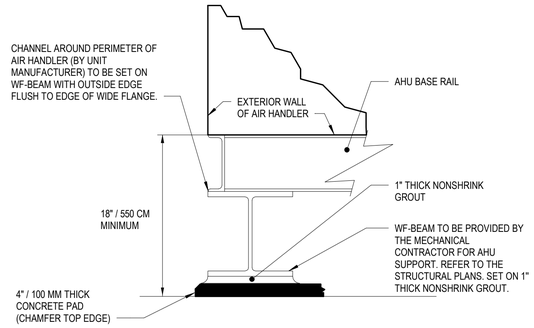


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH STUD WALL PARTITION DETAIL

SCALE: N.T.S.

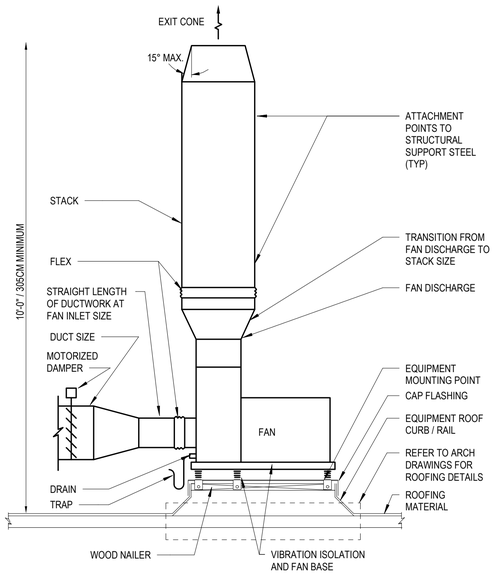


NOTES:

1. INCREASE THE HEIGHT AS REQUIRE TO PROVIDE ENOUGH HEIGHT FOR THE TRAP.

WF SUPPORT BEAM DETAIL

SCALE: N.T.S.

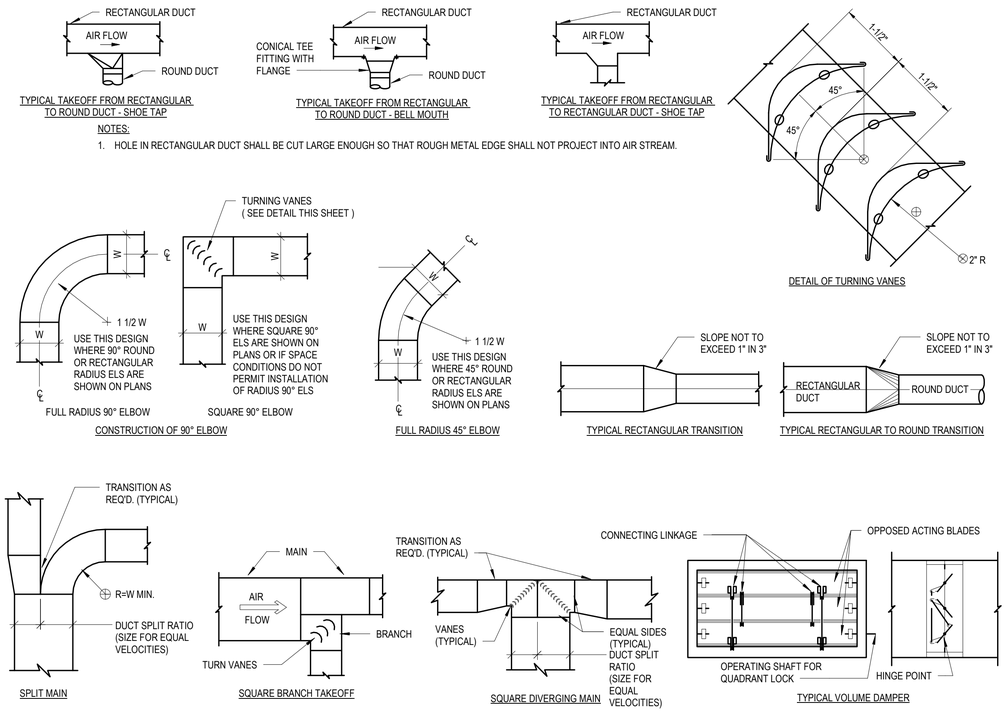


NOTES:

1. COORDINATE THE LOCATION AND SIZE OF THE EQUIPMENT RAIL BASED ON THE EQUIPMENT.
2. THE PURPOSE OF THE EQUIPMENT RAIL IS TO SUPPORT THE WEIGHT OF THE EQUIPMENT. IT SHALL BE RATED FOR THE OPERATING WEIGHT OF THE EQUIPMENT. FOLLOW VIBRATION / SEISMIC REQUIREMENTS PER THE CONTRACT DOCUMENTS.
3. THE TOP OF THE RAIL/CURB IS TO BE MOUNTED A MINIMUM OF 18 INCHES / 46 CM ABOVE THE TOP OF THE ROOF UNLESS NOTED OTHERWISE.
4. REFER TO THE CONTRACT DOCUMENTS FOR DUCT MATERIAL AND INSULATION REQUIREMENTS.
5. THE STRAIGHT DUCT BEFORE THE FAN INLET SHALL BE A MINIMUM OF 3 DUCT DIAMETERS
6. FILL THE TRAP PRIOR TO START-UP. FOLLOW THE MFRS REQUIREMENTS FOR DEPTH OF TRAP BASED ON THE FAN STATIC PRESSURE. PROVIDE A CAP FOR THE TRAP IN A PLASTIC BAG THAT IS FASTENED TO THE TRAP.
7. SET STACK FLANGE AND VIBRATION ISOLATION BASES IN SILICONE CALKING.
8. ENCAPSULATE ALL STACK AND FAN FASTENERS IN SILICONE CALKING.
9. FLANGES AND GUSSETS ARE WELDED TO THE STACK.
10. EXIT CONE OUTLET SHALL BE CONSTRUCTED TO ACHIEVE A MINIMUM EXIT VELOCITY OF 3000 FPM
11. COORDINATE SCOPE OF WORK WITH ROOFING CONTRACTOR / OWNER TO NOT VOID ANY WARRANTEES

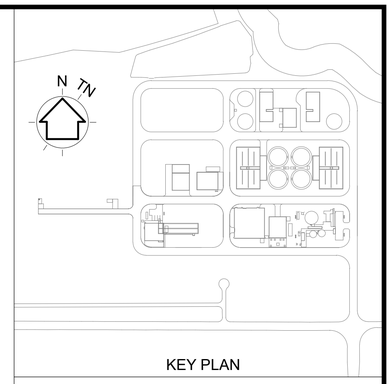
EXHAUST STACK AND FAN MOUNTING DETAIL

SCALE: N.T.S.



TYPICAL DUCT CONNECTION/ TRANSITION DETAIL

SCALE: N.T.S.



NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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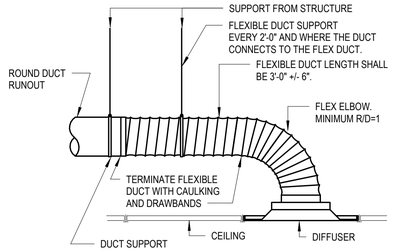
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR H.V.A.C. TYPICAL DETAILS

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-501
Date: 2022.07.26	
Project No.: 10449	

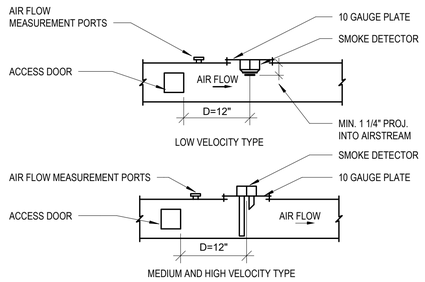


NOTES:

1. PROVIDE INSULATION TO DIFFUSER NECK ON SUPPLY DIFFUSERS.
2. PROVIDE FLEXIBLE DUCT SUPPORTS AT THE ELBOW TO KEEP SMOOTH THE ELBOW SHAPE.

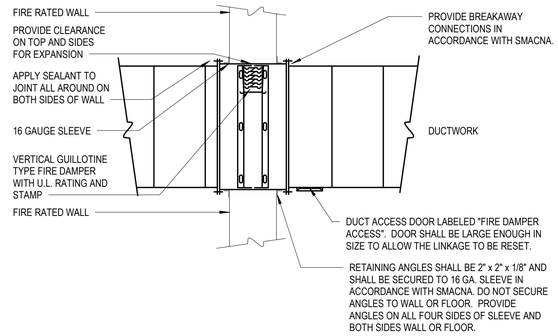
ROUND DIFFUSER TERMINATION DETAIL - FLEX ELBOW

SCALE: N.T.S.



SMOKE DETECTOR INSTALLATION IN DUCT DETAIL

SCALE: N.T.S.

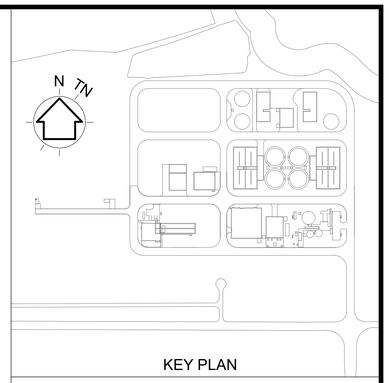


NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' WALL FIRE DAMPER DETAIL

SCALE: N.T.S.



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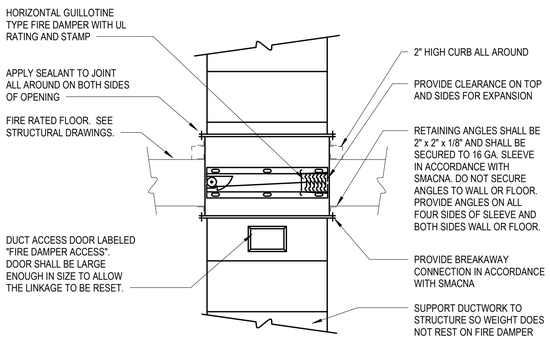

NOTES:

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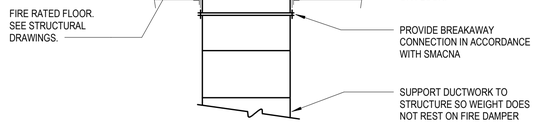
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' FLOOR FIRE DAMPER DETAIL

SCALE: N.T.S.



NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' ABOVE FLOOR FIRE DAMPER DETAIL

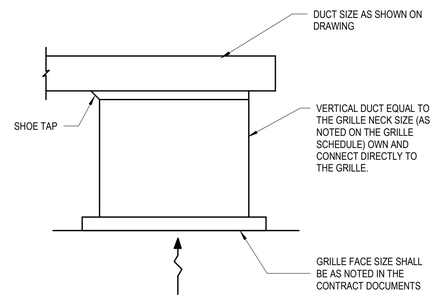
SCALE: N.T.S.

NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

SMOKE DAMPER DETAIL

SCALE: N.T.S.

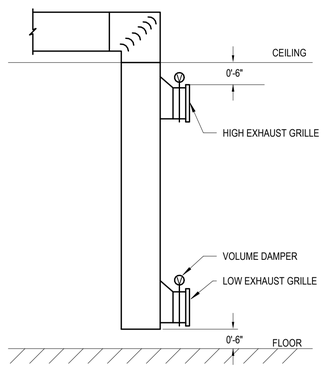


NOTES:

1. APPLIES TO ALL DUCTED RETURN AND EXHAUST GRILLES EXCEPT FOR WHEN THE CONTRACTOR ELECTS TO USE ANOTHER APPROVED DETAIL

RETURN/EXHAUST GRILLE DETAIL

SCALE: N.T.S.



HI/LOW EXHAUST

SCALE: N.T.S.

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B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
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MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR H.V.A.C. TYPICAL DETAILS

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-502
Date: 2022.07.26	
Project No.: 10449	

MAKEUP AIR UNIT SCHEDULE

UNIT IDENTIFICATION		FAN							HEATING SECTION										PHYSICAL CHARACTERISTICS				ELECTRICAL				
MARK	ROOM(S) SERVED	AIRFLOW (l/s)	ESP (Pa)	TSP (Pa)	SPEED (RPM)	BHP	HP	CONTROL	CAPACITY (kW)	EDB (°C)	LDB (°C)	MAX APD (Pa)	FUEL TYPE	PRESSURE RANGE (Pa)	FIRING RATE INPUT (KW)	FIRING RATE OUTPUT (KW)	BURNER CONTROL	MIN TURN DOWN	WEIGHT (kg)	HEIGHT (mm)	WIDTH (mm)	LENGTH (mm)	VOLTS	PHASE	MANUFACTURER	MODEL NUMBER	NOTES
ACC-AHU-2802	BLOWER ROOM	850	250.0	510.0	1,965	0.8	1	VFD	62.7	-36.7	24.4		NATURAL GAS	1740-3490	78.5	62.7	MODULATING	5:1	1,157	1,422	1,626	3,299	600	3	SOLUTION AIR	PMI-IF-11-300	1,2
ACC-AHU-2803	GALLERY	1,225	375.0	510.0	1,508	1.217	2	VFD	90.6	-36.7	24.4		NATURAL GAS	1740-3490	113.1	90.6	MODULATING	5:1	1,273	1,422	1,626	3,614	600	3	SOLUTION AIR	PMI-IF-11-400	1,2
ACC-AHU-2804	CHEMICAL ROOM	800	250.0	510.0	7,930	0.8	1	VFD	59.2	-36.7	24.4		NATURAL GAS	1740-3490	74.1	59.2	MODULATING	5:1	1,218	1,422	1,626	3,452	600	3	SOLUTION AIR	PMI-IF-11-400	1,2

NOTES:
1. COMPLETE WITH 2" MERV 8 PLEATED FILTERS
2. TOP DISCHARGE

ROOF TOP UNIT SCHEDULE - PART A

UNIT IDENTIFICATION			AIRFLOW						PHYSICAL CHARACTERISTICS	MAXIMUM UNIT DIMENSIONS			AIR BLENDER		FILTER			COMPONENTS							
																		INDIRECT GAS FIRED HEATING SECTION							
MARK	LOCATION	AREA SERVED	MAX SUPPLY AIR (l/s)	MIN SUPPLY AIR (l/s)	MAX RETURN AIR (l/s)	MIN RETURN AIR (l/s)	DESIGN OUTSIDE AIR (l/s)	MIN OUTSIDE AIR (l/s)	UNIT OPERATING WEIGHT (kg)	HEIGHT (mm)	WIDTH (mm)	LENGTH (mm)	QUANTITY OF BLENDERS	MAX APD (Pa)	FILTER TYPE	MERV RATING	MAX APD (Pa)	HEATING AIRFLOW (l/s)	EAT (°C)	LAT (°C)	INPUT RATING (KW)	OUTPUT RATING (KW)	NO OF STAGES	TURN DOWN RATIO	MAX APD (Pa)
ACC-AHU-2801	ROOF	ELEC. ROOM	1,416	1,416	944	944	472	472	955 +/-5% +72	1,529	2,195	3,066	0	-	PRE-FILTER	8	50.07	1,416	2.6	16.3	29.3	23.4	1	16:1	20.67

ROOF TOP UNIT SCHEDULE - PART B

UNIT IDENTIFICATION	COMPONENTS							CONDENSER SECTION				FANS					CAPACITY AND PERFORMANCE		ELECTRICAL				MOUNTING SUPPORT STYLE	MANUFACTURER	MODEL NUMBER	NOTES
	DX COOLING COIL							COMPRESSORS			FANS	SUPPLY														
MARK	TOTAL CAPACITY (kW)	SENSIBLE CAPACITY (kW)	EDB (°C)	EWB (°C)	LDB (°C)	LWB (°C)	MAX APD (Pa)	NO. OF COMP.	NO. OF STAGES	TYPE OF COMP.	NO. OF FANS	ESP (Pa)	TSP (Pa)	BHP	HP	SPEED (RPM)	NOMINAL CAPACITY (kW)	REFRIG TYPE	VOLTS	PHASE	MCA	MOP				
ACC-AHU-2801	23.0	20.4	26.5	19.0	14.7	14.5	588.60	1	1	INVERTER SCROLL	1	186.8	588.6	1.5	2	1,724	23.0	R-410A	600	3	13.0	20	CURB	GREENHECK	RV-25-5I-C-A1	1,2,3,4,5

NOTES:
1. FILTERS ARE TO BE PROVIDED WITH PRE-FILTER. MAXIMUM PRESSURE DROP SHALL BE BASED ON TOTAL PRESSURE DROP ACROSS THE FILTER BANK WITH DIRTY FILTERS.
2. PROVIDE STAINLESS STEEL GAS HEAT EXCHANGER.
3. PROVIDE FULLY MODULATING GAS VALVE.
4. PROVIDE VARIABLE CAPACITY COMPRESSOR ON LEAD CIRCUIT.
5. WEIGHT SHOWN IS UNIT PLUS ROOF CURB

FAN SCHEDULE

UNIT IDENTIFICATION		MAX AIRFLOW (l/s)	MIN AIRFLOW (l/s)	ESP (Pa)	CONTROL	FAN WHEEL					FAN MOTOR				ELECTRICAL		OPERATING WEIGHT (kg)	MANUFACTURER	MODEL NUMBER	NOTES
MARK	UNIT/AREA SERVED					TYPE	FAN CLASS	ARRANGEMENT	SPEED (RPM)	MIN WHEEL DIA (mm)	BHP	HP	SPEED (RPM)	DRIVE TYPE	VOLTS	PHASE				
ACC-FN-2801	BLOWER ROOM	897	897	373.6	VFD	BI	I	10	1,559		1.1	1.5	1,725	STANDARD	600	3	175	GREENHECK	FJC-315-BI	1, 2, 3, 4
ACC-FN-2802	GALLERY	1,180	1,180	498.2	VFD	BI	I	10	1,602		1.5	2	1,725	STANDARD	600	3	150	GREENHECK	USF-16	2, 3, 4
ACC-FN-2803	CHEMICAL ROOM	802	802	747.3	VFD	BI	I	10	1,319		1.5	2	1,725	STANDARD	600	3	116	GREENHECK	USF-13	2, 3, 4

NOTES:
1: PROVIDE CURB CAP INLET BOX MODEL GPFHL.
2: STAINLESS STEEL SHAFT.
3: NEMA PREMIUM EFFICIENT MOTOR - NEMA TABLE 12-12.
4: COATED WITH HI-PRO POLYESTER, CONCRETE GRAY-RAL 7023, FAN AND ATTACHED ACCESSORIES.

GRILLE, REGISTER, DIFFUSER SCHEDULE

UNIT...							
MARK	FLOW RANGE (l/s)	DIFFUSER NECK SIZE (mm)	MOUNTING TYPE	MATERIAL	MANUFACTURER	MODEL NUMBER	NOTES
S1				STAINLESS STEEL	E. H.PRICE	720D/F/L/A	1,2,3,4
S2				STAINLESS STEEL	E. H.PRICE	LBPH15B/1000/A/66	1,2,3,4
R1				STAINLESS STEEL	E. H.PRICE	730D/F/L/A	1,3,4
R2				STAINLESS STEEL	E. H.PRICE	730D/F/L/A	1,3,4
E1				STAINLESS STEEL	E. H.PRICE	710Z/F/L/A	1,3,4

NOTES:
1. REFER TO REFLECTED CEILING PLANS EXACT LOCATION. PROVIDE ALL FRAMES AND ACCESSORIES AS REQUIRED FOR PROPER INSTALLATION.
2. FLEXIBLE DUCTWORK SHALL BE THE SAME SIZE AS THE DIFFUSER NECK OR AN EQUIVALENT ROUND DUCT. FLEXIBLE DUCTWORK SHALL BE SUPPORTED TO PREVENT KINKS OR BENDS.
3. COLOR TO BE SELECTED BY ARCHITECT FROM STANDARD COLORS.
4. REFER TO PLAN FOR SIZE.

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
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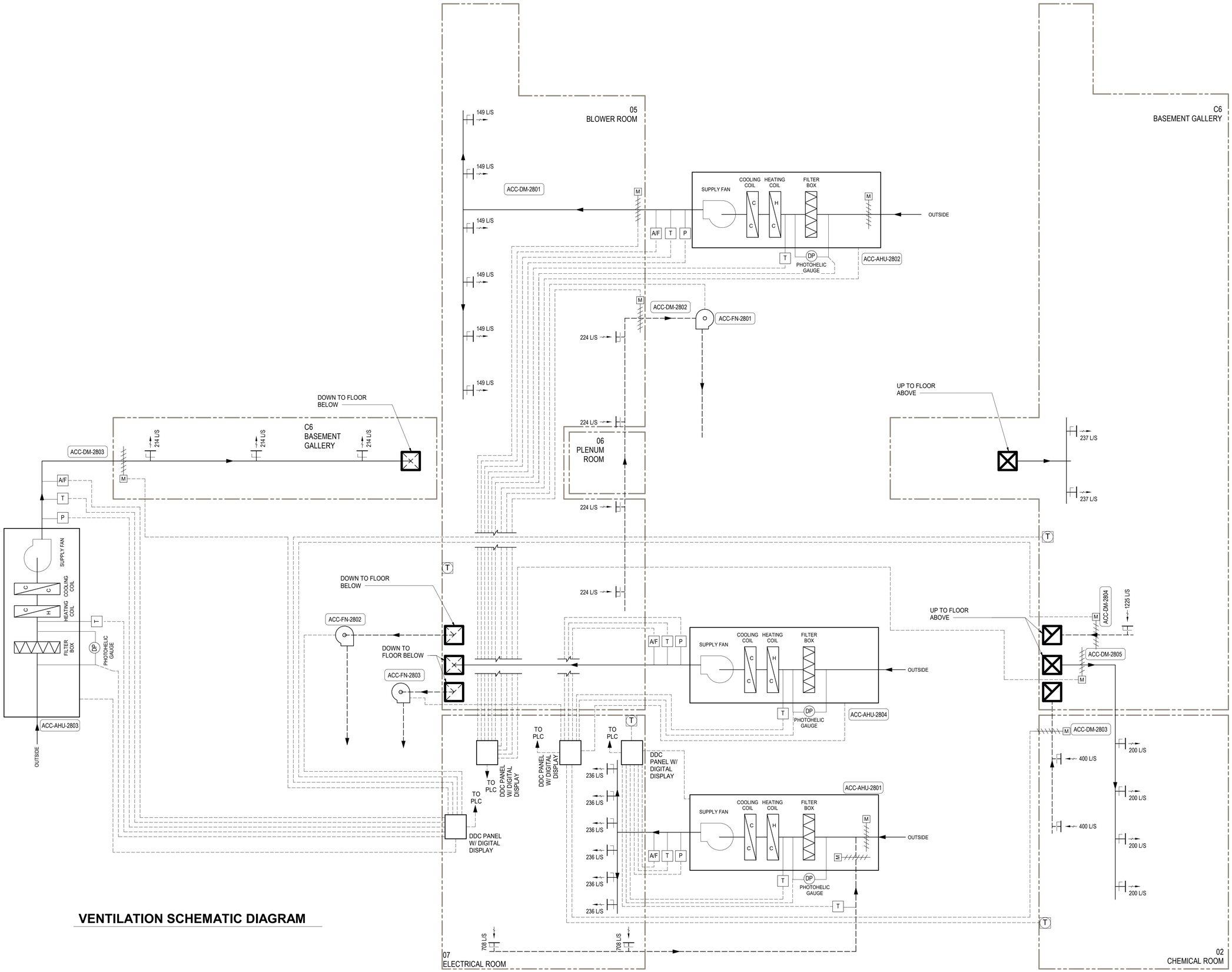
MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR H.V.A.C. SCHEDULES

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-601
Date: 2022.07.26	
Project No.: 10449	



VENTILATION SCHEMATIC DIAGRAM

KEY PLAN

NOTES:

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MIDHURST WASTEWATER TREATMENT PLANT - PH1 SEC BIOREACTOR H.V.A.C. SCHEMATICS

HVAC

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	Drawing No. H-SEC-602
Checked By: BILL DeGAGNE	
Date: 2022.07.26	
Project No.: 10449	

CADD FILE LOCATION: Autodesk Docs://10449 MWWTP (R2022)/09 SEC-09 HVAC.rvt

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PART 1 EXECUTION

1.1 General

1.5 Secondary Air Handling Units

1.5.1 ACC-AHU-2801: Packaged Heat-A/C Unit

.1 The packaged air handler unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Electrical Room**

.2 The unit will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 The packaged air handler shall shut down upon detection of smoke in the airstream.

.4 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.5 When the differential pressure across the filter gets above 62 Pa (adjustable setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.6 The packaged air handler shall control outside air and return air dampers with a built-in controller to provide additional outside air as follows:

.1 In standard operating mode, minimum outside air is provided with the outside air intake damper at minimum position (10% outside air – adjustable) and return damper shall be set match the supply air.

.2 Whenever outside air temperature is suitable for economizer cooling, the internal controller will modulate the outside air damper open based on maintaining the internal temperature setpoint and modulate the return damper towards the closed position.

.3 Points List:

1.5.1.6.3.1 Monitor:

.1 ACC-AHU-2801 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature

1.5.1.6.3.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 ACC-AHU-2803 failure
.3 ACC-FN-2802 failure
.4 Supply Temperature below setpoint allowance
.5 Supply Temperature above setpoint allowance
.6 Room temperature outside acceptable range (14C to 30C, adjustable)
.7 Room Pressure relative to adjacent space

.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 ACC-AHU-2803 failure
.3 ACC-FN-2802 failure
.4 Supply Temperature below setpoint allowance
.5 Supply Temperature above setpoint allowance
.6 Room temperature outside acceptable range (14C to 30C, adjustable)

.3 Alarm/Monitor to SCADA HMI:

.1 ACC-AHU-2803 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.5.4 ACC-AHU-2804 Packaged Heat-A/C Makeup Air Unit / ACC-FN-2803 Exhaust Fan

.1 The packaged air handler unit and exhaust fan will provide space heating/cooling and ventilation air to the following spaces:

.1 **Chemical Room**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.4 When the differential pressure across the filter gets above 62 Pa (setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.5 The packaged air handler shall control outside air damper with a built-in controller.

.6 The exhaust fan shall be interlocked with the MAU.

.7 Damper ACC-DM-2805 is interlocked with exhaust fan ACC-FN-2803. The damper shall have a limit switch that shall engage when open before operation of the exhaust fan.

.8 The exhaust fan shall operate at a higher flow rate than the MAU to ensure the room is at a minimum negative pressure, at least 12 Pa to the adjacent space.

.9 Points List:

.1 Monitor:

.1 ACC-AHU-2804 status
.2 ACC-FN-2803 status
.3 Supply Air Temperature
.4 Supply Air Pressure
.5 Supply Air Flow
.6 Space Temperature
.7 Room Pressure relative to adjacent space

.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 ACC-AHU-2804 failure
.3 ACC-FN-2803 failure
.4 Supply Temperature below setpoint allowance
.5 Supply Temperature above setpoint allowance
.6 Room pressure less than 12 Pa difference to the adjacent space for more than 5 minutes (time adjustable)
.7 Room temperature outside acceptable range (14C to 30C, adjustable)

.3 Alarm/Monitor to SCADA HMI:

.1 ACC-AHU-2804 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.5.2 ACC-AHU-2802 Packaged Heat-A/C Makeup Air Unit / ACC-FN-2801 Exhaust Fan

.1 The packaged air handler unit and exhaust fan will provide space heating/cooling and ventilation air to the following spaces:

.1 **Blower Room**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.4 When the differential pressure across the filter gets above 62 Pa (setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.5 The packaged air handler shall control outside air damper with a built-in controller.

.6 The exhaust fan shall be interlocked with the MAU.

.7 Supply air for the blowers will alternate being drawn from the Blower Room and outside through the Plenum Room. The Plenum Room dampers shall operate as follows:

.1 During Winter, the Plenum Room outside air damper will close and the exhaust fan will reduce its speed by the amount of the blower air flow. Confirm the blower air flow from the manufacturer submittal.

.2 During Summer, the Plenum Room outside air damper will open fully and the exhaust fan shall operate at the default airflow (to match the MAU).

.8 Points List:

.1 Monitor:

.1 ACC-AHU-2802 status
.2 ACC-FN-2801 status
.3 Supply Air Temperature
.4 Supply Air Pressure
.5 Supply Air Flow
.6 Space Temperature
.7 Room Pressure relative to adjacent space

.2 AHU failure
.3 Supply Temperature below setpoint allowance
.4 Supply Temperature above setpoint allowance
.5 Room temperature outside acceptable range (14°C to 30°C, adjustable)

1.5.1.6.3.3 Alarm/Monitor signal to SCADA HMI:

.1 ACC-AHU-2801 operational status
.2 Filter clogged
.3 AHU Alarm (Any of the alarm points to be investigated)

1.5.2 ACC-AHU-2802 Packaged Heat-A/C Makeup Air Unit / ACC-FN-2801 Exhaust Fan

.1 The packaged air handler unit and exhaust fan will provide space heating/cooling and ventilation air to the following spaces:

.1 **Blower Room**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.4 When the differential pressure across the filter gets above 62 Pa (setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.5 The packaged air handler shall control outside air damper with a built-in controller.

.6 The exhaust fan shall be interlocked with the MAU.

.7 Supply air for the blowers will alternate being drawn from the Blower Room and outside through the Plenum Room. The Plenum Room dampers shall operate as follows:

.1 During Winter, the Plenum Room outside air damper will close and the exhaust fan will reduce its speed by the amount of the blower air flow. Confirm the blower air flow from the manufacturer submittal.

.2 During Summer, the Plenum Room outside air damper will open fully and the exhaust fan shall operate at the default airflow (to match the MAU).

.8 Points List:

.1 Monitor:

.1 ACC-AHU-2802 status
.2 ACC-FN-2801 status
.3 Supply Air Temperature
.4 Supply Air Pressure
.5 Supply Air Flow
.6 Space Temperature
.7 Room Pressure relative to adjacent space

.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 ACC-AHU-2802 failure
.3 ACC-FN-2801 failure
.4 Supply Temperature below setpoint allowance
.5 Supply Temperature above setpoint allowance
.6 Room pressure difference above 6 Pa to adjacent space for more than 5 minutes (time adjustable)
.7 Room temperature outside acceptable range (14C to 30C, adjustable)

.3 Alarm/Monitor to SCADA HMI:

.1 ACC-AHU-2802 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.5.3 ACC-AHU-2803 Packaged Heat-A/C Makeup Air Unit / ACC-FN-2802 Exhaust Fan

.1 The packaged air handler unit and exhaust fan will provide space heating/cooling and ventilation air to the following spaces:

.1 **Basement Gallery**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.4 When the differential pressure across the filter gets above 62 Pa (setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.5 The packaged air handler shall control outside air damper with a built-in controller.

.6 The exhaust fan shall be interlocked with the MAU.

.7 Damper ACC-DM-2804 is interlocked with exhaust fan ACC-FN-2802. The damper shall have a limit switch that shall engage when open before operation of the exhaust fan.

.8 Points List:

.1 Monitor:

.1 ACC-AHU-2803 status
.2 ACC-FN-2802 status
.3 Supply Air Temperature
.4 Supply Air Pressure
.5 Supply Air Flow
.6 Space Temperature

KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

PRELIMINARY NOT FOR CONSTRUCTION

Not for permits, pricing or other official purposes. This document has not been completed or checked and is for general information or comment only.

Approver P. Eng.
Approved By

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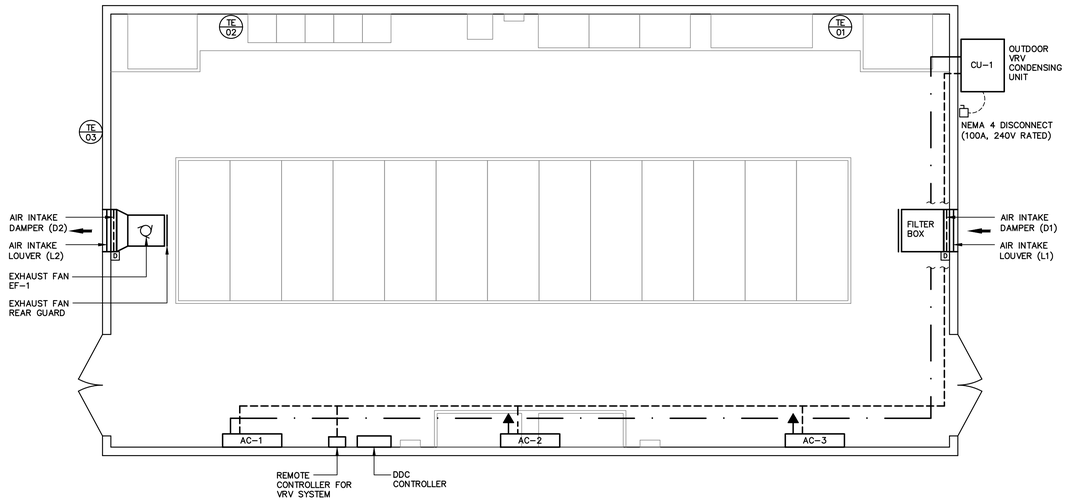
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
SEC
BIOREACTOR
SEQUENCE OF OPERATION

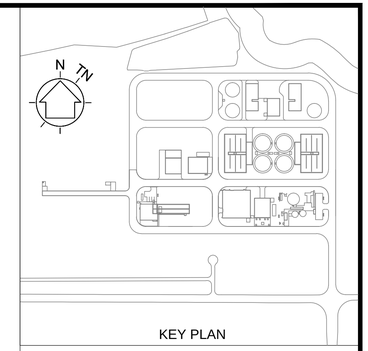
SPECIFICATION

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-SEC-603
Date: 2022.07.26	
Project No.: 10449	



HVAC SYSTEM LAYOUT – SUBSTATION BUILDING

SCALE 1:50



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST
WASTEWATER TREAMENT PLANT - PH1
SUBSTATION
MAIN BUILDING
HVAC SYSTEM LAYOUT

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-SUB-101
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-SUB-101.DWG

FAN SCHEDULE

REF	LOCATION	SPECIFICATION	POWER	VOLTAGE	COMMENTS
EF-1	SUBSTATION BLDG	COOK SQUARE INLINE FAN MODEL SQI-B-150, 2000 CFM @ 0.5" SP, 1201 RPM, BELT DRIVEN OPTIONS: .1 EPOXY COATED .2 BELT GUARD .3 MOTOR GUARD .4 INVERTER DUTY RATED MOTOR	0.75 HP	600V, 3ø, 60Hz	

LOUVER/DAMPER SCHEDULE

LOCATION	SYSTEM	LOUVER					DAMPER					WALL OPENING		COMMENTS
		REF.	TYPE	W(mm)	H(mm)	D(mm)	REF.	TYPE	W(mm)	H(mm)	D(mm)	W(mm)	H(mm)	
SUBSTATION BLDG	AIR INTAKE SYSTEM	L1	B	750	750	150	D1	A	750	750	100	750	750	
SUBSTATION BLDG	EXHAUST AIR SYSTEM	L2	B	750	750	150	D2	A	750	750	100	750	750	

ELECTRICAL ROOM CEILING MOUNTED SPLIT SYSTEM

TAG	DESCRIPTION	
AC-1 AC-2 AC-3	TYPE	WALL MOUNTED
	COOLING CAPACITY (BTU/HR)	24,000
	POWER SUPPLY	208-230V/60Hz/1ø
	MCA	0.6
	LIQUID CONNECTION	3/8"
	GAS CONNECTION	5/8"
	AIR FLOW (H/L)	635/470 CFM
	SOUND (H/L)	47/41 DBA
	WEIGHT	31 LBS
	REMOTE CONTROL	ONE

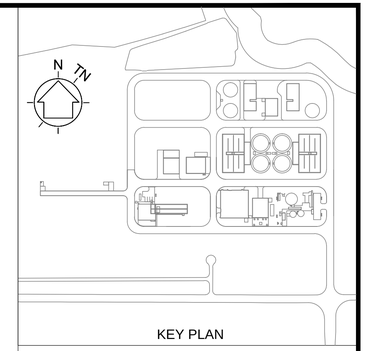
VRV HEAT PUMP

TAG	DESCRIPTION	
CU-1	TYPE	OUTDOOR
	RATED COOLING	69,000 BTU/HR
	POWER SUPPLY	208-230V/60Hz/3ø
	MCA	27.6 AMPS
	LIQUID CONNECTION	3/8"
	GAS PIPE CONNECTION	3/4"
	SOUND	58 DBA

LEGEND

DAMPER TYPE 'A' — TAMCO SERIES 9000, PARALLEL BLADE, ALUMINUM CONSTRUCTION, BLADE SEALS, JAMB SEALS & 25 mm POLYURETHANE INSULATION ON BLADES OR EQUAL.

LOUVER TYPE 'B' — PENN VENTILATOR TYPE, MODEL M68 ALUMINUM CONSTRUCTION



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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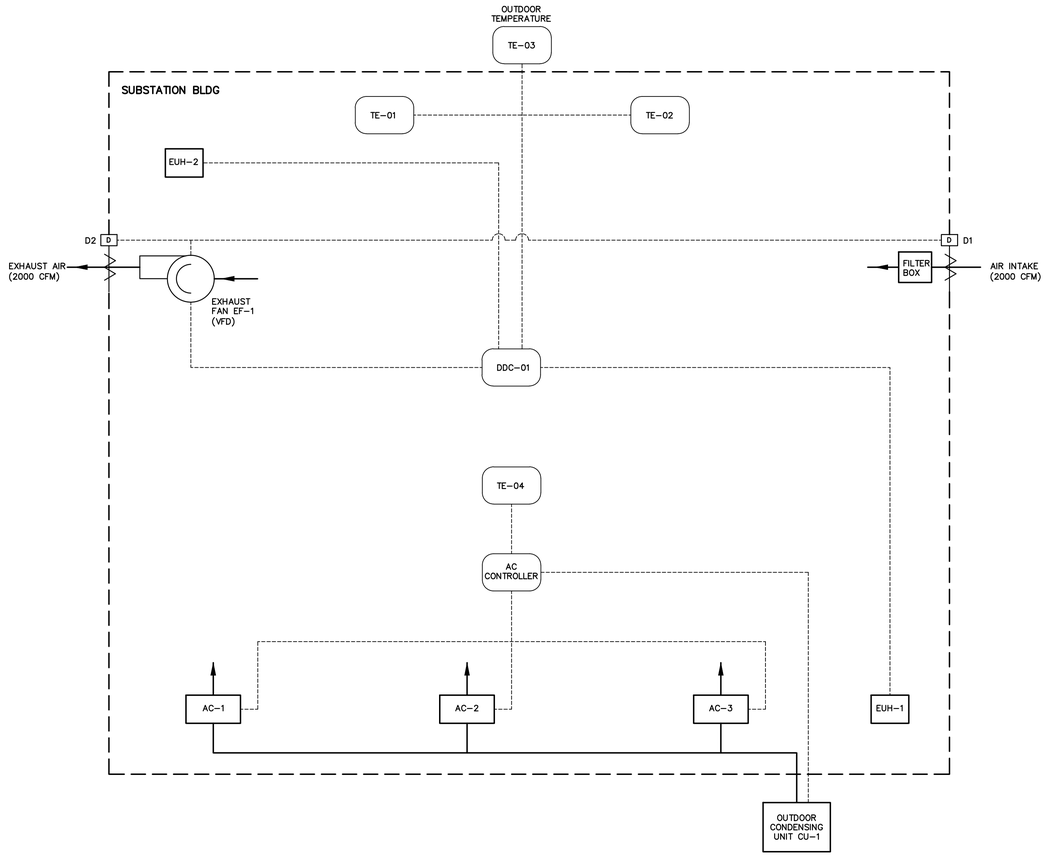
MIDHURST
WASTEWATER TREAMENT PLANT - PH1
SUBSTATION
MAIN BUILDING
HVAC SYSTEM SCHEDULES

HVAC

Scale: As Shown
Drawn By: J.Z.
Designed By: A.T.
Checked By: A.T.
Date: 2022-03-28
Project No.:

Contract No.

Drawing No.
H-SUB-601

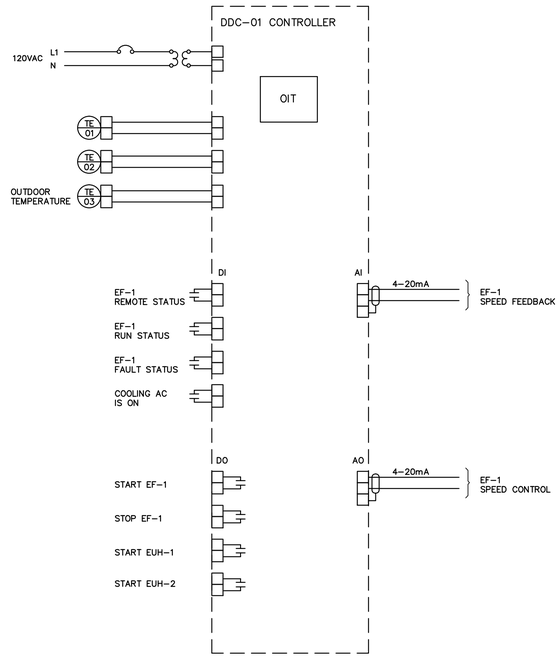


HVAC SCHEMATIC – SUBSTATION BLDG

N.T.S.

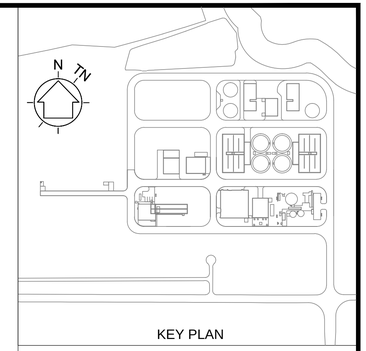
SEQUENCE OF OPERATION:

1. EXHAUST FAN EF-1 SHALL BE OPERATIONAL FROM 60% TO 100% SPEED TO MITIGATE ROOM TEMPERATURE RISE WHEN OUTDOOR TEMPERATURE IS BELOW 27°C. SET POINT: 25°C
2. WHEN OUTDOOR TEMPERATURE IS ABOVE 27°C THE AIR CONDITIONING SYSTEM SHALL BE USED TO MITIGATE ROOM TEMPERATURE RISE. SET POINT: 25°C



DDC CONTROLLER SCHEMATIC

N.T.S.



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

P. Eng.

Approved By

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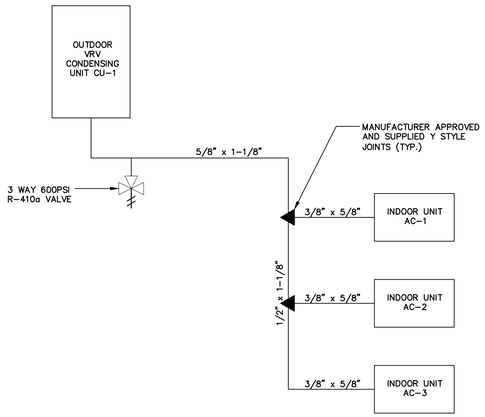
MIDHURST
WASTEWATER TREAMENT PLANT - PH1
SUBSTATION
MAIN BUILDING
HVAC SYSTEM SCHEMATIC 1

HVAC

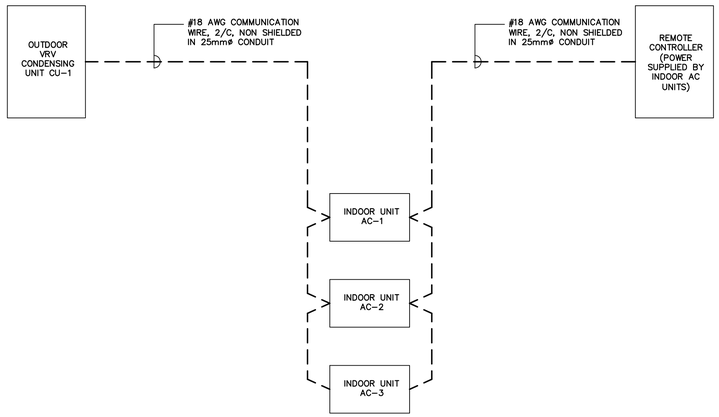
Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-SUB-602
Project No.:	

CAD File LOCATION: Z:\PUBLIC\VA-DWG\2021\22120-MIDHURST\22120-H-SUB-602.DWG



VRV SYSTEM PIPING SCHEMATIC (TYP.)

N.T.S.

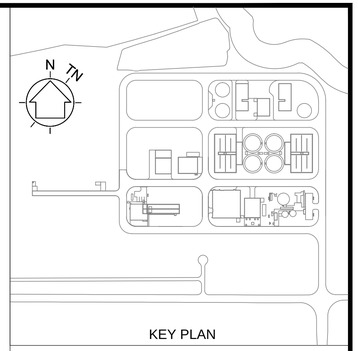


VRV SYSTEM COMMUNICATION WIRING (TYP.)

N.T.S.

NOTES:

1. THE 600 PSI PRESSURE RELIEF VALVE TO BE INSTALLED IN PARALLEL WITH SECONDARY PRESSURE RELIEF VALVES. TO BE APPLICABLE FOR LIQUID AND SUCTION LINES.
2. ALL PIPING TO BE TSSA REFRIGERANT PIPING CERTIFICATE B31.5, ASTM B280 ACR
   - UP TO AND INCLUDING 5/8" NOMINAL DIAMETER SHALL BE TYPE L.
   - ABOVE 5/8" NOMINAL DIAMETER SHALL BE TYPE K.
3. ALL SYSTEMS SHALL DISPLAY ODP (OZONE DEPLETION PREVENTION) TAGS PRIOR TO COMMISSIONING.
4. INSULATION:
   - FOR INDOOR PIPING: 1/2" ARMAFLEX
   - FOR OUTDOOR PIPING: 3/4" ARMAFLEX
5. EXPOSED OUTDOOR INSULATION SHALL BE PROTECTED BY ALUMINUM SHEET METAL COVER.
6. ALL PIPE SIZES ARE ESTIMATES. CONTRACTOR TO CONTACT THE VRV MANUFACTURER TO CONFIRM ACTUAL PIPE SIZING.
7. PROVIDE AS MANY BRACKETS AS REQUIRED FOR CEILING SUPPORT OF INDOOR AC UNITS. SUPPORT USING STAINLESS STEEL THREADED RODS SECURED TO CEILING.



KEY PLAN

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST
WASTEWATER TREAMENT PLANT - PH1
SUBSTATION
MAIN BUILDING
HVAC SYSTEM SCHEMATIC 2

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-SUB-603
Project No.:	

CAD File LOCATION: Z:\PUBLIC\CA-DWG\2021\22120-MIDHURST\22120-H-SUB-603.DWG

VENTILATION (HVAC)

→	AIR FLOW ARROW
18"x12" 18"x12"	RECTANGULAR DUCT AND SIZE*
18"ø 18"ø	ROUND DUCT AND SIZE*
18"x12"ø 18"x12"ø	FLAT OVAL DUCT AND SIZE*
18"x12"	EXTERIOR DUCT TREATMENT*
18"x12" 18"x12"	RECTANGULAR DUCT WITH ACOUSTIC LINING*
30"x12"	DUCT SECTION, SUPPLY AIR. SIZE* IS HORIZONTAL DIM. x VERTICAL DIM. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL
	DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL
	FLEXIBLE DUCT
	ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, OUTSIDE AIR DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, RETURN DOWN. APPLIES TO RECT., ROUND AND OVAL
	ELBOW TURN, EXHAUST DOWN. APPLIES TO RECT., ROUND AND OVAL
UP	CHANGE IN DUCT ELEVATION RISING IN DIRECTION INDICATED
DN	CHANGE IN DUCT ELEVATION DROPPING IN DIRECTION INDICATED
	END CAP
	ELBOW, RECTANGULAR, SMOOTH RADIUS WITH SPLITTER VANES (0.25 R/W DEFAULT)
	ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT)
	ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT)
	MITERED ELBOW, RECTANGULAR, WITH TURNING VANES
	RECTANGULAR TO ROUND TRANSITION
AD AD AD	DUCT ACCESS DOOR (TOP, SIDE, BOTTOM)
FC	FLEXIBLE CONNECTION
	BACKDRAFT DAMPER
BDD	MANUAL DAMPER
M	MOTORIZED DAMPER
	FIRE DAMPER
	SMOKE DAMPER
	SMOKE AND FIRE DAMPER
	DUCT SILENCER
X	CONTROL DEVICE (REFER TO CONTROLS LEGEND)
	AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND)
QUANTITY - TYPE - SIZE (IN.) - VOLUME (CFM)	AIR OUTLET OR INLET TAG (REFER TO SCHEDULE)
	RECTANGULAR DIFFUSER, SUPPLY. OPTIONAL ARROWS SHOW THE FLOW DIRECTION.
	RECTANGULAR REGISTER OR GRILLE, RETURN
	RECTANGULAR REGISTER OR GRILLE, EXHAUST
	ROUND DIFFUSER, SUPPLY
	LINEAR DIFFUSER
	SIDEWALL REGISTER OR GRILLE, SUPPLY
	SIDEWALL GRILLE, RETURN OR EXHAUST
UC	UNDERCUT DOOR
	DOOR GRILLE OR LOUVER
	TRANSFER GRILLE OR LOUVER
	COIL (REFER TO CONTROLS LEGEND)
ID-#	EQUIPMENT TAG
QUANTITY - TYPE - LENGTH (FT) - CAPACITY (MBH)	RADIATION HEATING TAG (REFER TO SCHEDULE)

* NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS (ALWAYS WIDTH X HEIGHT IN FLOOR PLAN AND SECTION)

CONTROLS

PG	AIR PRESSURE GAGE
S	AIR SAMPLING POINT
CO2	CARBON DIOXIDE SENSOR
CO	CARBON MONOXIDE SENSOR
CG	COMBUSTIBLE GAS SENSOR
CT	CURRENT SENSOR
CT	CURRENT TRANSMITTER WITH LEAD
D	DEWPOINT SENSOR
DPS	DIFFERENTIAL PRESSURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FM	FLOW METER
FS	FLOW SWITCH
FT	FLOW TRANSMITTER
FZ	FREEZE STAT
HOA	HAND SWITCH
H	HUMIDITY SENSOR
LC	LEVEL CONTROL
LS	LIMIT SWITCH
LPI	LOOP POWERED INDICATOR
Nox	NITROGEN OXIDE SENSOR
O	OCCUPANCY SENSOR
O2	OXYGEN SENSOR
PI	POSITION INDICATOR
PS	PRESSURE SENSOR
R	REFRIGERANT SENSOR
RH	RELATIVE HUMIDITY SENSOR
R	RELAY
H	ROOM HUMIDITY SENSOR
SP	STATIC PRESSURE SENSOR
TS	TEMPERATURE SENSOR
T	THERMOSTAT
TVO	TOTAL VOLATILE ORGANIC COMPOUND SENSOR
VIB	VIBRATION SENSOR
AFS	AIR FLOW SWITCH
I / P	CURRENT TO PRESSURE
E / P	ELECTRIC / PNEUMATIC
SCR	SILICON CONTROLLED RECTIFIER
TCP	TEMPERATURE CONTROL PANEL
TEC	TERMINAL EQUIPMENT CONTROLLER
	SENSOR WELL
	ALARM HORN
	ALARM BEACON
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
STR	STARTER
VFD	VARIABLE FREQUENCY DRIVE
	NON MOTORIZED VALVE
M	TWO WAY MOTORIZED VALVE
M	THREE WAY MOTORIZED VALVE
XX	TWO WAY SOLENOID VALVE

CONTROLS

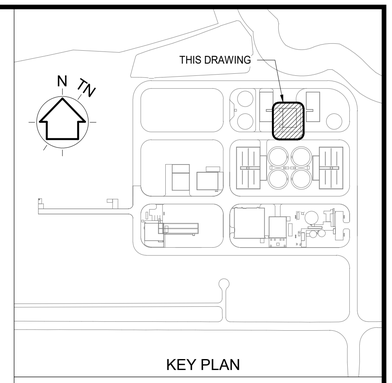
NC O	THREE WAY SOLENOID VALVE
NC XX	TWO WAY PNEUMATIC VALVE
NC O	THREE WAY PNEUMATIC VALVE
	PUMP
	MOTOR
S	DUCT SMOKE DETECTOR
H	DUCT SMOKE DETECTOR
	AIR VALVE
H C	UNITARY HEATING COIL
C C	UNITARY COOLING COIL
H R	UNITARY HEAT RECOVERY COIL
	FILTER
	AIR BLENDER
	ENERGY WHEEL
	PLATE ENERGY RECOVERY COIL
	AIR FLOW MEASURING STATION
	AIR FLOW PROBE
	BACKDRAFT DAMPER
	MOTORIZED DAMPER - PARALLEL BLADE
	MOTORIZED DAMPER - OPPOSED BLADE
NC	DAMPER ACTUATOR - ELECTRIC
NC	DAMPER ACTUATOR - ELECTRIC
	CENTRIFUGAL FAN
	PROP FAN
	PLENUM FAN
	HUMIDIFIER
ENERGY CORE + -	ENERGY CORE
	ETHERNET CONNECTION
	CONTACT
DDC_XXX	DDC PANEL
	COMPUTER

VENTILATION GENERAL NOTES

1. DO NOT SCALE DRAWING.
2. PROVIDE COMPLETE HVAC SYSTEM TO SERVE ALL SPACES AS NOTED ON THE DRAWING IN ACCORDANCE WITH NATIONAL BUILDING CODE AS WELL AS ANY REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
3. LOCATION OF DIFFUSERS AND GRILLES SHOWN ON DRAWING ARE APPROXIMATE ONLY. COORDINATE WITH ELECTRICAL LIGHTING LAYOUT AND ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATIONS.
4. CONTRACTOR SHALL CONFIRM AND COORDINATE THE LOCATION AND ROUTE OF ALL EQUIPMENT, PIPING, AND DUCTWORK ON SITE AND WITH OTHER TRADES.
5. ALL DIFFUSERS AND GRILLES SHALL HAVE UPSTREAM BALANCING DAMPERS.
6. PROVIDE TURNING VANES IN EACH RECTANGULAR ELBOW. ALL DUCT TAKE-OFFS TO HAVE ENLARGED THROATS WITH LEADING EDGES.
7. FIRE DAMPERS AND/OR SMOKE DAMPERS SHALL BE INSTALLED ON ALL DUCTWORK PENETRATING FIRE SEPARATION AND/OR SMOKE SEPARATION FLOOR, SLABS AND WALLS. REFER TO ARCHITECTURAL LIFE SAFETY PLAN FOR ALL FIRE/SMOKE SEPARATIONS.
8. COORDINATE THERMOSTAT LOCATIONS WITH FURNITURE, ETC.
9. VARIATIONS FROM SPECIFIED PRODUCTS AND ASSOCIATED WORK REQUIREMENTS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ADDITIONAL COMPENSATION WILL NOT BE CONSIDERED BECAUSE OF DIFFERENCES IN INTERPRETATION OF TECHNICAL PROVISIONS.
10. CONTRACTOR WILL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGING NEW EQUIPMENT PIPING AND DUCTWORK OVER THE COURSE OF CONSTRUCTION.
11. CONTRACTOR TO PROVIDE DUCTING SUPPORTS.
12. COORDINATE WITH GC ALL REQUIRED ACCESS HATCH/PANELS FOR MECHANICAL EQUIPMENT CONCEALED ABOVE INACCESSIBLE CEILINGS AND WITHIN WALLS. MAKE EFFORT TO LOCATE AND COORDINATE DEVICES REQUIRING ACCESS TO BE IN GROUPED AREAS TO REDUCE THE NUMBER OF ACCESS DOORS REQUIRED. ACCESS DOORS TO BE LOCATED WITH CONSIDERATION ON AND IN ALIGNMENT WITH ARCHITECTURAL DETAILS AND OTHER CEILING/WALL MOUNTED DEVICES TO THE SATISFACTION OF THE ARCHITECT.
13. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND CAPACITIES OF ELECTRIC FORCE FLOW UNITS, BASEBOARDS, AND UNIT HEATERS.
14. REFER TO THE ELECTRICAL DRAWINGS FOR AVAILABLE SPACE FOR MOUNTING CONTROL CABINETS. WHERE WALL SPACE IS NOT AVAILABLE THE USE OF GALVANIZED UNISTRUT IS PERMITTED. TREAT ALL EXPOSED CUT ENDS.

THICKENER HVAC SHEET LIST

Drawing No.	Sheet Name
G-GEN-001	LEGEND AND SYMBOLS
H-TCK-101	BASEMENT FL. PLAN - H.V.A.C. LAYOUT
H-TCK-102	MAIN FLOOR PLAN - H.V.A.C. LAYOUT
H-TCK-301	SECTIONS & DETAILS
H-TCK-302	SECTIONS & DETAILS
H-TCK-401	ENLARGED FLOOR PLAN
H-TCK-501	TYPICAL DETAILS
H-TCK-502	TYPICAL DETAILS
H-TCK-601	SCHEDULES
H-TCK-602	AIR FLOW DIAGRAM
H-TCK-603	SEQUENCE OF OPERATION



KEY PLAN

NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

PRELIMINARY NOT FOR CONSTRUCTION

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Approved By

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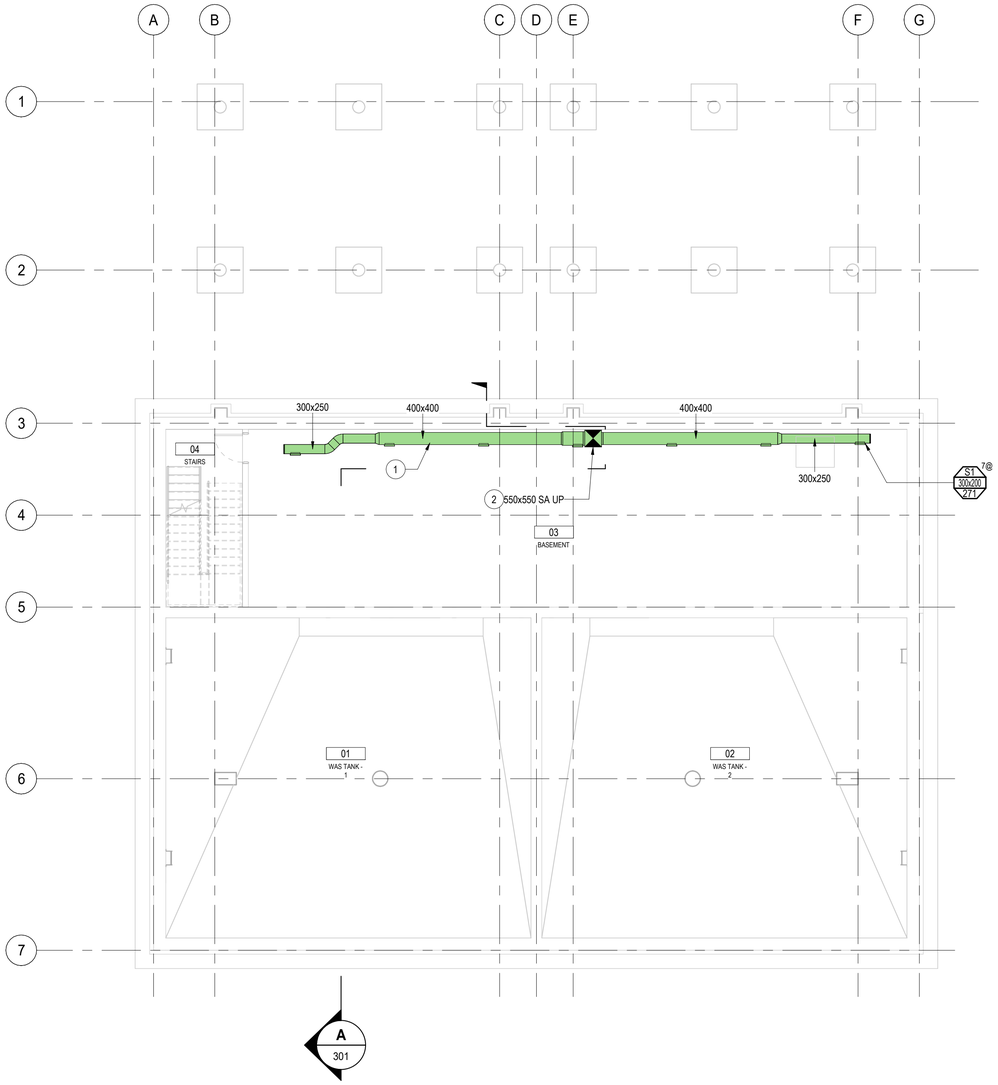
MIDHURST WASTEWATER TREATMENT PLANT - PH1 BIO THICKENER BUILDING LEGEND AND SYMBOLS

GENERAL

Scale:	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. G-GEN-001
Date: 2022.09.14	
Project No.: 10449	



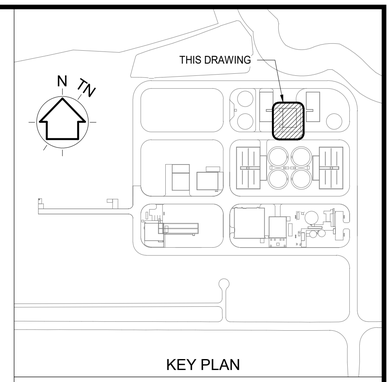
BASEMENT FLOOR PLAN - H.V.A.C LAYOUT

SCALE: 1 : 100

KEYNOTES

1 SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.

2 FOR CONTINUATION OF DUCTWORK REFER TO THE FLOOR ABOVE.



KEY PLAN

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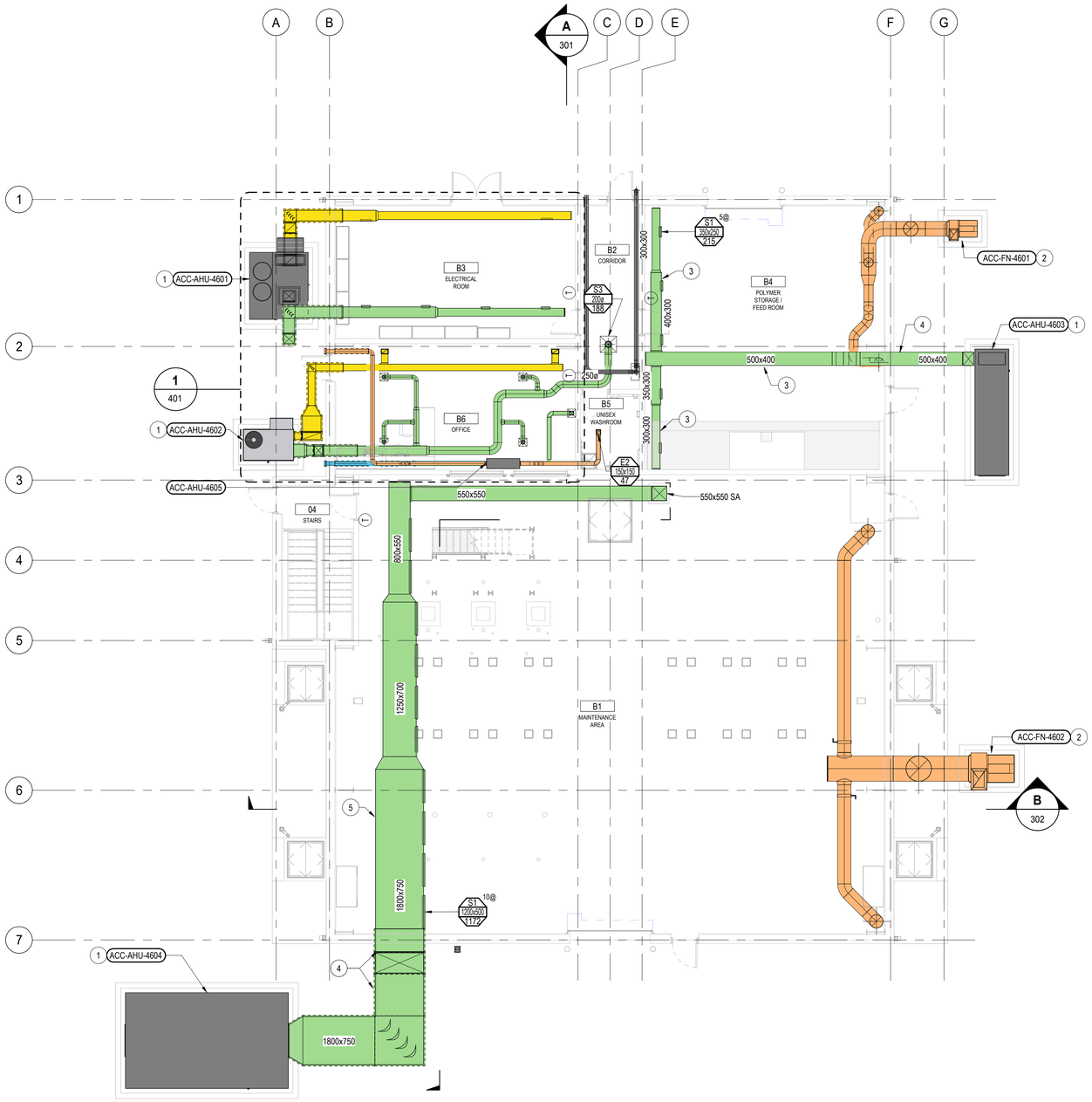
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
BASEMENT FL. PLAN - H.V.A.C. LAYOUT

H.V.A.C.

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-101
Date: 2022.09.14	
Project No.: 10449	

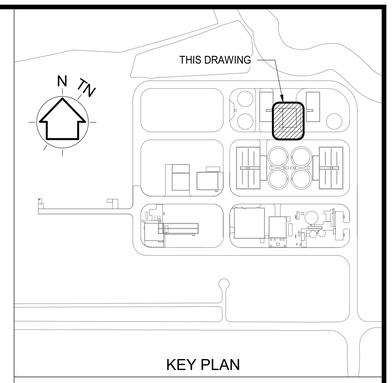


MAIN FLOOR PLAN - H.V.A.C. LAYOUT

SCALE: 1 : 100

KEYNOTES

1. MECHANICAL EQUIPMENT TO REST ON RAISED PLATFORM. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON THE RAISED PLATFORM. PLACEMENT OF UNIT TO MEET THE MAINTENANCE CLEARANCE LISTED IN THE MANUFACTURER'S INSTALLATION MANUAL.
2. MECHANICAL EQUIPMENT TO REST ON CONCRETE HOUSEKEEPING PAD. CONCRETE HOUSEKEEPING PAD BY OTHERS AND COORDINATE.
3. SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.
4. THE SUPPORT STRUCTURE FOR DUCTWORK IS BY STRUCTURAL. REFER TO THEIR DRAWINGS FOR ADDITIONAL INFORMATION.
5. THE ROUTING OF DUCTWORK IS TO BE COORDINATED WITH THE CRANE SYSTEM. RUN THE DUCTWORK ABOVE THE UNIT AND ENSURE NO CLASHES WITH EQUIPMENT AND STRUCTURAL MEMBERS.



KEY PLAN

NOTES:

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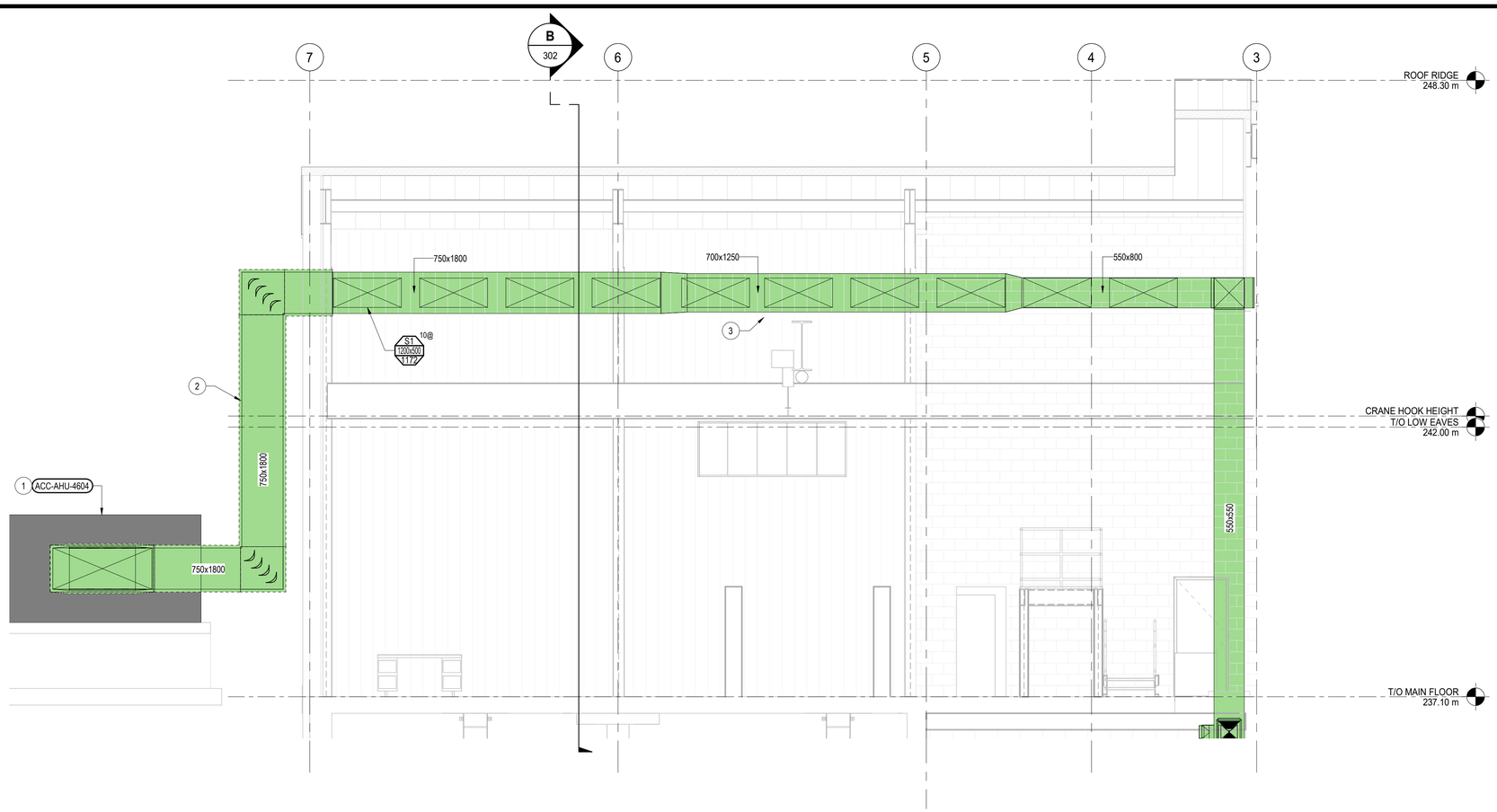
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
MAIN FLOOR PLAN - H.V.A.C. LAYOUT

H.V.A.C.

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-102
Date: 2022.09.14	
Project No.: 10449	



MAINTENANCE ROOM SECTION A

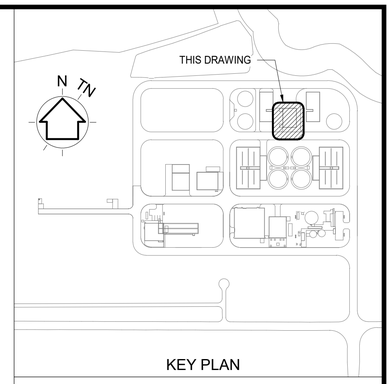
SCALE: 1 : 50

KEYNOTES

1 MECHANICAL EQUIPMENT TO REST ON RAISED PLATFORM. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON THE RAISED PLATFORM. PLACEMENT OF UNIT TO MEET THE MAINTENANCE CLEARANCE LISTED IN THE MANUFACTURER'S INSTALLATION MANUAL.

2 THE SUPPORT STRUCTURE FOR DUCTWORK IS BY STRUCTURAL. REFER TO THEIR DRAWINGS FOR ADDITIONAL INFORMATION.

3 THE ROUTING OF DUCTWORK IS TO BE COORDINATED WITH THE CRANE SYSTEM. RUN THE DUCTWORK ABOVE THE UNIT AND ENSURE NO CLASHES WITH EQUIPMENT AND STRUCTURAL MEMBERS.



KEY PLAN

NOTES:

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MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
SECTIONS & DETAILS

H.V.A.C.

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-301
Date: 2022.09.14	
Project No.: 10449	

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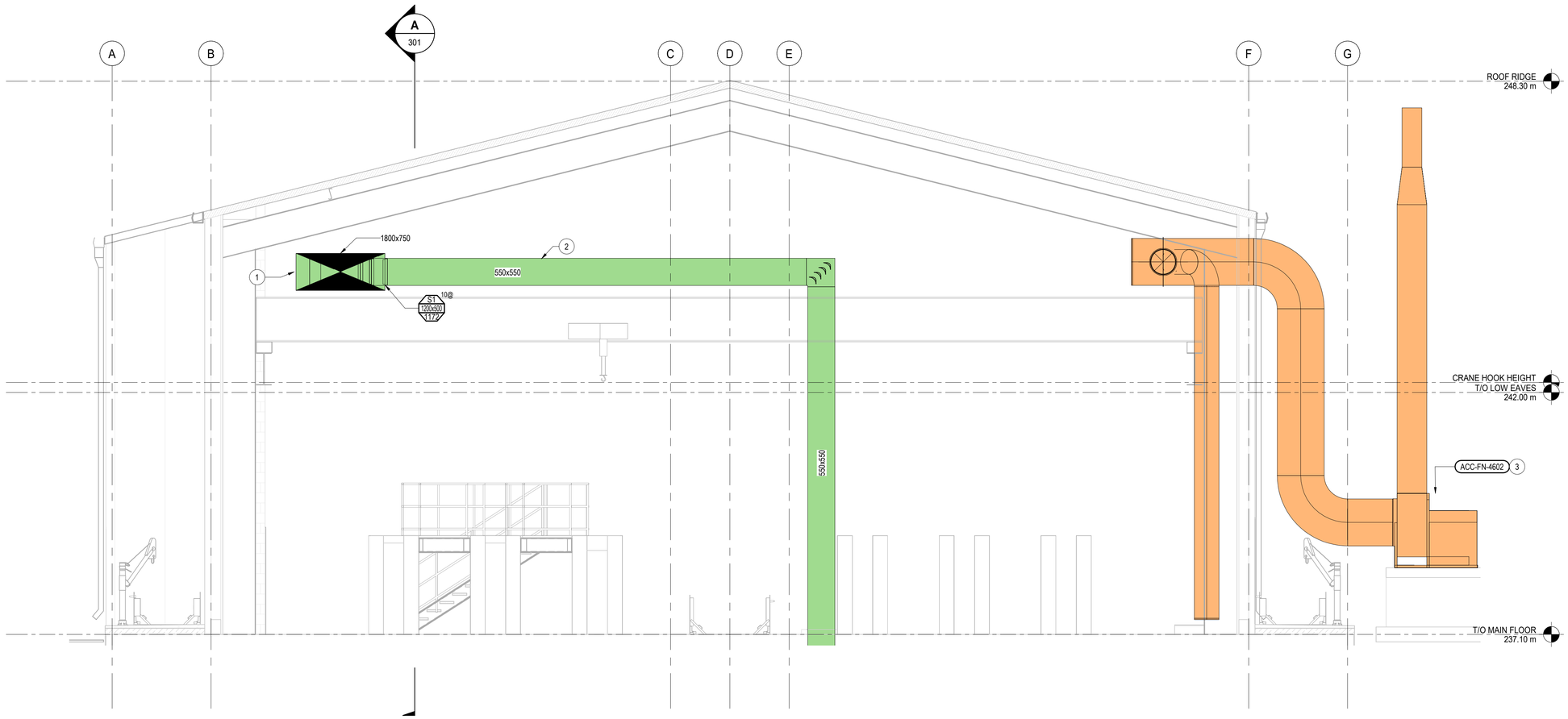
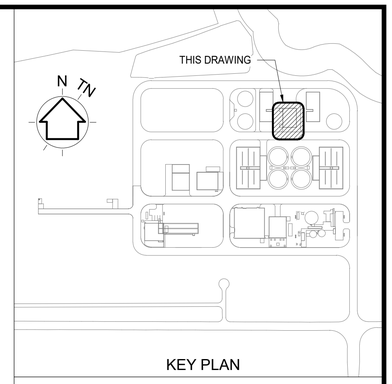


MAINTENANCE ROOM SECTION B

SCALE: 1 : 50

KEYNOTES

1. THE ROUTING OF DUCTWORK IS TO BE COORDINATED WITH THE CRANE SYSTEM. RUN THE DUCTWORK ABOVE THE UNIT AND ENSURE NO CLASHES WITH EQUIPMENT AND STRUCTURAL MEMBERS.
2. SUSPEND DUCTWORK FROM THE STRUCTURE USING THE APPROVED SMACNA METHOD. COORDINATE ROUTING WITH ALL TRADES BEFORE INSTALLATION OCCURS.
3. MECHANICAL EQUIPMENT TO REST ON CONCRETE HOUSEKEEPING PAD. CONCRETE HOUSEKEEPING PAD BY OTHERS AND COORDINATE.



KEY PLAN

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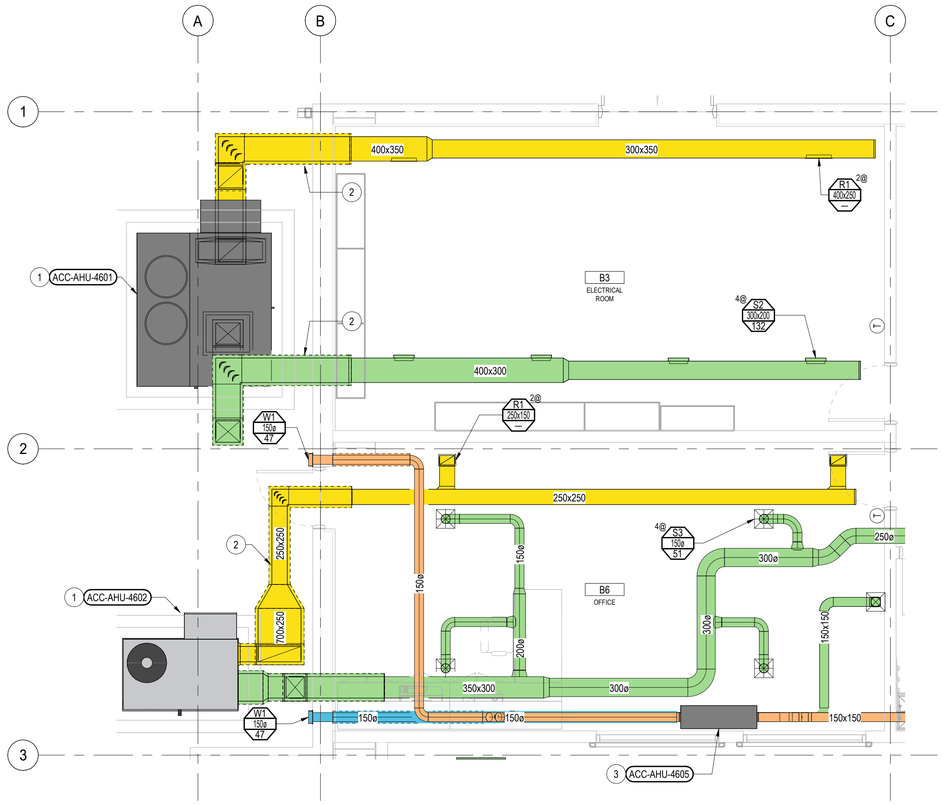
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
SECTIONS & DETAILS

H.V.A.C.

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-302
Date: 2022.09.14	
Project No.: 10449	



1 LARGE SCALE OFFICE & ELECTRICAL ROOM LAYOUT - H.V.A.C. LAYOUT

102 SCALE: 1 : 50

KEYNOTES

1 MECHANICAL EQUIPMENT TO REST ON RAISED PLATFORM. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION ON THE RAISED PLATFORM. PLACEMENT OF UNIT TO MEET THE MAINTENANCE CLEARANCE LISTED IN THE MANUFACTURER'S INSTALLATION MANUAL.

2 THE SUPPORT STRUCTURE FOR DUCTWORK IS BY STRUCTURAL. REFER TO THEIR DRAWINGS FOR ADDITIONAL INFORMATION.

3 EQUIPMENT SUSPENDED FROM STRUCTURE USING VIBRATION ISOLATORS AND FLEXIBLE DUCT CONNECTIONS. REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND DETAIL FOR ADDITIONAL INFORMATION AND COORDINATE LOCATION OF EQUIPMENT ON SITE AND MAINTAIN SERVICE CLEARANCE AS INSTRUCTED BY THE MANUFACTURER.

KEY PLAN

NOTES:

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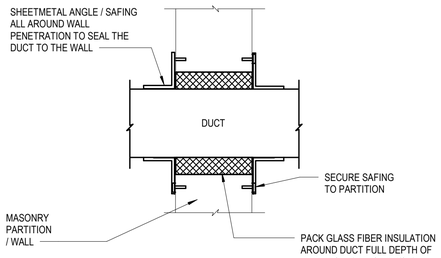
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
ENLARGED FLOOR PLAN

H.V.A.C.

Scale: AS INDICATED	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-401
Date: 2022.09.14	
Project No.: 10449	

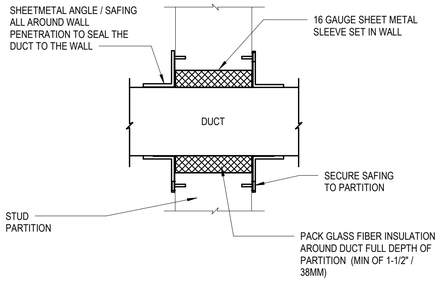


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH MASONRY WALL DETAIL

SCALE: N.T.S.

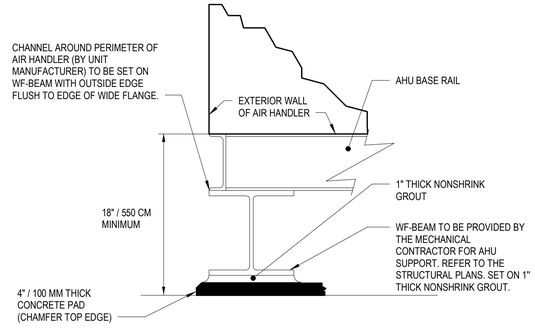


NOTES:

1. FOR INSULATED DUCTWORK, INSULATE THE DUCTWORK UP TO WALL. THE INSULATION SHALL TERMINATE TO COVER THE WHOLE SHEET METAL ANGLE. TAPE TO THE WALL TO SEAL.
2. SEAL WITH A NON HARDENING ACOUSTICAL SEALANT BETWEEN THE ANGLE / WALL AND THE ANGLE / DUCT.
3. ADDITIONAL REQUIREMENTS ARE REQUIRED FOR RATED WALLS, REFER TO THE CONTRACT DOCUMENTS.

DUCT PASSING THROUGH STUD WALL PARTITION DETAIL

SCALE: N.T.S.

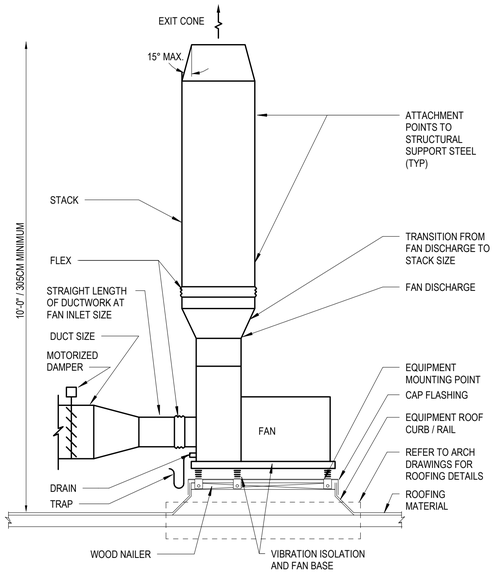


NOTES:

1. INCREASE THE HEIGHT AS REQUIRE TO PROVIDE ENOUGH HEIGHT FOR THE TRAP.

WF SUPPORT BEAM DETAIL

SCALE: N.T.S.

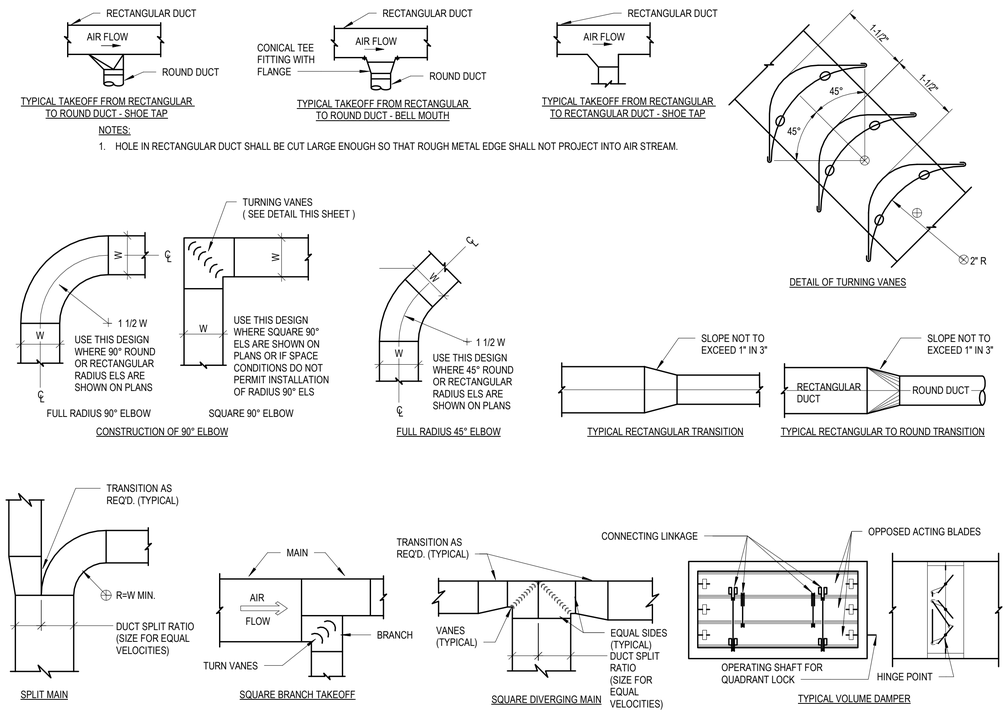


NOTES:

1. COORDINATE THE LOCATION AND SIZE OF THE EQUIPMENT RAIL BASED ON THE EQUIPMENT.
2. THE PURPOSE OF THE EQUIPMENT RAIL IS TO SUPPORT THE WEIGHT OF THE EQUIPMENT. IT SHALL BE RATED FOR THE OPERATING WEIGHT OF THE EQUIPMENT. FOLLOW VIBRATION / SEISMIC REQUIREMENTS PER THE CONTRACT DOCUMENTS.
3. THE TOP OF THE RAIL/CURB IS TO BE MOUNTED A MINIMUM OF 18 INCHES / 46 CM ABOVE THE TOP OF THE ROOF UNLESS NOTED OTHERWISE.
4. REFER TO THE CONTRACT DOCUMENTS FOR DUCT MATERIAL AND INSULATION REQUIREMENTS.
5. THE STRAIGHT DUCT BEFORE THE FAN INLET SHALL BE A MINIMUM OF 3 DUCT DIAMETERS
6. FILL THE TRAP PRIOR TO START-UP. FOLLOW THE MFRS REQUIREMENTS FOR DEPTH OF TRAP BASED ON THE FAN STATIC PRESSURE. PROVIDE A CAP FOR THE TRAP IN A PLASTIC BAG THAT IS FASTENED TO THE TRAP.
7. SET STACK FLANGE AND VIBRATION ISOLATION BASES IN SILICONE CALKING.
8. ENCAPSULATE ALL STACK AND FAN FASTENERS IN SILICONE CALKING.
9. FLANGES AND GUSSETS ARE WELDED TO THE STACK.
10. EXIT CONE OUTLET SHALL BE CONSTRUCTED TO ACHIEVE A MINIMUM EXIT VELOCITY OF 3000 FPM
11. COORDINATE SCOPE OF WORK WITH ROOFING CONTRACTOR / OWNER TO NOT VOID ANY WARRANTEES

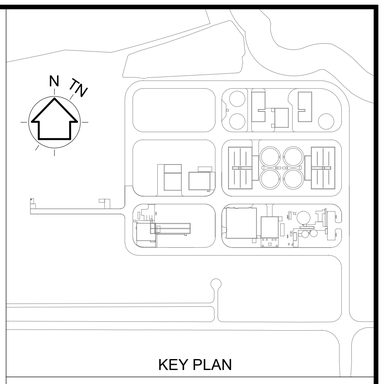
EXHAUST STACK AND FAN MOUNTING DETAIL

SCALE: N.T.S.



TYPICAL DUCT CONNECTION/ TRANSITION DETAIL

SCALE: N.T.S.



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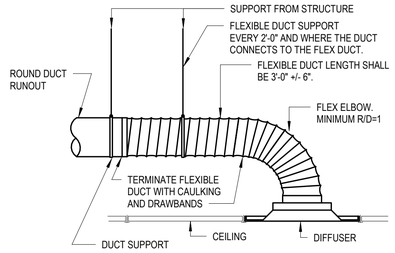
MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
TYPICAL DETAILS

H.V.A.C.

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-501
Date: 2022.09.14	
Project No.: 10449	

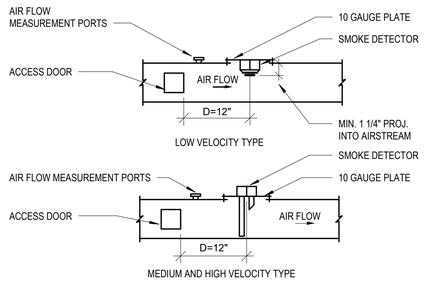


NOTES:

1. PROVIDE INSULATION TO DIFFUSER NECK ON SUPPLY DIFFUSERS.
2. PROVIDE FLEXIBLE DUCT SUPPORTS AT THE ELBOW TO KEEP SMOOTH THE ELBOW SHAPE.

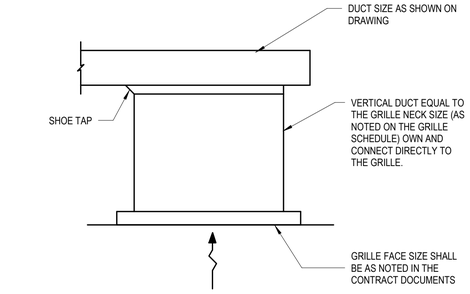
ROUND DIFFUSER TERMINATION DETAIL - FLEX ELBOW

SCALE: N.T.S.



SMOKE DETECTOR INSTALLATION DETAIL

SCALE: N.T.S.

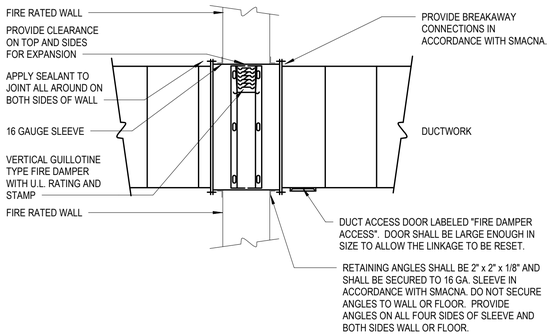


NOTES:

1. APPLIES TO ALL DUCTED RETURN AND EXHAUST GRILLES EXCEPT FOR WHEN THE CONTRACTOR ELECTS TO USE ANOTHER APPROVED DETAIL

RETURN/EXHAUST GRILLE DETAIL OPTION

SCALE: N.T.S.

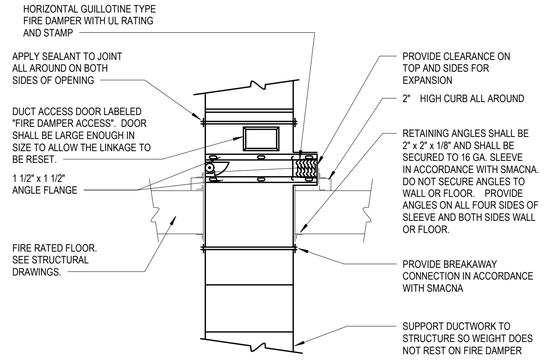


NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

STYLE 'A' WALL FIRE DAMPER DETAIL

SCALE: N.T.S.

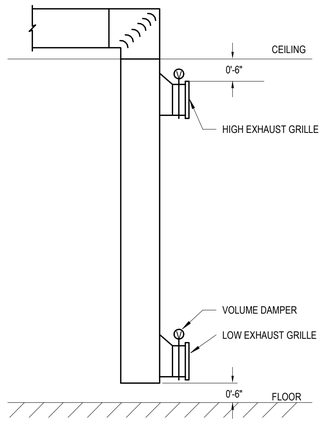


NOTES:

1. FOLLOW ALL OF THE MFRS MINIMUM INSTALLATION REQUIREMENTS FOR A UL RATED ASSEMBLY
2. PROVIDE EXTERNAL INSULATION (IF REQUIRED PER THE CONTRACT DOCUMENTS) UP TO THE WALL AND COVERING ALL OF THE ANGLES.
3. THE INTENT IS FOR THE DAMPER SLEEVE (ACCESSIBLE SIDE) TO BE AS SHORT AS POSSIBLE (LESS THAN MAX) GIVEN THE DAMPER WALL ASSEMBLY AND ACHIEVING THE UL WALL RATING.

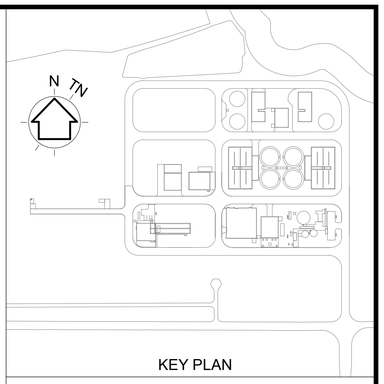
STYLE 'A' ABOVE FLOOR FIRE DAMPER DETAIL

SCALE: N.T.S.



HI/LOW EXHAUST

SCALE: N.T.S.



NOTES:

No.	REVISIONS	Date	By	Approved
B	ISSUED FOR 95% CLIENT REVIEW	JAN. 2023	JS	BH
A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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MIDHURST WASTEWATER TREATMENT PLANT - PH1 BIO THICKENER BUILDING TYPICAL DETAILS

H.V.A.C.

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-502
Date: 2022.09.14	
Project No.: 10449	

MAKEUP AIR UNIT SCHEDULE

UNIT IDENTIFICATION		FAN															PHYSICAL CHARACTERISTICS				ELECTRICAL				
MARK	ROOM(S) SERVED	AIRFLOW (l/s)	ESP (Pa)	TSP (Pa)	SPEED (RPM)	BHP	HP	CONTROL	EDB (°C)	LDB (°C)	MAX APD (Pa)	FUEL TYPE	PRESSURE RANGE (Pa)	FIRING RATE INPUT (KW)	FIRING RATE OUTPUT (KW)	BURNER CONTROL	MIN TURN DOWN	WEIGHT (kg)	HEIGHT (mm)	WIDTH (mm)	LENGTH (mm)	VOLTS	PHASE	MANUFACTURER	MODEL NUMBER	NOTES
ACC-AHU-4603	POLYMER STORAGE	1,085	311.0	610.0	2,446	1.4	2	VFD	-36.7	24.4		NATURAL GAS		99.9	80.0	MODULATING	8:1	1,241	1,270	1,270	4,724	600	3	SOLUTION AIR	PMI-IF-12-350	1
ACC-AHU-4604	MAINTENANCE	9,250	373.6	640.2	1,508	5.9	10	VFD	-36.7	24.4		NATURAL GAS		652.8	682.2	STEP/ MODULATING	15:1	5,338	1,956	3,581	6,096	600	3	SOLUTION AIR	AW-I-3-250	1

1. Complete with packaged controls.

ROOF TOP UNIT SCHEDULE - PART A

UNIT IDENTIFICATION			AIRFLOW						PHYSICAL CHARACTERISTICS				AIR BLENDER		FILTER			COMPONENTS							
										MAXIMUM UNIT DIMENSIONS									INDIRECT GAS FIRED HEATING SECTION						
MARK	LOCATION	AREA SERVED	MAX SUPPLY AIR (l/s)	MIN SUPPLY AIR (l/s)	MAX RETURN AIR (l/s)	MIN RETURN AIR (l/s)	DESIGN OUTSIDE AIR (l/s)	MIN OUTSIDE AIR (l/s)	UNIT OPERATING WEIGHT (kg)	HEIGHT (mm)	WIDTH (mm)	LENGTH (mm)	QUANTITY OF BLENDERS	MAX APD (Pa)	FILTER TYPE	MERV RATING	MAX APD (Pa)	HEATING AIRFLOW (l/s)	EAT (°C)	LAT (°C)	INPUT RATING (KW)	OUTPUT RATING (KW)	NO OF STAGES	TURN DOWN RATIO	MAX APD (Pa)
ACC-AHU-4601	PLATFORM	ELEC. ROOM	1,227	1,227	859	859	368	368	955 +/-5% +72	1,529	2,195	3,066	0	-	PRE-FILTER	8	50.07	1,416	4.6	20.4	29.3	23.4	1	16:1	20.67
ACC-AHU-4602	PLATFORM	OFFICE	354	354	248	248	106	106	288 +/-5% + 52	548	1,186	1,889			PRE-FILTER	8		354	8.4	46.3	19.6	15.8			

ROOF TOP UNIT SCHEDULE - PART B

UNIT IDENTIFICATION	COMPONENTS							CONDENSER SECTION				FANS					CAPACITY AND PERFORMANCE		ELECTRICAL				MOUNTING SUPPORT STYLE	MANUFACTURER	MODEL NUMBER	NOTES
	DX COOLING COIL							COMPRESSORS			FANS	SUPPLY														
MARK	TOTAL CAPACITY (kW)	SENSIBLE CAPACITY (kW)	EDB (°C)	EWB (°C)	LDB (°C)	LWB (°C)	MAX APD (Pa)	NO. OF COMP.	NO. OF STAGES	TYPE OF COMP.	NO. OF FANS	ESP (Pa)	TSP (Pa)	BHP	HP	SPEED (RPM)	NOMINAL CAPACITY (kW)	REFRIG TYPE	VOLTS	PHASE	MCA	MOP				
ACC-AHU-4601	22.5	18.7	26.2	18.8	13.8	13.6	588.60	1	1	INVERTER SCROLL	1	186.8	588.6	1.5	2	1,724	23.0	R-410A	600	3	13.0	20	CURB	GREENHECK	RV-25-5I-C-A1	1,2,3,4,5
ACC-AHU-4602	9.6	5.9	28.8	19.0	11.7	10.7					1	249.0	254.1	0.4		1,766			600	3	7.0	15	CURB	CARRIER	48FCSA04A3A1-0F0A0	1,2,3,4,5

NOTES:
1. FILTERS ARE TO BE PROVIDED WITH PRE-FILTER. MAXIMUM PRESSURE DROP SHALL BE BASED ON TOTAL PRESSURE DROP ACROSS THE FILTER BANK WITH DIRTY FILTERS.
2. PROVIDE STAINLESS STEEL GAS HEAT EXCHANGER.
3. PROVIDE FULLY MODULATING GAS VALVE.
4. PROVIDE VARIABLE CAPACITY COMPRESSOR ON LEAD CIRCUIT.
5. WEIGHT SHOWN IS UNIT PLUS ROOF CURB

HEAT RECOVERY VENTILATOR SCHEDULE

TAG	LOCATION	MANUFACTURER / MODEL	DIMENSIONS			INSTALLED WEIGHT	FAN SECTION							OUTDOOR AIR FLOW	FILTER SECTION				NOTES
							SUPPLY FAN				RETURN / EXHAUST FAN				SUPPLY		RETURN		
			LENGTH	HEIGHT	WIDTH		AIR FLOW	ESP	FAN	POWER DRAW	AIR FLOW	ESP	FAN			FINAL PD (PRESSURE DROP)		FINAL PD (PRESSURE DROP)	
			MM	MM	MM	KG	L/s	Pa	TYPE	A	L/s	Pa	TYPE	L/s	TYPE	Pa	TYPE	Pa	
ACC-AHU-4605	WASHROOM	LIFEBREATH/195DCS	1245	476	375	45	54	0.7	CENTR	1.5	92	0.6	CENTR	92	MERV-13	0.7	MERV-13	0.7	

NOTES:
1. COMPLETE WITH 99-BC03 CONTROL. PROVIDED BY HRV MANUFACTURER AND INTEGRAL WITH UNIT.
2. ELECTRIC PRE-HEATING COIL TO BE 208V/3PH/60HZ REMOTE DUCT MOUNTED WITH CONTROLS INTEGRAL TO ERV. PROVICE SCR CONTROLS CAPABLE OF OPERATING IN VERTICAL ORIENTATION.
3. ERV IS 600V/3PH/60HZ. STEP UP TRANSFORMER FOR 208V CONNECTION TO BE SUPPLIED AND SHIPPED LOOSE BY ERV MANUFACTURER TO BE FIELD WIRED BY DIVISION 26.
4. CUSTOM L-SHAPED UNIT WITH SUPPLY ON UPPER LEVEL AND VERTICAL RETURN AIR. REFER TO DRAWINGS FOR CONNECTION POINTS AND SIZES.
5. COOLING COIL SHALL OPERATE AS A CHANGE OVER COIL WITH ABILITY TO PROVIDE HEATING.

FAN SCHEDULE

UNIT IDENTIFICATION		MAX AIRFLOW (l/s)	MIN AIRFLOW (l/s)	ESP (Pa)	CONTROL	FAN WHEEL					FAN MOTOR				ELECTRICAL		OPERATING WEIGHT (kg)	MANUFACTURER	MODEL NUMBER	NOTES
MARK	UNIT/AREA SERVED					TYPE	FAN CLASS	ARRANGEMENT	SPEED (RPM)	MIN WHEEL DIA (mm)	BHP	HP	SPEED (RPM)	DRIVE TYPE	VOLTS	PHASE				
ACC-FN-4601	POLYMER STORAGE	1,085	1,085	373.6			I	10	2,431		1.4	1.5	1,725		600	3	150	GREENHECK	USF-16	2, 3, 4
ACC-FN-4602	MAINTENANCE AREA	9,250	9,050	435.9			II	10	1,668		19.7	20	1,725		600	3	550	GREENHECK	USF-30	2, 3, 4

NOTES:
1: PROVIDE CURB CAP INLET BOX MODEL GPFHL.
2: STAINLESS STEEL SHAFT.
3: NEMA PREMIUM EFFICIENT MOTOR - NEMA TABLE 12-12.
4: COATED WITH HI-PRO POLYESTER, CONCRETE GRAY-RAL 7023, FAN AND ATTACHED ACCESSORIES.

GRILLE, REGISTER, DIFFUSER SCHEDULE

MARK	FLOW RANGE (l/s)	DIFFUSER NECK SIZE (mm)	MOUNTING TYPE	MATERIAL	MANUFACTURER	MODEL NUMBER	NOTES
S1				STAINLESS STEEL	E. H. PRICE	720D/F/L/A	1,2,3,4
S2				STEEL	E. H. PRICE	520/F/L/A	1,2,3,4
S3				STEEL	E.H. PRICE	SCD	1,2,3,4
R1				STEEL	E. H. PRICE	530/F/L/A	1,3,4
E1				STAINLESS STEEL	E. H. PRICE	710Z/F/L/A	1,3,4
E2				STEEL	E. H. PRICE	520/F/L/A	1,3,4

NOTES:
1. REFER TO REFLECTED CEILING PLANS EXACT LOCATION. PROVIDE ALL FRAMES AND ACCESSORIES AS REQUIRED FOR PROPER INSTALLATION.
2. FLEXIBLE DUCTWORK SHALL BE THE SAME SIZE AS THE DIFFUSER NECK OR AN EQUIVALENT ROUND DUCT. FLEXIBLE DUCTWORK SHALL BE SUPPORTED TO PREVENT KINKS OR BENDS.
3. COLOR TO BE SELECTED BY ARCHITECT FROM STANDARD COLORS.
4. REFER TO PLAN FOR SIZE.

KEY PLAN

NOTES:

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A	ISSUED FOR 65% CLIENT REVIEW	SEPT. 2022	JS	BH

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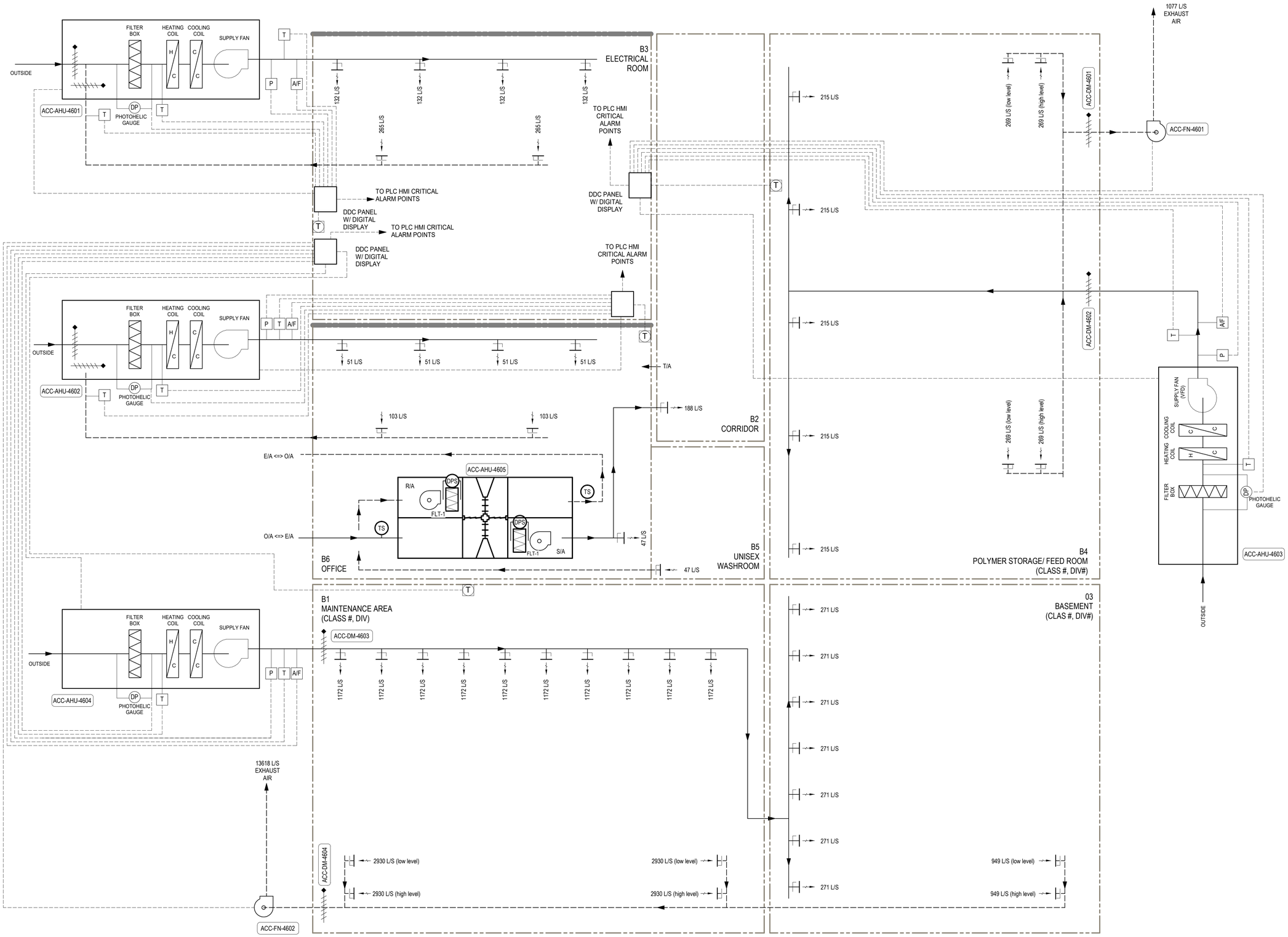
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
SCHEDULES

H.V.A.C.

Scale: N.T.S.
Drawn By: JEFF SCHRAUD
Designed By: BRUCE HAUGH
Checked By: BILL DeGAGNE
Date: 2022.09.14
Project No.: 10449

Contract No. #####

Drawing No. H-TCK-601



VENTILATION SCHEMATIC DIAGRAM

KEY PLAN

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MIDHURST WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
AIR FLOW DIAGRAM

H.V.A.C.

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-602
Date: 2022.09.14	
Project No.: 10449	

PART 1 EXECUTION

1.1 General

1.4 Thickener Air Handling Units

1.4.1 ACC-AHU-4601: Packaged Heat-A/C Unit

.1 The packaged air handler unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Electrical Room**

.2 The unit will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 The packaged air handler shall shut down upon detection of smoke in the airstream.

.4 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.5 When the differential pressure across the filter gets above 62 Pa (adjustable setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.6 The packaged air handler shall control outside air and return air dampers with a built-in controller to provide additional outside air as follows:

.1 In standard operating mode, minimum outside air is provided with the outside air intake damper at minimum position (10% outside air – adjustable) and return damper shall be set match the supply air.

.2 Whenever outside air temperature is suitable for economizer cooling, the internal controller will modulate the outside air damper open based on maintaining the internal temperature setpoint and modulate the return damper towards the closed position.

.3 Points List:

1.4.1.6.3.1 Monitor:

.1 ACC-AHU-4601 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature

1.4.1.6.3.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Temperature below setpoint allowance
.4 Supply Temperature above setpoint allowance
.5 Room pressure below 6 Pa to adjacent space for more than 5 minutes (time adjustable)
.6 Room temperature outside acceptable range (14C to 30C, adjustable)

1.4.1.6.3.3 Alarm/Monitor signal to SCADA HMI:

.1 ACC-AHU-4601 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.4.2 ACC-AHU-4602: Packaged Heat-A/C Unit

.1 The packaged air handler unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Office**
.2 **Corridor**
.3 **Washroom**

.2 The packaged air handler will be controlled by the DDC system via a room space temperature sensor (with adjustable setpoint).

.3 The packaged air handler shall shut down upon detection of smoke in the airstream.

.4 When the supply air temperature falls to 9°C (adjustable), send an alarm to the DDC display panel.

.5 When the differential pressure across the filter gets above 62 Pa (setpoint to be obtained from the filter manufacture; determined based on the filters used), send an alarm to the DDC system for filter replacement. This alarm to be sent to the SCADA PLC system, to be displayed on the HMI panel.

.6 The packaged air handler shall control outside air and return air dampers with a built-in controller to provide additional outside air as follows:

.1 In standard operating mode, minimum outside air is provided with the outside air intake damper at minimum position (10% outside air – adjustable) and return damper shall be set to a position that will enable a minimum 6 Pa positive across the Corridor-Polymer Room door.

.2 Whenever outside air temperature is suitable for economizer cooling, the internal controller will modulate the outside air damper open based on maintaining the internal temperature setpoint and modulate the return damper towards the closed position. The corridor pressure is to be maintained at no less than 6Pa positive pressure to the adjacent space.

.3 Room-mounted static pressure sensor: The corridor room is to be kept positively pressurized compared to the Polymer Room. If the space drops below the pressure setpoint for more than 5 minutes, an alarm will be set at the DDC display.

.4 Points List:

1.4.2.6.4.1 Monitor:

.1 ACC-AHU-4602 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature
.8 Room Pressure relative to adjacent space

1.4.2.6.4.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Temperature below setpoint allowance
.4 Supply Temperature above setpoint allowance
.5 Room pressure below 6 Pa to adjacent space for more than 5 minutes (time adjustable)
.6 Room temperature outside acceptable range (14C to 30C, adjustable)

1.4.2.6.4.3 Alarm/Monitor to SCADA HMI:

.1 ACC-AHU-4602 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.4.3 ACC-AHU-4603: Makeup Air Unit

.1 The packaged air handler unit will provide space heating and ventilation air to the following space:

.1 **Polymer Room**

.2 The make-up unit will supply 6 ACH of outside air during normal operation. Make-up unit shall be interlocked with exhaust fan ACC-FN-4601 and interfaced to the DDC panel (operation and monitoring).

.3 The MAU will provide heat to the space via feedback from a temperature sensor located within the Polymer Storage Room. The space will be kept at 16C

.4 Points List:

.1 Monitor:

.1 ACC-AHU-4603 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature
.8 Room Pressure relative to adjacent space

.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Temperature below setpoint allowance
.4 Supply Temperature above setpoint allowance
.5 Room pressure below 6 Pa to adjacent space for more than 5 minutes (time adjustable)
.6 Room temperature outside acceptable range (14C to 30C, adjustable)

.3 Alarm/Monitor to SCADA HMI:

.1 ACC-AHU-4604 operational status
.2 Filter clogged
.3 General air handling system alarm (Any of the alarm points to be investigated)

1.4.4 ACC-AHU-4604: Makeup Air Unit

.1 The packaged air handler unit will provide space heating/cooling and ventilation air to the following spaces:

.1 **Maintenance Room**

.2 **Basement**

.2 The make-up unit will supply 12 ACH of outside air during normal operation.

Make-up unit shall be interlocked with exhaust fan ACC-FN-4602 and interfaced to the DDC panel (operation and monitoring).

.3 Points List:

.1 Monitor:

.1 ACC-AHU-4604 status
.2 Supply Air Temperature
.3 Return Air Temperature
.4 Mixed Air Temperature
.5 Supply Air Pressure
.6 Supply Air Flow
.7 Space Temperature
.8 Room Pressure relative to adjacent space

.2 Alarm:

.1 Filter pressure (clogged filter condition)
.2 AHU failure
.3 Supply Temperature below setpoint allowance
.4 Supply Temperature above setpoint allowance
.5 Room pressure below 6 Pa to adjacent space for more than 5 minutes (time adjustable)

KEY PLAN

NOTES:

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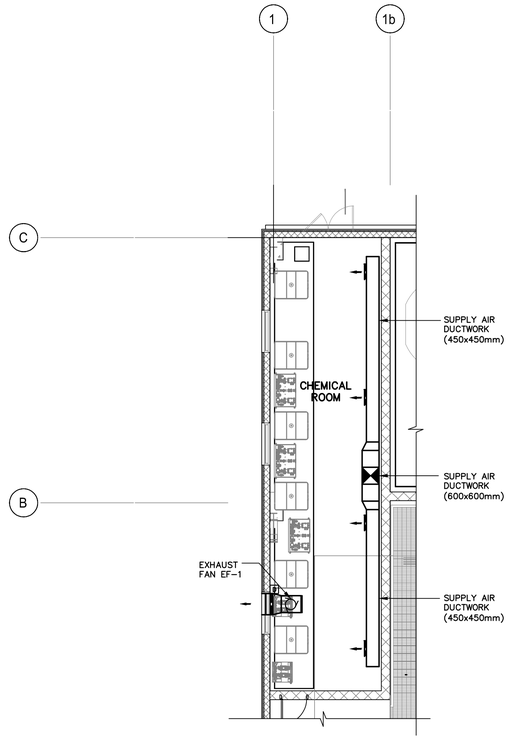
MIDHURST
WASTEWATER TREATMENT PLANT - PH1
BIO
THICKENER BUILDING
SEQUENCE OF OPERATION

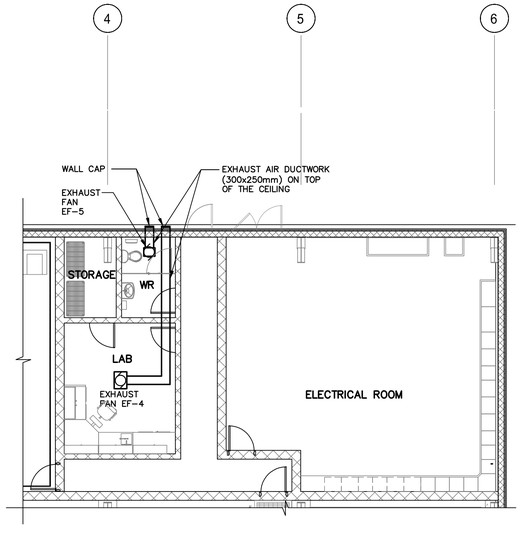
SPECIFICATION

Scale: N.T.S.	Contract No. #####
Drawn By: JEFF SCHRAUD	
Designed By: BRUCE HAUGH	
Checked By: BILL DeGAGNE	Drawing No. H-TCK-603
Date: 2022.09.14	
Project No.: 10449	



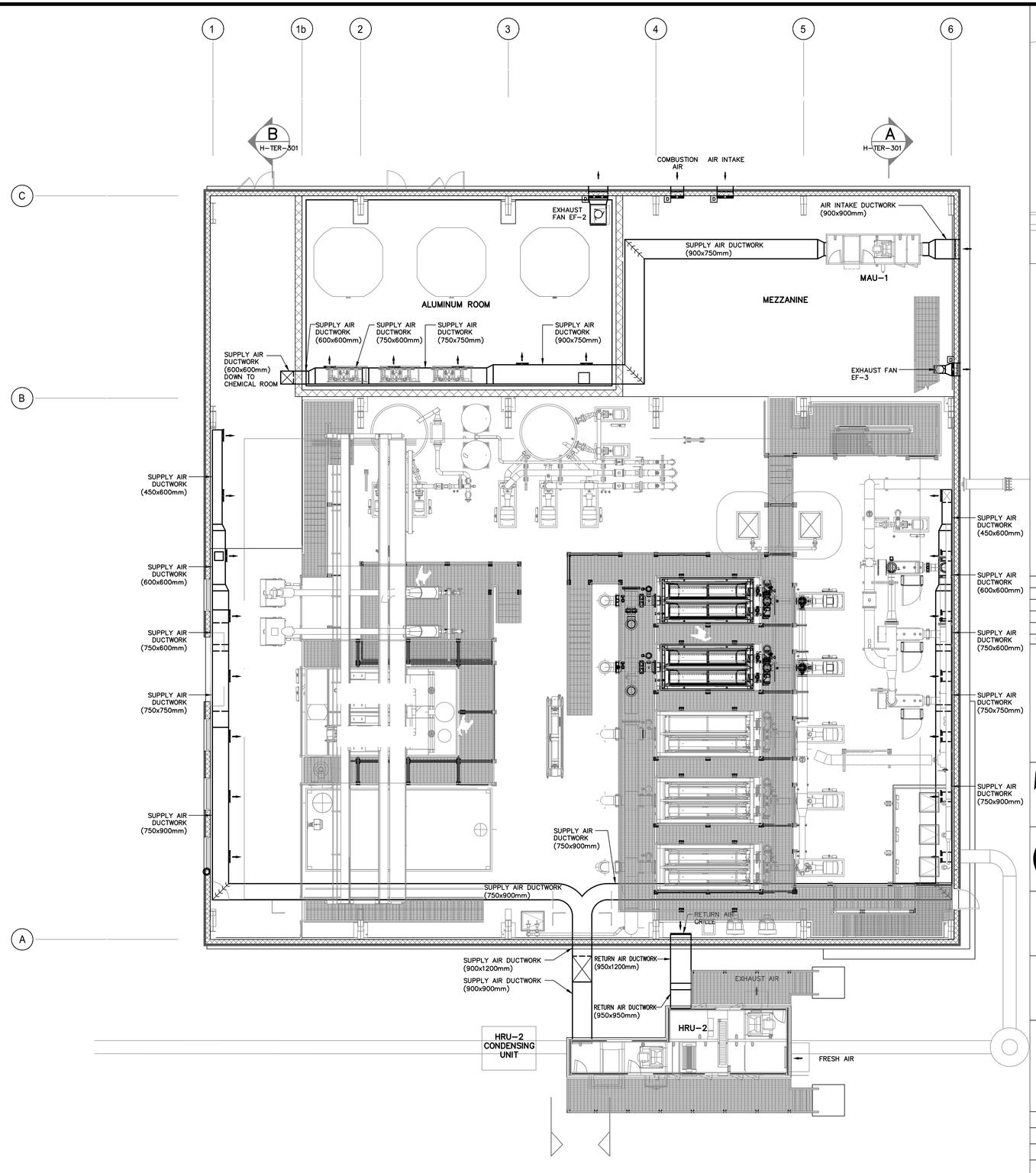
MAIN FLOOR PLAN – TERTIARY BUILDING CHEMICAL ROOM

SCALE 1:100



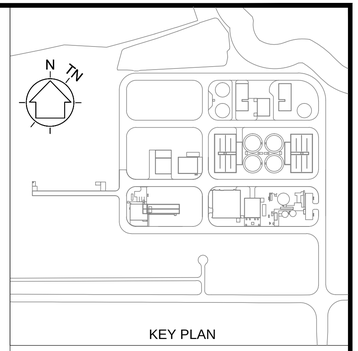
MAIN FLOOR PLAN – TERTIARY BUILDING ELECTRICAL ROOM

SCALE 1:100



MAIN FLOOR PLAN – TERTIARY BUILDING

SCALE 1:100



No.	Revisions	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

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MIDHURST WASTEWATER TREAMENT PLANT - PH1

TERTIARY TREATMENT MAIN BUILDING VENTILATION SYSTEM LAYOUT

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-TER-101
Project No.:	

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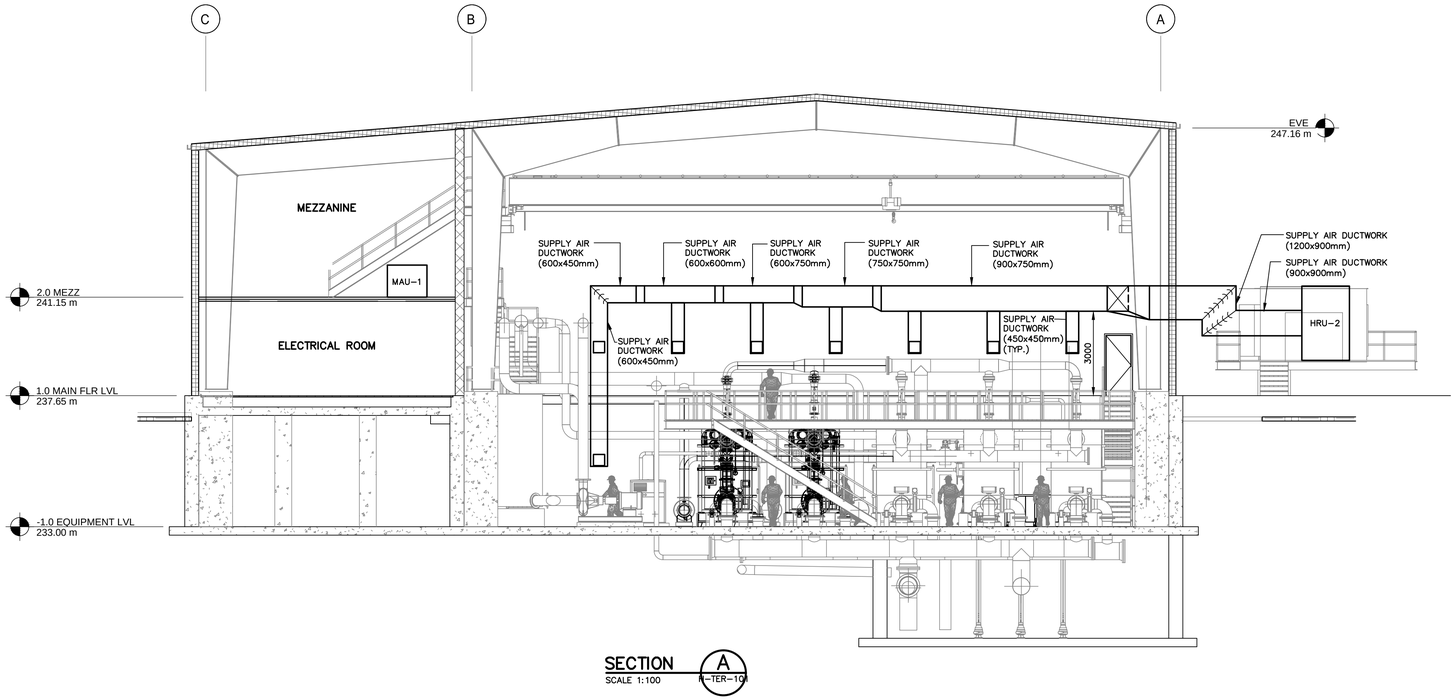

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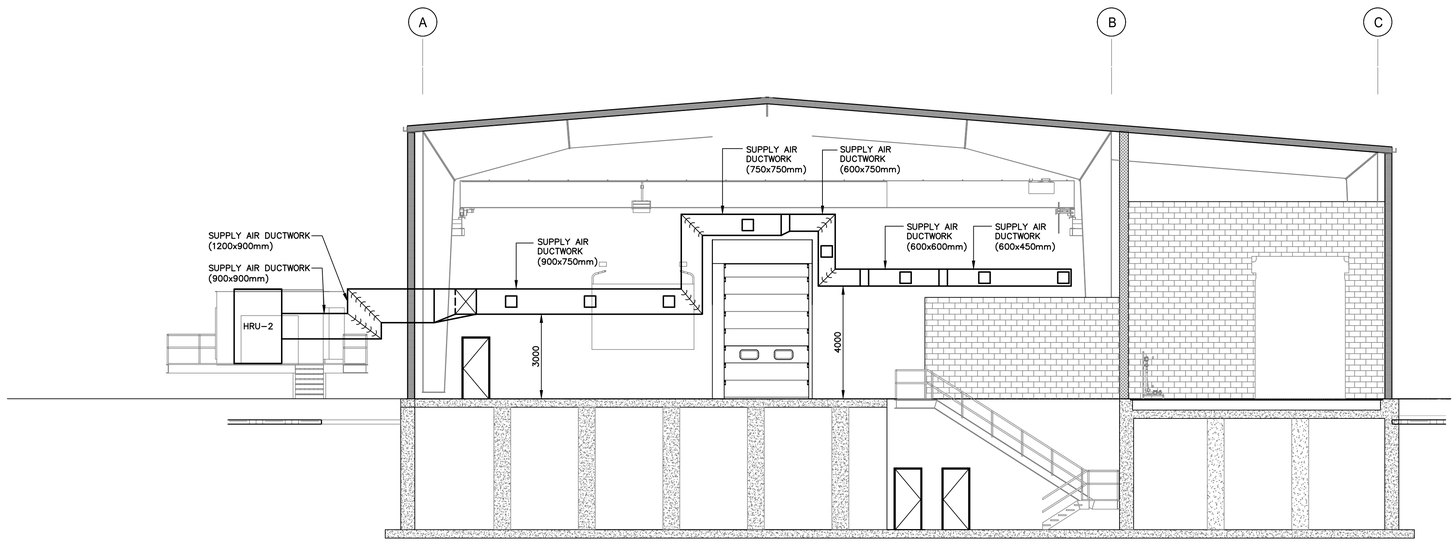
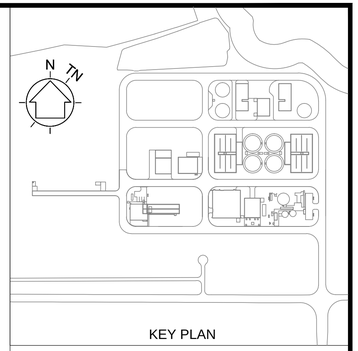
SCALE 1:100
H-TER-101



SECTION B
SCALE 1:100
H-TER-102



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MIDHURST WASTEWATER TREAMENT PLANT - PH1

TERTIARY TREATMENT MAIN BUILDING VENTILATION SYSTEM SECTIONS

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-TER-301
Project No.:	

FAN SCHEDULE

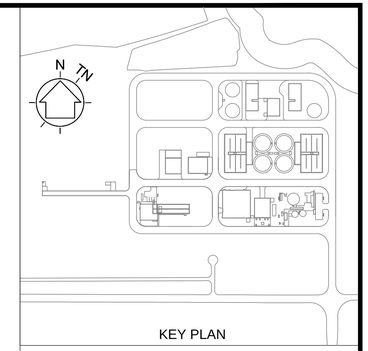
TAG	CFM	HP	VOLTAGE	PH	COMMENTS
EF-1	1700	XX	600	3	INTERLOCKED WITH MAU-1
EF-2	3600	XX	600	3	INTERLOCKED WITH MAU-1

ELECTRIC UNIT HEATER SCHEDULE

TAG	KW	VOLTAGE	PH	CLASSIFICATION	COMMENTS
EUH-1 EUH-2	10.0 10.0	600	3	UNCLASSIFIED	CONTROL BY DDC-1
EUH-3 EUH-4 EUH-5 EUH-6 EUH-7 EUH-8	10.0 10.0 10.0 10.0 10.0 10.0	600	3	UNCLASSIFIED	CONTROL BY DDC-2
EUH-9 EUH-10 EUH-11	10.0 10.0 10.0	600	3	UNCLASSIFIED	CONTROL BY DDC-3
EUH-12 EUH-13 EUH-14	10.0 10.0 10.0	600	3	UNCLASSIFIED	CONTROL BY DDC-3

AIR HANDLING UNIT SCHEDULE

TAG	LOCATION	FLOW (CFM)	HEATING CAPACITY (BTU)	ELECTRIC			CLASSIFICATION	AIR CHANGE/HR	COMMENTS
				FLA	VOLTAGE	PH			
AHU-1	TERTIARY BLDG ELECTRICAL ROOM	6000	160,000	XX	600	3	UNCLASSIFIED	6	CONTROL BY DDC-1
HRU-2	TERTIARY BLDG PROCESS ROOM	12000	604,000	XX	600	3	UNCLASSIFIED	3	CONTROL BY DDC-2
MAU-1	TERTIARY BLDG ALUMINUM ROOM	3600	311,000	XX	600	3	UNCLASSIFIED	6	CONTROL BY DDC-3
	TERTIARY BLDG CHEMICAL ROOM	1700	167,000	XX	600	3	UNCLASSIFIED	6	CONTROL BY DDC-3



KEY PLAN

LEGEND

D	DAMPER MOTOR	BD	BALANCING DAMPER
EF	EXHAUST FAN	CU	CONDENSING UNIT
SF	SUPPLY FAN	AHU	AIR HANDLING UNIT
		RF	RETURN FAN
D	DAMPER		
FS	FLOW SWITCH		
TS	TEMPERATURE SWITCH		
DDC-1	DIGITAL CONTROLLER (HVAC)		
TE-01	TEMPERATURE SENSING ELEMENT		
----------	CONTROL WIRING		
AC	AIR CONDITIONING UNIT		
EUH	ELECTRIC UNIT HEATER		

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

P. Eng.
Approved By

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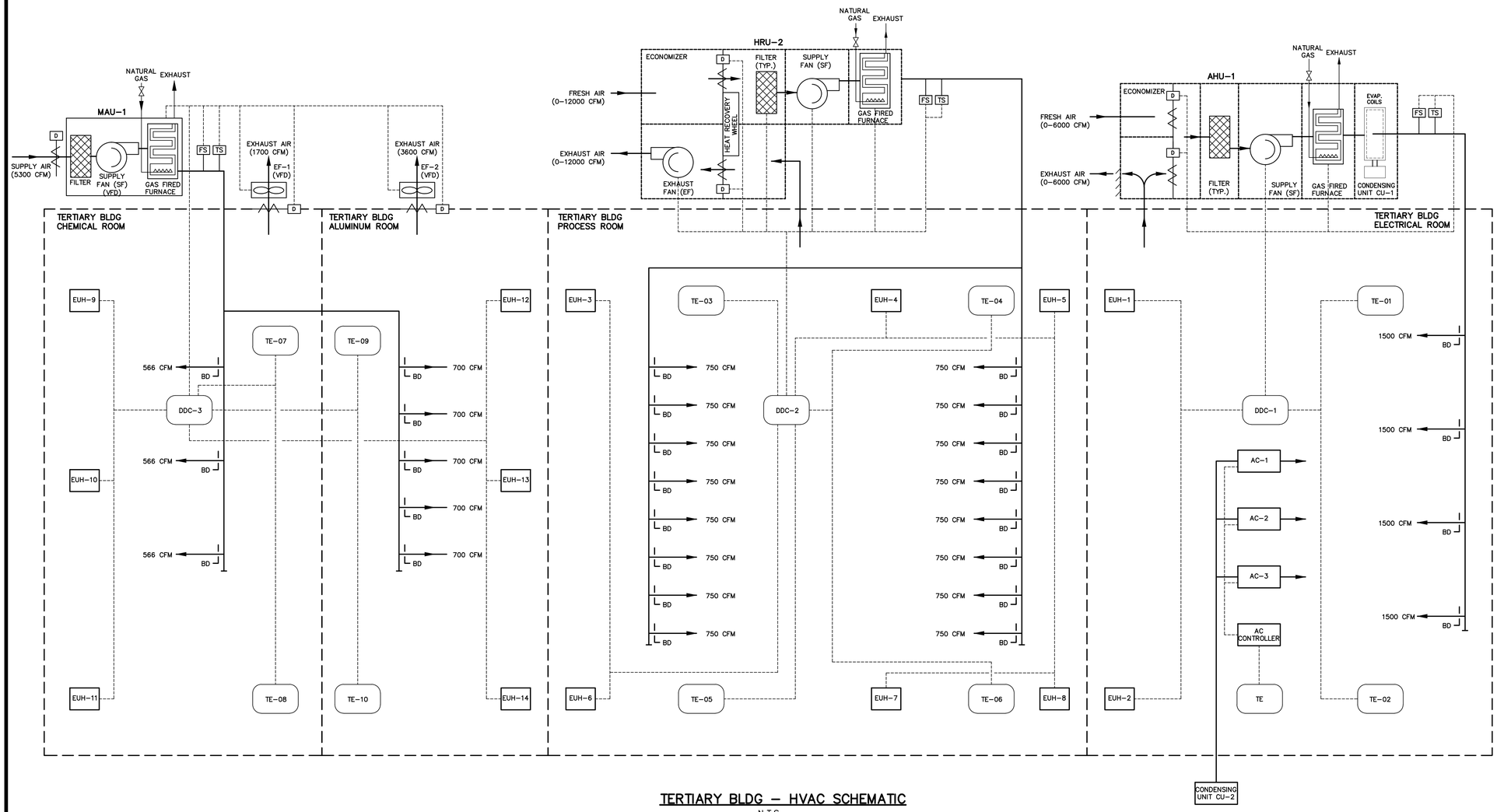
MIDHURST
WASTEWATER TREAMENT PLANT - PH1
TERTIARY TREATMENT
MAIN BUILDING
HVAC SYSTEM SCHEDULES

HVAC

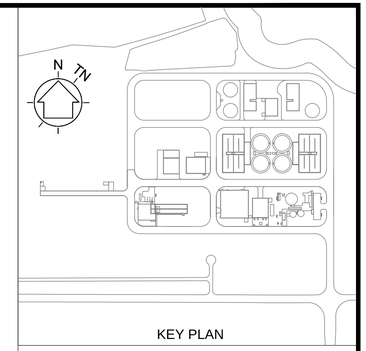
Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-TER-601
Project No.:	

CAD File LOCATION: Z:\PUBLIC\A-DWG\2021\22120-MIDHURST\22120-H-TER-601.DWG



TERTIARY BLDG – HVAC SCHEMATIC

N.T.S.



KEY PLAN

LEGEND

D	DAMPER MOTOR	BD	BALANCING DAMPER
EF	EXHAUST FAN	CU	CONDENSING UNIT
SF	SUPPLY FAN	AHU	AIR HANDLING UNIT
D	DAMPER	RF	RETURN FAN
FS	FLOW SWITCH		
TS	TEMPERATURE SWITCH		
DDC-1	DIGITAL CONTROLLER (HVAC)		
TE-01	TEMPERATURE SENSING ELEMENT		
	CONTROL WIRING		
AC	AIR CONDITIONING UNIT		
EUH	ELECTRIC UNIT HEATER		

No.	REVISIONS	Date	By	Approved
A	FOR 65% CLIENT REVIEW	SEPT 2022	A.T.	

P. Eng
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MIDHURST WASTEWATER TREAMENT PLANT - PH1

TERTIARY TREATMENT MAIN BUILDING AIR FLOW DIAGRAM

HVAC

Scale: As Shown	Contract No.
Drawn By: J.Z.	
Designed By: A.T.	
Checked By: A.T.	Drawing No.
Date: 2022-03-28	H-TER-602
Project No.:	

CAD File LOCATION: Z:\PUBLIC\A-DWG\2021\22120-MIDHURST\22120-H-TER-602.DWG

Appendix D

AERMOD Supporting Files

Ministry of the Environment, Conservation and Parks

Environmental Monitoring and Reporting Branch

125 Resources Road
Etobicoke ON M9P 3V6
Tel.: 416 235-6300
Fax: 416 235-6235

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Direction de la Surveillance Environnmentale

125, chemin Resources
Etobicoke ON M9P 3V6
Tél. : 416 235-6300
Téléc. : 416 235-6235

Ontario

July 13, 2020
Vimal Patel, Senior Project Manager
Carson Road Development Inc.
3190 Steeles Avenue East, unit 300
Markham, Ontario
L3R 1G9

Dear Madam/Sir:

Re: Request for Approval under Paragraph 3 of section 13(1) of Regulation 419/05 For use of Site-specific Meteorological Data: Carson Road Development Inc. - Midhurst Wastewater Treatment Plant (located at 1432 Snow Valley Road, Springwater, Ontario)

In accordance with the application for approval under s.13(1) of Regulation 419/05 for use of site-specific meteorological data, I am approving the use of site-specific data for the above-referenced site as requested by Carson Road Development Inc. in the application dated June 4, 2020.

The site-specific meteorological data referenced as the Borden data is a reasonable reflection of the meteorological conditions for the proposed modelling assessment.

A fully-processed 5-year (2012 to 2016) meteorological data set has been prepared by the Ministry of the Environment, Conservation and Parks with wind-sector dependent land use specific to the site identified in the application, upper air data from the U.S. National Weather Service's Buffalo station and surface data from the Environment and Climate Change Canada's Borden station, with missing cloud cover data filled with those from the Toronto international airport station.

This fully-processed site-specific meteorological data was prepared in response to a request submitted under O. Reg. 419/05 and is approved for use at this specific facility until such time as there are significant land use changes in vicinity of the facility.

This meteorological dataset was prepared using the AERMET 19191 meteorological pre-processor computer program. It is to be used in conjunction with the corresponding version of AERMOD to model discharges from the above-referenced facility. You are reminded that this dataset must be reprocessed when the Ministry adopts a newer version of AERMET. The Ministry can provide reprocessed meteorological data upon request.

This s.13(1) approval expires on February 28, 2022.

Should you have any comments or questions relating to the above site specific meteorological dataset, please send an e-mail to MetDataENE@ontario.ca within 30 days of the date of this correspondence with details, so that this dataset can be modified, if necessary.

Yours truly,

Yvonne Hall
Director, Section 13, O. Reg. 419/05

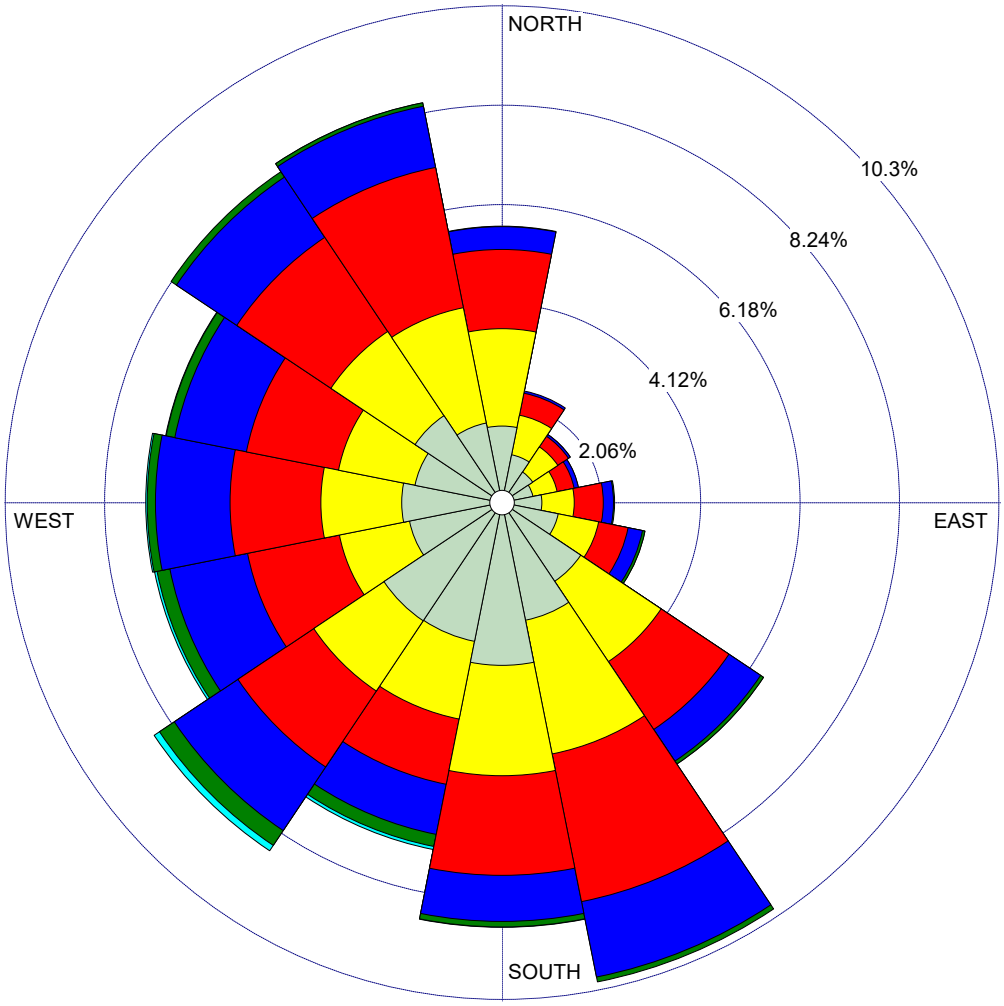
cc: District Manager, Barrie District Office
Director, Section 9, Environmental Protection Act
Environmental Assessment and Permissions Branch
BCX Environmental Consulting

WIND ROSE PLOT:

Midhurst Interim WTP and WWTP - 10432 Snow Valley Rd, Springwater, ON
Site Specific Meteorological Data

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10

Calms: 0.00%

COMMENTS: AERMET 19191	DATA PERIOD: **Start Date: 2012-01-01 - 00:00** **End Date: 2016-12-31 - 23:59**	COMPANY NAME: **BCX Environmental Consulting**	
		MODELER: **JS**	
	CALM WINDS: **0.00%**	TOTAL COUNT: **42338 hrs.**	
	AVG. WIND SPEED: **3.35 m/s**	DATE: **2020-07-17**	PROJECT NO.: **1364-01.01**