Nova Group

Inspired Solutions by Nova Group

MERP Level 2 Energy Audit

Prepared For

Department of Buildings & General Services - State of Vermont
133 State Street
Montpelier, VT 05633

Brandon - Waste Water Treatment Plant
500 Union Street
Brandon, VT 05733

Nova Group Carbon Neutral Report

novagroupgbc.com/carbonneutral

August 23, 2024

Department of Buildings & General Services - State of Vermont
133 State Street
Montpelier, VT 05633

Re: MERP Level 2 Energy Audit
Brandon - Waste Water Treatment Plant
500 Union Street
Brandon, VT 05733
Nova Project No.: SE24-3892

Nova Group, GBC has completed a MERP Level 2 Energy Audit in accordance with the State of Vermont ACT 172 at Brandon - Waste Water Treatment Plant located at 500 Union Street in Brandon, VT. Nova Group, GBC visited the site on May 23rd, 2024.

The assessment was performed at the Client's request using methods and procedures consistent with and using methods and MERP Level 2 Energy Audit procedures as outlined in Nova Group, GBC Proposal.

This report has been prepared for and is exclusively for the use and benefit of the Client identified on the cover page of this report. The purpose for which this report shall be used shall be limited to the use as stated in the contract between the client and Nova Group, GBC.

This report, or any of the information contained therein, is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of Nova Group, GBC. Any reuse or distribution without such consent shall be at the client's or recipient's sole risk, without liability to Nova Group, GBC.

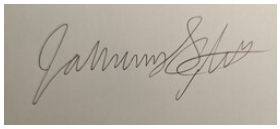
Estimated installation costs are based on Nova Group, GBC experience on similar projects and industry standard cost estimating tools including *RS Means*. Since actual installed costs may vary widely for particular installation based on labor & material rates at time of installation, Nova Group, GBC does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein. We strongly encourage the owner to confirm these cost estimates independently. Nova Group, GBC does not guarantee the costs savings estimated in this report. Nova Group, GBC shall in no event be liable should the actual energy savings vary from the savings estimated herein.

Nova Group, GBC certifies that Nova Group, GBC has no undisclosed interest in the subject property and that Nova Group, GBC employment and compensation are not contingent upon the findings or estimated costs to remedy any deficiencies due to deferred maintenance and any noted component or system replacements.

Respectfully submitted,

NOVA GROUP, GBC

Reviewed by:



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1.0 EXECUTIVE SUMMARY

1.1 General Description

1.1.1 Purpose

The purpose of this MERP Level 2 Energy Audit is to provide the State of Vermont - Building and General Services and Brandon - Waste Water Treatment Plant with energy efficiency opportunities at the facility and specific recommendations for Energy and Conservation Measures (ECM's). Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Utility grants towards energy conservation, or as a basis for replacement of equipment or systems.

1.1.2 Scope of Work

1.1.2.1 Energy Audit Scope of Work

The purpose of this Energy Assessment is to provide the State of Vermont - Building and General Services and Brandon - Waste Water Treatment Plant with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, as well as support performance contracting, justify a municipal bond-funded improvement program, or as a basis for replacement of equipment or systems.

The energy assessment consisted of an onsite visual assessment to determine current conditions, itemize the energy consuming equipment (i.e. Boilers, Make-Up Air Units, DWH equipment); review lighting systems both exterior and interior; and review efficiency of all such equipment. The study also included interviews and consultation with operational and maintenance personnel. The following is a summary of the tasks and reporting that make up the Energy Assessment portion of the report.

The following is a summary of the tasks and reporting that make up the Energy Assessment portion of the report.

Energy and Water Using Equipment

Nova Group, GBC has surveyed the tenant spaces, common areas, offices, maintenance facilities and mechanical rooms to document utility-related equipment, including heating systems, cooling systems, air handling systems and lighting systems.

Building Envelope

Nova Group, GBC has reviewed the characteristics and conditions of the building envelope, checking insulation values and conditions where accessible. This review also includes an inspection of the condition of walls, windows, doors, roof areas, insulation and special use areas.

Recommendations for Energy Savings Opportunities

Based on the information gathered during the on-site assessment, the utility rates, as well as recent consumption data and engineering analysis, Nova Group, GBC has identified opportunities to save energy and provide probable construction costs, projected energy/utility savings and provide a simple payback analysis.

Energy Assessment Process

- Interviewing staff and review plans and past upgrades
- Performing an energy assessment for each use type. Performing a preliminary evaluation of the utility system
- Making preliminary recommendations for system energy improvements and measures
- Estimating initial cost

Reporting

The Nova Group, GBC Energy Assessment Report includes:

- A comprehensive study identifying all applicable Energy Conservation Measures (ECMs) and priorities, based on initial cost.

1.2 Findings

1.2.1 Energy Conservation Measure Sorting

Simple Payback Period – The number of years required for the cumulative value of energy cost savings less future non-fuel costs to equal the investment costs of the building energy system, without consideration of discount rates. ECMs with a payback period greater than the Expected Useful Life (EUL) of the project are not typically recommended for loan-funded energy projects, as the cost of the project will not be recovered during the lifespan of the equipment; however they will be considered for energy projects funded by the MERP Implementation Grant. These ECMs are recommended for implementation during future system replacement. At that time, replacement may be evaluated based on the premium cost of installing energy efficient equipment. The ECMs presented in the table below are presented in order of priority of payback, however ECM's involving resilience components will be prioritized accordingly.

Simple Payback = Initial Cost/Annual Savings

Interactive Energy Conservation Measures - This analysis excludes the interactive effects of Energy Conservation Measures. Due to the significant interactive effects between the ECMs that include the replacement or modification of the Heating Ventilation and Air Conditioning Systems and the other recommended ECM's, the HVAC ECMs are presented independently of the ECMs that do not include the replacement or modification of HVAC equipment. Furthermore, a 10% discount in energy savings was applied to account for the interactive effects amongst the ECMs. In addition to the consideration of the interactive effects, Nova Group, GBC has applied a 15% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs.

Interactive Energy Conservation Measures - The change in resultant energy saving estimates due to implementing multiple Energy Conservation Measure's that have indirect impacts on one another.

1.2.2 Assumptions

Nova Group, GBC has made the following assumptions in calculation of the Energy Conservation Measures.

- Building operating hours are assumed to be 49 hours per week.
- The facility occupancy is assumed to be three (3) people.
- Annual Heating Equipment Operating Hours vary between each building.
- Annual Cooling Equipment Operating Hours vary between each building.

1.2.3 Recommendations

Nova Group, GBC has recommended one (1) HVAC Energy Conservation measure option and thirteen (13) Energy Conservation Measures (ECMs) that do not modify or replace the existing HVAC.

HVAC option one (1) includes replacing the existing propane boiler in Building 2 with a propane condensing boiler and replacing the three (3) existing propane unit heaters in Buildings 3, 4, & 5 with electric unit heaters.

The savings for each measure is calculated using standard engineering methods followed in the industry.

The following table summarizes the recommended ECMs in terms of description, investment cost, energy consumption reduction, and cost savings.

Evaluated Energy Conservation Measures: Financial Impact		
	HVAC Option - Propane Furnace and Unit Heaters	**ECM Package Excluding HVAC**
Total Projected Initial ECM Investment	$ 66,700	$ 102,601
Estimated Annual Cost Savings Related to all ECMs	$ (670)	$ 5,556
Estimated Annual Cost Savings- Electricity	$ (8,116)	$ 559
Estimated Annual Cost Savings- Propane	$ 7,446	$ 4,996
Estimated Annual Cost Savings- Natural Gas	N/A	N/A
Estimated Annual Cost Savings- Fuel Oil	N/A	N/A
Net Effective ECM Payback	N/A	18.47 Years
Estimated Annual Energy Savings	3%	9%
Estimated Annual Utility Cost Savings (excluding water)	-1%	8%

Solar and Battery Analysis

Nova Group, GBC has evaluated the site for a two (2) potential combined solar and battery systems, estimated at $1,663,111 and $1,905,551 respectively (Total Investment Cost).

Option 1 includes a 202.0 kW rated solar panel system and a 1,400 kWh storage battery system, sized for the current electric demand.

Option 2 includes a 234.2 kW rated solar panel system and a 1,600 kWh storage battery system, sized for the future electric demand if electric unit heaters were implemented.

Based on the roofing material incompatibility with solar arrays and the availability of land on the property, a ground mounted solar system is recommended.

The current electrical panel will likely need to be upgraded, a licensed electrical engineer should be consulted to verify.

The system was designed with a depth of discharge at 50% and a cold weather factor of 1.3 to provide energy for one (1) full day of power. The system assumes that net metering will be available as an option if the building needs are met. For additional information please see Appendix D.

On Site RENEWABLE GENERATION Solar Photovoltaic Analysis with Battery		
	Option 1 - Current Electric Demand	Option 2 - Proposed Electric Demand
Estimated number of panels	546	633
Estimated kW Rating	202.0 kW	234.2 kW
Potential Annual kWh Produced	251,674 kWh solar system with a 1,400 kWh battery storage system	291,776 kWh solar system with a 1,600 kWh battery storage system
% of Current Electricity Demand	100%	101%
New Ground Mount Cost	$213,667	$245,289
New Electrical Panel Cost	$25,000	$25,000
Battery Investment Cost	$980,000	$1,120,000
Solar Investment Cost	$444,444	$515,262
Federal Investment Tax Credit (FITC)	$427,233	$490,579
Total Investment Cost (Solar+ Battery + Electrical Panel + Ground Mount)	$1,663,111	1,905,551
Estimated Annual Energy Cost Savings	$48,588	$56,330
Payback without Incentives	34 Years	33 Years
Payback with all Incentives	25 Years	25 Years

1.2.4 ECM Recommendations

HVAC Energy Conservation Measures

Evaluated HVAC Energy Conservation Measures with Savings												
ECM #	Description of ECM	Projected Initial Investment ($)	Natural Gas (Therms)	Propane (gal)	No. 2 Oil (gal)	Wood Pellets (Tons)	Electricity (kWh)	Energy Savings (kBTU)	% Savings (Energy)	Estimated Annual Maintenance Savings	Total Estimated Annual Cost Savings ($)	Simple Payback (Years)
Evaluated Measures												
1a	Replace the existing propane boiler in Building 2 with a propane condensing boiler with a minimum efficiency of 95% AFUE.	$ 13,000	N/A	529	N/A	N/A	N/A	48,335	3.2%	N/A	$ 1,875	6.93
1b	Replace the three (3) existing propane unit heaters in Buildings 3, 4, & 5 with electric unit heaters rated at 97% AFUE .	$ 45,000	N/A	1,623	N/A	N/A	(38,218)	18,037	1.2%	$ 600	$ (1,620)	N/A
	Totals	$ 58,000	N/A	2,152	N/A	N/A	(38,218)	66,372	4.4%	$ 600	$ 256	N/A
	Interactive Savings Discount @ 10%	N/A	N/A	2,099	N/A	N/A	(42,039)	48,499	3.2%	$ 600	$ (670)	N/A
	Total Contingency Expenses @ 15%	$ 66,700	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Totals for Improvements	$ 66,700	N/A	2,099	N/A	N/A	(42,039)	48,499	3.2%	$ 600	$ (670)	N/A

Energy Conservation Measure Options Excluding HVAC

Evaluated Energy Conservation Measures with Savings													
ECM #	Description of ECM	Projected Initial Investment ($)	Natural Gas (Therms)	Propane (gal)	No. 2 Oil (gal)	Steam (ML)	Wood (Tons)	Electricity (kWh)	Energy Savings (kBTU)	% Savings (Energy)	Total Estimated Annual Cost Savings ($)	Estimated annual Maintenance Savings	Simple Payback (Years)
Evaluated Measures													
1	Insulate exposed heating hot water lines with R-4 or greater insulation.	$ 150	N/A	272	N/A	N/A	N/A	N/A	24,893	1.7%	$ 966	N/A	0.16
2	Insulate exposed domestic hot water lines with R-4 or greater insulation.	$ 60	N/A	N/A	N/A	N/A	N/A	319	1,090	0.1%	$ 62	N/A	0.97

Evaluated Energy Conservation Measures with Savings													
3	Install a programmable thermostat to control the heating systems.	$ 1,000	N/A	280	N/A	N/A	N/A	N/A	25,574	1.7%	$ 992	N/A	1.01
4	Replace the existing bathroom aerators with new WaterSense certified 1.0 GPM aerators.	$ 20	N/A	N/A	N/A	N/A	N/A	51	172	0.01%	$ 10	N/A	2.05
5	Insulate the electric storage tank water heater with R-8 tank-wrap insulation.	$ 150	N/A	N/A	N/A	N/A	N/A	306	1,044	0.1%	$ 59	N/A	2.54
6	Improve air sealing by reducing the ACH50 rate to the following (or lower): Building 2 - 10.4 ACH 50 Building 3 - 6.8 ACH50 Building 5 - 11.5 ACH50	$ 3,003	N/A	327	N/A	N/A	N/A	N/A	29,894	2.0%	$ 1,160	N/A	2.59
7	Replace the existing clothes washer with a new ENERGY STAR clothes washer	$ 1,200	N/A	N/A	N/A	N/A	N/A	379	1,293	0.1%	$ 73	N/A	16.40
8	Upgrade lighting with ENERGY STAR or DLC certified LED technologies. Please see the lighting tool for specific recommendations.	$ 4,250	N/A	N/A	N/A	N/A	N/A	1,325	4,521	0.3%	$ 256	$ 2	16.61
9	Add loose fill roof insulation to the original building roof to achieve a uniform R-49 coverage.	$ 37,485	N/A	575	N/A	N/A	N/A	N/A	52,555	3.5%	$ 2,039	N/A	18.38
10	Replace the existing clothes dryer with a new ENERGY STAR clothes dryer	$ 1,200	N/A	N/A	N/A	N/A	N/A	184	628	0.04%	$ 36	N/A	33.78
11	Replace the three (3) existing refrigerators with new ENERGY STAR rated refrigerators.	$ 4,500	N/A	N/A	N/A	N/A	N/A	656	2,238	0.1%	$ 127	N/A	35.53
12	Replace the current single-paned windows with new ENERGY STAR rated double pane windows, minimums U-value .35, minimum SHGC .50.	$ 19,200	N/A	98	N/A	N/A	N/A	N/A	8,965	0.6%	$ 348	N/A	55.20
13	Replace the two overhead garage doors in B5 with new insulated overhead garage doors, R-21.	$ 17,000	N/A	13	N/A	N/A	N/A	N/A	1,209	0.1%	$ 47	N/A	362.31
Totals		$ 89,218	N/A	1,565	N/A	N/A	N/A	3,220	154,077	10.2%	$ 6,173	$ 2	14.45
Interactive Savings Discount @ 10%		N/A	N/A	1,408	N/A	N/A	N/A	2,898	138,669	9.2%	$ 5,556	$ 2	N/A
Total Contingency Expenses @ 15%		$ 102,601	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals for Improvements		$ 102,601	N/A	1,408	N/A	N/A	N/A	2,898	138,669	9.2%	$ 5,556	$ 2	18.47

1.2.5 Measures that Warrant Further Study

The following items are presented for consideration in operational and capital planning:

- Replace 1.6 GPF toilet with 1.28 GPF toilet for water savings

ENERGY CALCULATIONS AND ASSUMPTIONS

A property energy model was created using spreadsheet calculations based on appropriate and industry-accepted engineering formulas and standards for organizations such as ASHRAE. Nova cost estimates are based on construction cost data from sources such as RS-Means and technical discussions with equipment manufacturers and local contractors. The property owner may wish to solicit competitive bids from qualified contractors to ensure the most accurate pricing. Nova's cost estimates are general industry standards and may not account for all variations and specificities related to this site.

The building's historical energy consumption and the data collected on site were analyzed and "trued-up" in order to create energy models of the building systems. These models were used to predict energy and cost savings for the recommended measures. For this audit, Nova used proprietary spreadsheet models to estimate savings for the proposed retrofits.

Key information on building systems, including the results of performance tests conducted onsite are included in the tables on the following pages.

2.0 PROPERTY OVERVIEW

The facility consists of five (5) buildings: the original building (Building 1), the main building (Building 2), the New Chemical Building, the North Garage and the South Garage (Buildings 3, 4 and 5). The sixth building on the property, a garage on the northeast corner of the property, is not part of the Wastewater Treatment Plant. It is operated by Parks and Recreation and operates on a different electrical meter. There is a new treatment pond on site, South of building two, with a below grade pump room with a roof hatch access near grade. The new system equipment has been tested but was not operating the day of the inspection.

Facility Schedule	
Building Type/Name	Wastewater Treatment Plant
# of Stories	One-story buildings plus basements
Year Built/Renovated	1960, 1975, 2005
Building Size	Building 1 (Secondary) - 1st FL and Basement - 1,908 sqft Building 2 (Primary) - 1st FL and Basement - 3,353 sqft Building 3 (Chemical) - 360 sqft Building 4 (North Garage) - 1,207 sqft Building 5 (South Garage) - 900 sqft 7,728 Total Square Feet
Hours of Operations/Week	49 hours
Operational Weeks/Year	52 weeks
Estimated Facility Occupancy	Three people

Property Contact	
Point of Contact Name	Steve Cijka
Point of Contact Title	Plant Manager
Point of Contact - Contact Number	(802) 247-6730

3.0 SITE VISIT

The objective of the Document Review and Interview process is to augment the walk-through survey and to further assist in understanding the Site's latent physical components, physical deficiencies as well as preceding or on-going efforts toward energy and water conservation and/or waste diversion. The information obtained as a result of the Document Review and Interview process is assumed to be true and correct, provided that such information appears to be reasonable.

3.1 Site Visit Information

SITE VISIT INFORMATION	
Date of Site Observation	May 23rd, 2024
Weather Conditions	Partly Cloudy, 68°F°F
Nova Field Associate	Johanna Stuz, BPI-BA
Nova Reviewers	Frank Castro, CEM Keely Felton, CEA Morgan Carson, CEM

3.2 Interviews

PROVISION OF INFORMATION	
	Property Management did not provide us with service provider information as requested in our Pre-Survey Questionnaire.
✔	Property Management did provide us with some information regarding service providers.

Based upon the Pre-Survey Questionnaire and the interview process, the individuals and organizations listed below were contacted and/or interviewed:

INTERVIEWS					
Service Provider/Property Rep.	**Title / Organization**	**Contact Information**	**Contact Attempted**	**Contact Made**	**No Reply / No Response**
Steve Cijka	Plant Manager, Town of Brandon	(802) 247-6730		✔	

4.0 ENERGY AUDIT - HISTORIC UTILITY CONSUMPTION

4.1 Utility Consumption

A preliminary end use analysis was performed on the subject property to understand how the property is using energy, to understand its performance relative to similar properties and to establish baseline GHG Emissions.

4.1.1 Historical Energy Consumption and Costs

Site Utilities	
Facility Electric Service Size	Building 1 has one (1) 400 Amp Main Breaker. Building 2 has two (2) 225 Amp Main Breakers. The Chemical Building and the two (2) Garages are sub panels off the Buildings 1 and 2 Main Breakers. The primary breaker to the facility was not found and is likely to be inside of a locked utility cabinet.
Onsite Transformer	There are two transformers on-site. One is in Building 1 on the ground level floor and one is in the basement vault of Building 2. Building 1 Transformer: Eaton, Model V48M28T7516; Design V75DA001; Manufactured 2022 Building2 Transformer: Eaton, Model V48M28T7516; Design V75DA001; Manufactured 2022
Electric Meter Location	Pole Mount Near Building 2

Utility Analysis						
Utility Type	**Utility Provider**	**Meter Quantity**	**Energy/Water Uses**	**Annual Consumption**	**Est./Act.**	**Annual Cost**
Electric (Grid)	Green Mountain Power	One (1)	Large Pumps, Large Motors, Space Heating and Cooling, Lighting, Appliances, Plug Loads, and Water Heating	251,799 kWh	Actual	$48,325 (calculated using Green Mountain Power rate of $0.19306 per kWh)
Propane	Suburban	None	Space Heating	6,946 Gal	Actual	$24,644 (calculated using EIA rate of $3.548 per gallon)

4.1.2 On-Site Utility Storage

Propane is stored on-site.

Onsite Utility Storage
Battery Storage

Onsite Utility Storage	
Storage Capacity	None
Year Installed	N/A
Location Installed	N/A
Space Served	N/A
Fossil Fuel Storage	
No. 2 Oil	None
Propane Gas	Two (2) 1000-gallon buried tanks and eight (8) 120 gallon above ground tanks
Wood Chips/Pellet	None

4.1.3 On-Site Generation

There is a 100 kW propane fired generator on-site.

Emergency Backup Generators	
Generator Capacity	100 kW
Year Installed	2007
Location Installed	Pad Mount, Near Center of Facility
Space served	Entire Facility
Generator Fuel	Propane
Make	Cummins

4.1.4 On-site Electric Vehicle Charging

There are no electric vehicle charging stations on-site.

Onsite Electric Vehicle Charging	
Installed Chargers	None
Electrical Charger Type	N/A
Location Installed	N/A
Charger Manufacturer	N/A
Electric Metering to Chargers	N/A
Recommendations	Electric vehicle charging is not recommended since there is no designated parking area.

4.2 Heating Fuel

Nova was provided with twenty-four (24) months of propane usage totals in Excel format from the property. Total consumption was provided. Cost was calculated using the EIA rate of $3.548 per gallon. The most recent year of historical data was considered in Nova's analysis.

The following chart shows propane consumption month by month for the period from 1/1/2023 to 12/31/2023.

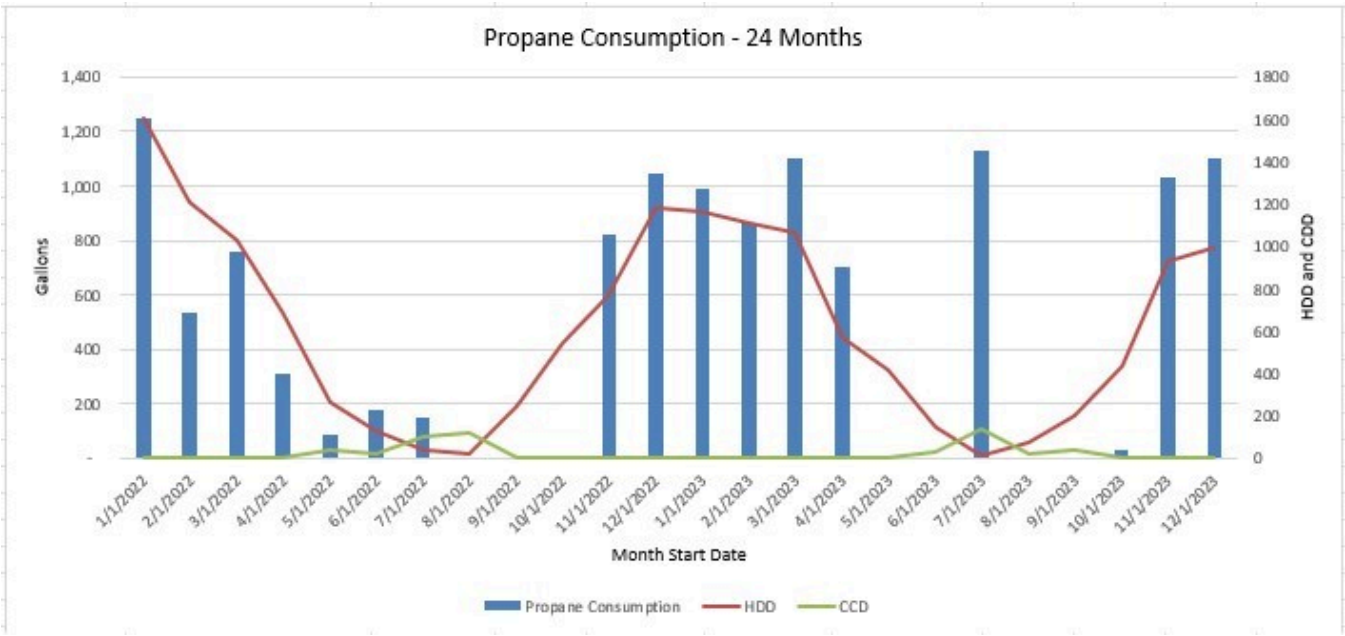
4.2.1 Provision of Data

ANNUAL CONSUMPTION FOR HEATING FUEL					
Start	**End**	**Consumption**	**Cost (calculated using EIA rate)**	**Estimated**	**Days**
1/1/2022	12/31/2022	5,147	$18,262.27	Actual	365
1/1/2023	12/31/2023	6,946	$24,644.41	Actual	365

PROPANE CONSUMPTION					
Start	**End**	**Consumption (Gallons)**	**Cost (calculated using EIA rate)**	**Estimated?**	**Days**
1/1/2023	1/31/2023	990	$ 3,512	No	31
2/1/2023	2/28/2023	867	$ 3,074	No	28
3/1/2023	3/31/2023	1,101	$ 3,905	No	31
4/1/2023	4/30/2023	704	$ 2,499	No	30
5/1/2023	5/31/2023	-	$ -	No	31
6/1/2023	6/30/2023	-	$ -	No	30
7/1/2023	7/31/2023	1,127	$ 3,997	No	31
8/1/2023	8/31/2023	-	$ -	No	31
9/1/2023	9/30/2023	-	$ -	No	30
10/1/2023	10/31/2023	30	$ 107	No	31
11/1/2023	11/30/2023	1,028	$ 3,649	No	30
12/1/2023	12/31/2023	1,099	$ 3,900	No	31
		6,946	$ 24,644		0

4.2.2 Analysis

When charted against heating degree days, it is evident that owner-paid propane consumption peaks during the colder months, likely due to increased heating load. There is a spike in usage in July 2023 that does not follow seasonal trends. This is likely due to to refilling the propane tank to be ready for the heating season.



4.3 Electricity

4.3.1 Provision of Data

Nova was provided with twenty-four (24) months of electricity usage history in Excel format from the property. Total consumption was provided. Cost was calculated using the Green Mountain Power tariff of $0.19306 per kWh. The most recent twelve (12) months of historical data was considered in Nova's analysis.

The following charts show electricity consumption totals month by month for the period from 1/1/2023 to 12/31/2023.

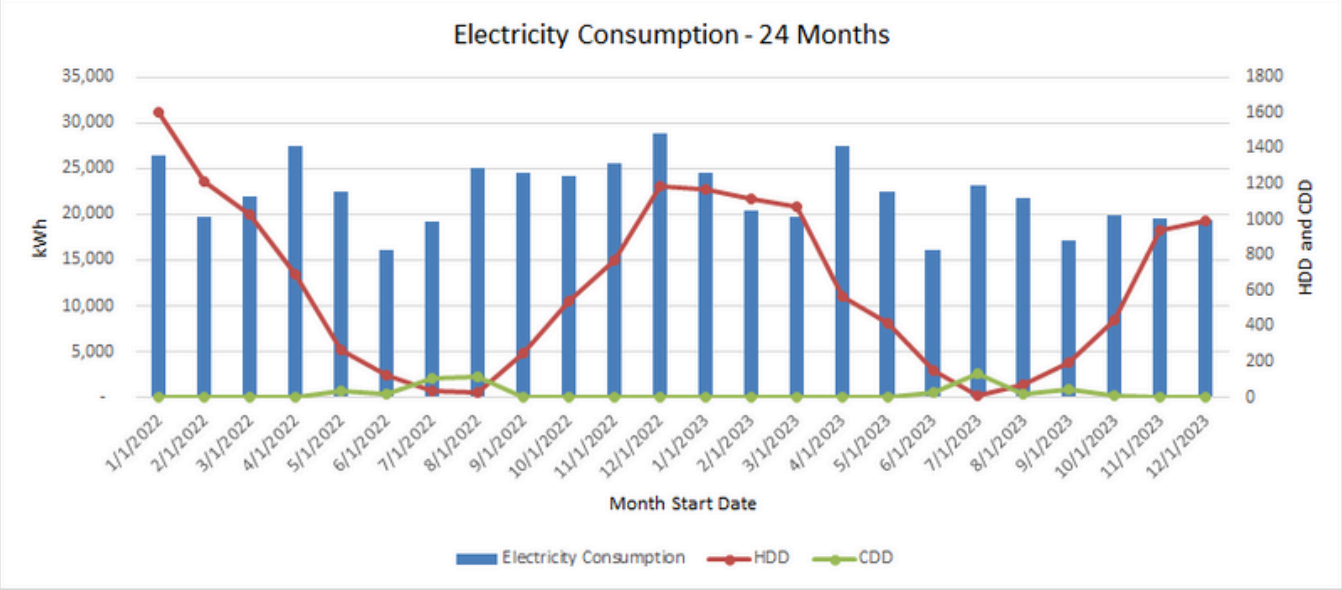
Annual Consumption of Electricity					
Start	**End**	**Consumption**	**Cost**	**Estimated**	**Days**
1/1/2022	12/31/2022	281,527	$53,124.14	Actual	365
1/1/2023	12/31/2023	251,799	$47,514	Adjusted (3 months of data were missing - added estimate of consumption based on historical monthy consumption average)	365

ELECTRICITY CONSUMPTION					
Start	**End**	**Consumption (kWh)**	**Cost (calculated using tariff rate)**	**Estimated?**	**Days**
1/1/2023	1/31/2023	24,557	$ 4,741	No	31
2/1/2023	2/28/2023	20,480	$ 3,954	No	28
3/1/2023	3/31/2023	19,744	$ 3,812	No	31
4/1/2023	4/30/2023	27,399	$ 5,170	Yes	30

ELECTRICITY CONSUMPTION					
Start	**End**	**Consumption (kWh)**	**Cost (calculated using tariff rate)**	**Estimated?**	**Days**
5/1/2023	5/31/2023	22,452	$ 4,237	Yes	31
6/1/2023	6/30/2023	16,194	$ 3,056	Yes	30
7/1/2023	7/31/2023	23,166	$ 4,472	No	31
8/1/2023	8/31/2023	21,836	$ 4,216	No	31
9/1/2023	9/30/2023	17,134	$ 3,308	No	30
10/1/2023	10/31/2023	19,844	$ 3,831	No	31
11/1/2023	11/30/2023	19,606	$ 3,785	No	30
12/1/2023	12/31/2023	19,387	$ 3,743	No	31
		251,799	$ 48,325		

4.3.1.1 Analysis

When charted against heating degree days, it is evident that whole property electric consumption peaks during the colder months, likely due to increased heating load. The site has a very high baseload since it is a waste water treatment facility which utilizes multiple pumps and motors in order to operate.



4.3.1.2 Renewable (Green Power) Energy Sources

No renewables or energy generation systems were observed on site.

4.4 Utility Rate Structure Analysis

Rates for common area utilities were provided on the utility tariff for each company.

UTILITY RATE STRUCTURE ANALYSIS						
Service	**Utility**	**Rate**	**Service/Customer Charge**	**Demand Charge**	**EIA Rate**	**Rate Used In Calculation**
Electricity	Green Mountain Power (GMP)	$0.19306 per kWh	$0.690 per day	No	$0.1887 per kWh	$0.19306 per kWh
Propane	Suburban	Rates vary	NA	No	$3.548 per gallon	$3.548 per gallon

4.4.1 Billing Irregularities

Spike in July 2023 propane usage likely due to refilling of propane tank in anticipation of upcoming heating season.

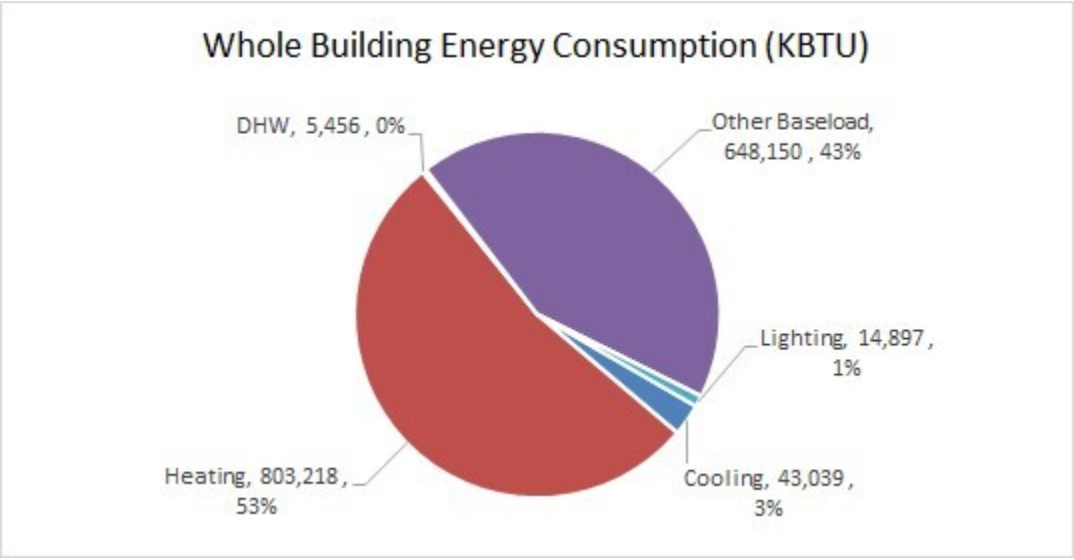
Also, three months of 2023 electricity consumption data was missing, so estimate of consumption was added to those months based on historical monthy consumption average.

4.5 Utility End Use Analysis

Utility end use at the subject property was observed to be consistent with other buildings with the similar occupancy and HVAC equipment.

4.5.1 End Use Breakdown

The figure below shows an annual breakdown of energy consumption for the entire facility. Electric baseload uses include appliances, large pumps and motors, plug loads, lighting and domestic hot water. Liquid Propane is delivered for heating only, therefore a separate graph is not included.



5.0 EXISTING SYSTEMS AND EQUIPMENT - ENERGY

5.1 Existing Conditions

This section includes an inventory of existing systems and equipment and their current conditions.

Detailed equipment tables are included in Exhibit C of this report.

5.2 Building Envelope

Building 1 was constructed in 1965. It a has a basement pump room for the main sewer pond. The foundation below grade walls and floor are poured concrete. The above grade walls are brick with a CMU block framed addition. The ceiling is vaulted. The windows for the gable walls above the top plates are plexi-glass and are broken in the corners.

Building 2 was constructed in 1975. The first story is an office and laboratory. The basement is a pump room for two ponds; The walls in the basement to the North and to the South are insulated with spray foam. The below grade walls and floor are poured concrete. Some of the this pump room basement has a roof of black rubber level with the first story floor with exhaust fan vent and access hatches. The above grade walls are brick. The roof is a vented attic, assumed to be wood frame and insulated with fiberglass batts.

Building 3 was constructed in 2005 for a chemical tank storage. The foundation is poured slab on grade. The walls are reinforced CMU blocks. The interior is finished with gypsum drywall on the walls and flat ceiling. The ventilated attic is made of wood framed trusses and insulated with fiberglass batts on the ceiling.

The fourth building is a garage built after 1970. The foundation is a poured concrete slab on grade. The exterior siding is wood panel T-111. The walls and roof are wood framed. The walls are insulated with R-11 from 3.5 inches of fiberglass batts The ventilated attic is insulated with R-19 from 5.5 inches of fiberglass batts on the flat ceiling.

The fifth building is a garage built after 1970. The foundation is poured concrete slab on grade. The walls and roof are wood framed. It is assumed to be insulated with fiberglass batts.

The sixth "building" is a below grade pump room just south of Building 2 that houses a new pond pump . The pump room is accessed through a metal hatch in the near grade black rubber roof. This "building" is heated with an electric unit heater. **This building is NOT OPERATIONAL as of the writing of this report.**

5.2.1 Structure

STRUCTURE	
Component	**Description**
Construction Drawings	Construction drawings were not made available for review
Foundation Type	Buildings 1 & 2 are built over vault basements. Buildings 3, 4, and 5 are on slab on grade foundations.

STRUCTURE	
Component	**Description**
Wall Type and Framing	Buildings 1 & 2 below grade walls are poured concrete. Their above grade walls are brick, with the addition at Building 1 CMU block frame. Building 3 is made up of CMU block frame. Buildings 4 & 5 are conventional wood stud framing.
Upper Floor Framing	N/A
Exterior Facade Description	Buildings 1, 2, & 3 have brick exterior facades. Buildings 4 & 5 have wood siding.
Wall Insulation Verification	Insulation was verified via discussions with maintenance staff.
Roof Type	Buildings on site are constructed with gable roofs
Roof Framing	Roof framing consists of pre-manufactured wood trusses, supporting plywood or OSB roof sheathing.
Roofing Material	Building sloped roofs are standing seam metal
Median Roof Age	The standing seam metal roofs of all buildings were installed in 2015.
Roofing Reflectance	0.05 - 0.08 which is not considered reflective
Roof Water Intrusion	No evidence of active roof leaks was reported or observed.
Roof Insulation Verification	Insulation was verified visually and via discussions with maintenance staff.

ENVELOPE INSULATION			
Slab	**Basement Walls**	**Above Grade Walls**	**Roof/Attic**
No Insulation	No Insulation	Building 1, 2, and 3 are reinforced masonry; Building 4 and 5 are wood framed with 3.5" Fiberglass Batt, R-11	Bldg 1 - Vaulted Ceiling - R-12 (assumption based on vintage) Bldg 2 - R-12-(assumption based on vintage) Bldg 3 - 5.5" Fiberglass Batt, R-19 Bldg 4 - 5.5" Fiberglass Batt, R-19 Bldg 5 - 5.5" Fiberglass Batt, R-19 (assumption based on similar garage)

DOORS AND WINDOWS	
Component	**Description**
Windows	
Window Frame	Windows are steel framed except for in the North Garage which has vinyl framed windows.
Window Operation	Windows that are operable are crank vent windows except for in the North Garage which has sliders.
Window Glazing	Windows are double glazed except for the Gable windows of Building One (1) which are triangular, site built and single glazed.
Window Weatherstripping	Weather stripping does appear to provide an adequate air seal to the exterior.
Window Age	Windows appear to be original to the property.
Window Center of Glass (COG) Values	Single Pane Metal - U-factor 1.19, SHGC 0.83 Double Pane Metal - U-factor 0.79, SHGC 0.7 Double Pane Vinyl - U-factor 0.51, SHGC 0.60
Window Tint/Films	Windows are not tinted.

DOORS AND WINDOWS	
Component	**Description**
Window to Wall Ratio	Building 1: 2.0% (3,845 square feet of above and below grade wall surface area; 76 square feet of window surface area) Building 2: 1.4% (4,408 square feet of above and below grade wall surface area; 60 square feet of window surface area) Chemical Building: 2.6% (760 square feet of exterior wall surface area; 20 square feet of window surface area) North Garage: 6.1% (1,190 square feet of exterior wall surface area; 72 square feet of window surface area) South Garage: 3.6% (1,020 square feet of exterior wall surface area; 36 square feet of window surface area)
Doors	
Main Entry Doors	Entry doors are metal doors in metal frames; partially double glazed.
Door Weatherstripping	Weather stripping does appear to provide an adequate air seal to the exterior except for the South Garage which has leaky overhead doors.
Door Age	Doors appear to be original to the property.
Overhead Doors	There are a total of seven (7) overhead doors. Building 2 has one (1) 7' wide by 7' tall metal, uninsulated, unglazed overhead door. The North Garage has four (4) 9' wide by 10' tall, vinyl over metal frame, insulated overhead doors with three (3) square feet of double glazed window surface each. The South Garage has two (2) 10' wide by 8' tall, metal, insulated overhead doors. Each door has eighteen (18) square feet of single glazed window area.

Blower Door Testing	
Blower Door Equipment	Retrotec
Building Volume	Of the five (5) Wastewater Treatment Plant buildings, only four (4) could be Blower Door tested because the North Garage does not have a standard entry door. It only has overhead doors that the Blower Door frame will not fit. Building 1 Volume: 26,710 cubic feet (11,450 cubic feet - 1st FL) Building 2 Volume: 42,993 cubic feet (14,817 cubic feet - 1st FL) Chemical Building Volume: 3,600 cubic feet South Garage Volume: 7,650 cubic feet
Leakage Rate @ -50 Pa (CFM50)	Building 1 CFM50: 1,115 CFM50 Building 2 CFM50: 2,865 CFM50 Chemical Building CFM50: 451 CFM50 South Garage CFM50: 1,630 CFM50
Leakage Rate ACH50	Building 1: 5.8 ACH50 (based only on 1st FL volume) Building 2: 11.6 ACH50 (based only on 1st FL volume) Chemical Building: 7.5 ACH50 South Garage: 12.8 ACH50

Blower Door Testing	
Noted areas of infiltration	Building 1: There is air leaking around the gable walls, window frames, and door frames. Building 2: There is air leaking around the door frames, windows frames, top plates, and openings for ventilation (this was closed for the test). Chemical Building: There is air leaking around the double door frames, window frames, the attic access hatch, and openings for ventilation (was closed for the test). Four Bay Garage - North: There is air leaking around the overhead door frames, window frames, attic access hatch, bottom plates, unsealed wood panels at the interior and exterior siding, and a broken window. South Garage: There is air leaking around the overhead door frames, bottom plates, and penetrations in the walls.

Infrared Imaging	
Infrared Equipment	Flir One (1) Pro
Outdoor temperature	78 degrees F
Indoor space temperature	70 degrees F
Infrared Comments	Building One: The doors, gable windows, concrete floor, and concrete basement walls are cold. Building Two: The basement roof hatch, concrete walls and floor below grade are cold and there is heat from the blower motor room. Building Three: The attic access hatch, top plates, and window and doors are cold. Building Four: The overhead doors, windows, raised sill plates, and top plates are cold. Building Five: The overhead doors, entry door, and top plates are cold.

5.3 Heating, Ventilation and Air Conditioning (HVAC)

5.3.1 Heating

Building 1 and 2 are heated with a hydronic boiler via radiators and hydro fan coils.

Building 3, 4, and 5 are heated with propane unit heaters.

The below grade pump room for the new pond is heated with an electric unit heater.

HEATING SYSTEM SUMMARY			
	Heating System Type 1	**Heating System Type 2**	**Heating System Type 3**
Area Served	Buildings 1 and 2	Buildings 3, 4, and 5	Building 6 (Below Grade Pump)
Heating System Type	Boiler	Monitor Heater	Monitor Heater
Heating Fuel	Propane	Propane	Electric
Heating System Configuration	Heating systems are centrally located and shared between common spaces	Individual heating systems are installed in common spaces	Individual heating systems are installed in common spaces
Heating Equipment Location	Central mechanical room	Ceiling Mounted	Ceiling Mounted
Typical Range of Efficiency	80-95% AFUE	80 - 83% AFUE	100% AFUE
Equipment Manufacture Date Range	2017-2021	2022	2022
Quantity	2	3	1
Access Issues	None	None	None
Description of Variation in Type, Fuel, Configuration or Location Between Areas	Building 1 has a newer, more efficient, small water reservoir. Building 2 serves a larger interior space that is adjacent to two (2) large ponds.	Unit Heater	Unit Heater -currently building non-operational

COMMERCIAL HEATING EQUIPMENT - PROPERTY WIDE	
Sample Representation	100% of systems on site were observed as part of the sample.
Explanation of Discrepancy	None
Heating Systems Recommended for Replacement	Heating systems serving the Building 2, 3, 4, and 5.
Reason for Replacement	Equipment efficiency could be improved to achieve savings goals

5.3.2 Cooling

Cooling is provided to the Laboratory Office in Building 2, via one (1) mini-split heat pump. The other five buildings are only heated.

COOLING SYSTEM SUMMARY	
	Cooling System
Area Served	Laboratory Office in Building 2
Cooling System Type	Air Source Heat Pump - Ductless

COOLING SYSTEM SUMMARY	
	Cooling System
Cooling System Configuration	Individual cooling systems are installed to serve each common space
Cooling Equipment Location	Ground Pad
Typical Range of Efficiency	18.6 SEER
Equipment Manufacture Date Range	2022
Quantity	One (1)
Access Issues	None
Description of Variation in Type, Fuel, Configuration or Location Between Areas	None

COMMERCIAL COOLING EQUIPMENT - PROPERTY WIDE	
Sample Representation	100% of systems on site were observed as part of the sample.
Explanation of Discrepancy	None
Cooling Systems Recommended for Replacement	N/A
Reason for Replacement	N/A

5.3.3 Dehumidification

There is a portable dehumidifier in the basement of Building 1.

DEHUMIDIFICATION SYSTEM SUMMARY	
Area Served	Building 1 Basement
System Capacity	30 Pints per Day; unplumbed, hose to drain
Equipment Location	Building 1 Basement
Typical Range of Efficiency	1.23 L/kWh
Equipment Manufacture Date Range	2020
Quantity	One (1)
Access Issues	None
Description of Variation in Type, Fuel, Configuration or Location Between areas	N/A

5.3.4 Distribution, Controls and Ventilation

Heat is distributed by hydrocoils in Building One (1) and Building Two (2). The Chemical Building and the two (2) garages have point source furnaces. Only the Lab and Office area of Building Two (2) is air conditioned, distribution is point source. Thermostats are non-programmable. Restrooms are mechanically ventilated.

DISTRIBUTION & CONTROLS	
Ducted Distribution	
HVAC Duct Location	N/A
Access HVAC to Ductwork	N/A
HVAC Ductwork Air Sealing	N/A
HVAC Duct Insulation	N/A

DISTRIBUTION & CONTROLS	
Affected Systems	N/A
HVAC Blower Fan Motors	
Type of Blower Fan Motors	Shaded Pole or Permanent Split Capacitor
Hydronic or Steam Distribution	
Type of Distribution	Hydronic fan coils
Hydronic or Steam Pipe Insulation	Yes
Affected Systems	Heating
Controls	
Common Area Thermostats	Non-programmable
Building Automation System	N/A
Heating Setpoints	68 degrees F
Cooling Setpoints	74 degrees F
Opportunity for Improvement	Programmable thermostats

VENTILATION	
Kitchen Ventilation Type	No mechanical ventilation
Kitchen Exhaust Destination	N/A
Bathroom Ventilation Type	Mechanical exhaust fans - individual
Bathroom Exhaust Destination	Vented to an unknown location

5.4 Domestic Water Heating

5.4.1 DHW Equipment

The facility is served by three (3) electric water heaters, one (1) in each of the following buildings: Buildings 1, 2, & 3.

DOMESTIC HOT WATER SYSTEM SUMMARY	
Area Served	Building 1 - Restroom Building 2 - Lab Office & Restroom Building 3 - Chemical Tank Building
DHW System Type	Tank - Direct
DHW Fuel	Electricity
DHW System Configuration	Individual DHW systems are installed in commercial spaces
DHW Equipment Location	Building 1 - Restroom, Building 2 - Mechanical Room, Building 3 - Chemical Tank Building
Typical Range of Efficiency	0.91 - 0.92 UEF
Equipment Manufacture Date Range	2021-2023
Quantity	Three (3)
Access Issues	None
DHW Lines	Domestic hot water piping was observed to be 33% insulated where exposed.
Is a re-circ pump installed?	No
Existing High Rise Water Pressure Boosting System	No
Are Existing Booster(s) Variable Speed?	N/A
Description of Water Fixtures Related to DHW Usage (Faucet Aerators and Showerheads)	One (1) shower Four (4) faucets
Description of Variation in Type, Fuel, Configuration or Location Between Areas	None

DHW EQUIPMENT - PROPERTY WIDE	
Sample Representation	100% of systems on site were observed as part of the sample.
Explanation of Discrepancy	None
DHW Systems Recommended for Replacement	None
Reason for Replacement	N/A

WATER FIXTURES - SUMMARY					
Fixture Type	**Location**	**Range Rated Flow Rate (GPM or GPF)**	**Average Rated Flow Rate (GPM or GPF)**	**Qty**	**% of Sample**
Toilet	Common Bathroom	1.6 GPF	1.6 GPF	2	100%
Faucet	Common Bathroom	1.5-2.0 GPM	1.75 GPM	2	100%
Faucet (no aerator)	Building 2 - Lab	3.0 GPM	3.0 GPM	1	100%
Janitor Sink - Faucet	Building 1 - Bathroom	5.0 GPM	5.0 GPM	1	100%
Showerhead	Common Bathroom	1.2 GPM	1.2 GPM	1	100%

5.5 Lighting

5.5.1 Interior Lighting

LED light fixtures provide the majority of the interior lighting in the buildings. The remainder of the lighting is provided by linear fluorescent fixtures.

Manual switches provide the controls for the majority of the fixtures, with occupancy sensors on the fixtures on the stairs and first floor of Building 2**.**

The EXIT signs in the facility consist of LED lamp-based fixtures.

Interior Lighting			
Fixture Types	**Wattage**	**% of Total Fixtures**	**Recommended for Replacement**
T-8 Fluorescent	32 W	11%	Yes
T-12 Fluorescent	75 W	3%	Yes
LED	9 - 28 W	86%	No

5.5.2 Exterior Site Lighting

The exterior lighting primarily consists of LED fixtures, with one (1) Halogen wall pack.

Exterior lighting controls are a combination of wall switches, motion sensors, and timers.

Exterior Lighting Lighting			
Fixture Types	**Wattage**	**% of Total Fixtures**	**Recommended for Replacement**
Halogen	150 W	5%	Yes
LED	16 - 20 W	95%	No

5.6 Appliances

5.6.1 Kitchen Appliances

There are three (3) refrigerators on-site.

Breakroom Appliances				
Location	**Item**	**Type**	**Estimated Age & Condition**	**ENERGY STAR Certified**
Building 2	Refrigerator	18.1 cubic feet Freezer location: Top Manufacturer: Kenmore Estimated Annual Consumption: 691 KWh	24 years old and in poor condition	Not ENERGY STAR Certified
Building 2	Refrigerator	3.8 cubic feet Freezer location: Top Manufacturer: Sanyo Estimated Annual Consumption: 325 KWh	35 years old and in poor condition	Not ENERGY STAR Certified
Building 1	Refrigerator	1.8 cubic feet Freezer location: Top Manufacturer: Emerson Estimated Annual Consumption: 275 KWh	14 years old and in average condition	Not ENERGY STAR Certified

REFRIGERATORS - PROPERTY WIDE	
Sample Representation	100% of appliances on site were observed as part of the sample.
Explanation of Discrepancy	None
Refrigerators Recommended for Replacement	Refrigerators in Building 1 & 2
Reason for Replacement	Equipment is inefficient and has exceeded its EUL

5.6.2 Laundry

Observed laundry equipment is summarized in the tables below.

Laundry Equipment	
Equipment	**Comment**
Commercial Washing Machines	None
Commercial Dryers	None
Residential Washers	Sears; Model 110.19101990; Manufactured 1999
Residential Dryers	Sears; Model 66101691; Manufactured 1997

CLOTHES WASHERS - PROPERTY WIDE	
Sample Representation	100% of appliances on site were observed as part of the sample.
Explanation of Discrepancy	None
Clothes Washers Recommended for Replacement	The clothes washer in Building 1.
Reason for Replacement	Equipment is inefficient and has exceeded its EUL

5.7 Process Equipment and Loads

Tenant process equipment observed on site is described below.

PROCESS EQUIPMENT - MOTORS									
System(s) Served	**Motor Manufacturer**	**Motor Model #**	**Maximum HP**	**Motor RPM**	**Motor Efficiency**	**Motor Control**	**Qty**	**Varying Load?**	**VFD Installed Y/ N**
Building 2 - Grit Filter	Tec Westinghouse	AEUHXG	3	1755	89.5	VFD	1	Yes	Yes
Building 2 - Grit Filter	Marathon	LX184TTGN6526AAL	5	1755	90.2	VFD	1	Yes	Yes
Building 2 - Blower	Louis Allis	LAM25 18 284T	25	1775	93.6	VFD	1	Yes	Yes
Building 2 - Blower	US Electrical Motors	284T TE	25	1775	93	VFD	1	Yes	Yes
Building 2 - Existing Pond	Emerson	5831	5	1165	90.2	VFD	1	Yes	Yes
Building 6 (Vault) - New Pond	Emerson	5831	5	1165	90.2	VFD	1	Yes	Yes
Building 6 (Vault) - New Pond	Tec Westinghouse	AEHH98N	3	1175	89.5	VFD	1	Yes	Yes
Building 1 - Big Tank Pond Pumps	Baldor	A22048R-55	20	1765	93	VFD	3	Yes	Yes
Building 1 - Pond Blower	Toshiba	B0154DLF2UM	15	1755	89	VFD	1	Yes	Yes
Building 1 - Grit Room	Baldor	G15208041	5	1750	90	VFD	1	Yes	Yes
Buildins 2 & 3 - Chemical Metering Pumps	LMI	PD061-940S1	1/9	Unknown	Unknown	Trickle	2	No	No

5.8 Other Systems

The property is equipped with one (1) propane-fired back-up generator. No other systems were noted on site as significant energy-consumers.

5.9 Onsite Energy Generation

There is a 100 kW propane fired Cummins generator on-site.

5.9.1 Solar Energy & Cogeneration

There is currently no on-site energy generation at the Property.

The property has significant potential for a solar photovoltaic (PV) system, with a large amount of unused land on site, and a significant electric baseload throughout the year.

Nova bases solar sizing calculations on the following considerations:

1. Maximize available solar space
2. Only use the orientations that will be the most profitable (aiming for <15 year paybacks)
3. Offset more than 100% of owner paid electricity after factoring in the kWh reduction of the recommended ECMs. The 100% value helps ensure that the property is more likely to over-produce electricity during cyclical periods of lower electricity consumption throughout the year to feed battery storage system.
4. Any additional electricity produced will be fed back into the grid for net metering credits.

6.0 RECOMMENDED ENERGY CONSERVATION MEASURES (ECMS)

6.1 Building Envelope

ECM: IMPROVE AIR SEALING

Green Alternative	Engage a BPI-accredited air sealing contractor to reduce air leakage by an estimated 10% in Buildings 2, 3, and 5. Recommended areas of focus include penetrations and transitions between the attic and top floor units, as well as penetrations through exterior walls. Electrical outlets on exterior walls should be sealed with foam gaskets. Attic hatches should be sealed with weather stripping and insulated with rigid foam. Exterior door weather stripping should be replaced as needed.
Benefits Attained	Air sealing reduces heat loss in the winter and heat gain in the summer. Air sealing can reduce the risk of fire, and stop interior moisture from reaching attics. Comfort may improve as the air sealing reduces the transfer of odors, noise and animal pests between different parts of the building.
Assumptions	The ACH50 rate is estimated to be the following for each individual building based on visual inspection and building vintage. Building 2 - 11.6 ACH 50 Building 3 - 7.5 ACH50 Building 5 - 12.8 ACH50
Recommendation	This "green alternative" is considered cost-effective for early replacement and is recommended.

ECM: IMPROVE ATTIC INSULATION

Green Alternative	Nova recommends adding closed cell spray foam to Building 1 to total R21 and adding blown-in insulation to the attic space to total R49 in Buildings 2, 3, 4 & 5. Before adding the insulation, we recommend air sealing. Site staff should confirm that the roof is in good condition and is leak-free prior to insulation work. Larger openings, such as chases, shall be sealed with rigid foam board or sheet metal. Before insulation is installed, dams should be built around access hatches, chimney flues, and open ventilation shafts. Blocking should be installed around soffit vents to ensure adequate air flow while preventing 'wind washing' through the insulation near the eaves.
Benefits Attained	Improved roof insulation reduces heat loss in the winter and heat gain in the summer.
Assumptions	The following assumptions were made to calculate savings from the proposed roof insulation: › The existing R value of the attic was considered to be R-12 based on vintage for Building 1 › The existing R value of the attic was considered to be R-12 based on vintage for Building 2 › The existing R value of the attic was considered to be R-19 based on visual inspection for Building 3 › The existing R value of the attic was considered to be R-25 based on visual inspection for Building 4 › The existing R value of the attic was considered to be R-25 based on visual inspection for Building 5
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

ECM: REPLACE WINDOWS

Green Alternative	Nova recommends replacing existing original, single-pane windows in Building 1 with new, high-efficiency ENERGY STAR® certified units. Select window that are appropriate for this climate zone in order to optimize heating and cooling savings. Air seal the rough opening around each unit during install with low-expanding foam. Flash each unit appropriately to prevent water damage.
Benefits Attained	Replacing windows and doors is an expensive measure, and the utility savings associated with this improvement is not enough to fully offset the install cost. However, many of the units will need replacement in the coming years as they are reaching the end of their useful life. Replacing now with high efficiency alternatives provides significant cost savings and comfort benefits and reduces large future capital expense.
Assumptions	The following assumptions were made to calculate savings from the proposed window and glass door replacement: › The existing windows are modeled with a u-value of 1.19 and a SHGC of 0.83. › New windows are modeled with a u-value of 0.35 and a SHGC of 0.5. › Air leakage is estimated to be reduced by 5% by replacing windows.
Recommendation	This “green alternative” is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

6.2 HVAC Systems

ECM: INSTALL PROGRAMMABLE THERMOSTATS

Green Alternative	Nova recommends installing five (5) digital programmable thermostat to control the operation of the heating systems within each building. Because these thermostats are often difficult for the building staff to properly program, we recommend that the contractor install and program all new thermostats.
Benefits Attained	Replacing the existing thermostats with programmable thermostats will reduce overheating of the buildings and improve comfort.
Assumptions	We modeled the savings using common engineering practices. We based a load profile on engineering practices and property staff interviews. The savings baseline assumes that overall temperature in the buildings will be adjusted by at least 5 degrees F.
Recommendation	This "green alternative" is considered cost-effective for early replacement and is recommended.

ECM: INSULATE HYDRONIC HEATING PIPES

Green Alternative	Nova recommends insulating all exposed hydronic heating pipes to R4. Installer to ensure compliance with all applicable codes.
Benefits Attained	Exposed pipes in unconditioned spaces are a significant cause of heat loss from hydronic or steam heating systems. Moreover, when their surface temperature exceeds 100 degrees F, they present a health and safety liability. Insulating these pipes will reduce energy consumption by reducing the heat loss through uninsulated piping.
Assumptions	We modeled the savings using spread-sheet based calculations.
Recommendation	This "green alternative" is considered cost-effective for early replacement and is recommended.

ECM: INSTALL HIGH EFFICIENCY UNIT HEATER

Green Alternative	Install high efficiency electric unit heaters rated at 100% AFUE in Buildings 3, 4, and 5.
Benefits Attained	While replacing heating units is an expensive measure, many of the units will need replacement in the coming years as they are reaching the end of their useful life. Replacing now with high efficiency alternatives provides significant cost savings and comfort benefits and reduces large future capital expense.
Assumptions	We modeled the savings using spreadsheet-based calculations. To calculate heating savings we assumed an improvement in efficiency from 80 - 83% to 100% AFUE for affected buildings.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

ECM: INSTALL HIGH EFFICIENCY CENTRAL BOILER - SPACE HEATING

Green Alternative	Install high efficiency condensing propane boiler rated at 95% AFUE or higher to provide heat to Building 2, replacing the inefficient central boiler in that building.
Benefits Attained	While replacing central boilers is an expensive measure, these units will need replacement in the coming years as they are reaching the end of their useful life. Replacing now with high efficiency alternatives provides significant cost savings and comfort benefits and reduces large future capital expense.

Assumptions	We modeled the savings using spreadsheet-based calculations. To calculate heating savings we assumed an improvement in efficiency from 80 to 95% AFUE for Building 2. In determining feasible exterior wall vent locations, proximity to windows, doors and walkways should be considered. Venting for this type of system is pressurized and cannot be vented into a chimney which is utilized by atmospherically vented appliances. If vented into an existing chimney, positive pressure venting should be extended to the building exterior. Local codes and manufacturer's specifications should always be consulted to ensure feasibility, legality, and safety.
Recommendation	This “green alternative” is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

6.3 Domestic Water Systems

ECM: INSULATE DOMESTIC HOT WATER PIPING

Green Alternative	Nova recommends insulating all exposed hot water piping and the first three (3) feet of exposed cold water piping located in mechanical rooms to R4. Installer to ensure compliance with all applicable codes.
Benefits Attained	Exposed pipes in unconditioned spaces are a significant cause of heat loss from domestic hot water systems. Moreover, when their surface temperature exceeds 100 degrees F, they present a health and safety liability. Insulating these pipes will reduce energy consumption by reducing the heat loss through uninsulated piping.
Assumptions	We modeled the savings using spread-sheet based calculations.
Recommendation	This “green alternative” is considered cost-effective for early replacement and is recommended.

ECM: INSULATE DOMESTIC HOT WATER TANKS

Green Alternative	Nova recommends insulating all electric hot water tanks with R8 tank wrap insulation. Installer to ensure compliance with all applicable codes. The sides and top of each tank should be insulated but electrical components should not be covered.
Benefits Attained	While hot water tanks are manufactured to have some insulating value, there is still standby heat loss. This results in the use of more energy to keep the water hot. Savings are greater for older tanks, or tanks located in unconditioned spaces.
Assumptions	We modeled the savings using spread-sheet based calculations. Existing tanks were assumed to have an R-value of 8.5.
Recommendation	This “green alternative” is considered cost-effective for early replacement and is recommended.

6.4 Lighting Systems

ECM: UPGRADE EXTERIOR LIGHTING

Green Alternative	Nova recommends the following: › Replace high-wattage halogen based fixture with low-wattage LED based fixture. › Existing LEDs lamps and fixtures to remain in place.
Benefits Attained	Installing high-efficiency lighting will significantly reduce the property's electrical consumption while maintaining equivalent or better light levels. Also, many of the recommended bulbs and fixtures have longer lifespans. This measure will reduce the number of bulbs replaced at the property as well as maintenance costs.
Assumptions	We modeled the savings using spreadsheet-based calculations. We based light runtime hours on observations from our site visit and on discussions with property staff and residents.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

ECM: UPGRADE COMMON AREA LIGHTING

Green Alternative	Nova recommends the following: › Retrofit existing linear-fluorescent technology fixtures with LED technology lamps. › For fluorescent lamps, management should consider replacing the existing ballasts with LED drivers. › Existing LEDs lamps and fixtures to remain in place.
Benefits Attained	Installing high-efficiency lighting will significantly reduce the property's electrical consumption while maintaining equivalent or better light levels. Also, many of the recommended bulbs and fixtures have longer lifespans. This measure will reduce the number of bulbs replaced at the property as well as maintenance costs.
Assumptions	We modeled the savings using spreadsheet-based calculations. We based light runtime hours on observations from our site visit and on discussions with property staff and residents.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

6.5 Appliances

ECM: REPLACE REFRIGERATORS

Green Alternative	Nova recommends installing approximately three (3) new ENERGY STAR®-qualified refrigerators (designed to consume 10% less than minimum federal efficiency standards) in place of the existing inefficient refrigerators. Refrigerators shall possess top-mounted freezers and be appropriately sized. Ice-maker and dispenser models are not recommended because they use 15% more energy than standard ENERGY STAR-qualified models and will increase the purchase price.
Benefits Attained	ENERGY STAR qualified refrigerators are equipped with high-efficiency compressors that have improved insulation; they also consume approximately 25% less energy than similar non-ENERGY STAR models. Models with top-mounted freezers use 10-25% less energy than bottom or side-by-side models.
Assumptions	We based this improvement on data acquired from a full audit of the property, which we used to estimate the total consumption of the installed refrigerator. We based the costs for this measure on common costs of equivalent sized ENERGY STAR-qualified refrigerators. The savings calculations assume existing refrigerator consumption at 691 kWh and proposed consumption at 387 kWh annually and mini-fridge consumption at 300 kWh and proposed consumption at 124 kWh annually.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

ECM: REPLACE CLOTHES WASHERS

Green Alternative	Nova recommends installing approximately 1 new ENERGY STAR®-qualified clothes washers in place of the existing inefficient clothes washers.
Benefits Attained	ENERGY STAR qualified washing machines consume approximately 25% less energy than similar non-ENERGY STAR models.
Assumptions	We based this improvement on data acquired from a full audit of the property, which we used to estimate the total consumption of the installed clothes washer. We based the costs for this measure on common costs of equivalent sized ENERGY STAR-qualified clothes washers. The savings calculations assume existing clothes washer consumption at 0.7 kWh per load and 29 gallons per cycle and replacement clothes washer consumption at 280 kWh annually and 14.3 gallons per cycle. Domestic hot water savings, based on the gallons of water saved, are also incorporated.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

ECM: REPLACE CLOTHES DRYERS

Green Alternative	Nova recommends installing approximately one (1) new ENERGY STAR-qualified clothes dryer in place of the existing inefficient clothes dryers.
Benefits Attained	ENERGY STAR qualified clothes dryers consume approximately 20% less energy than similar non-ENERGY STAR models.
Assumptions	We based this improvement on data acquired from a full audit of the property, which we used to estimate the total consumption of the installed dryer. We based the costs for this measure on common costs of equivalent sized ENERGY STAR-qualified clothes dryers. The savings calculations assume existing clothes dryer consumption at 920 kWh annually and replacement clothes dryer consumption at 734 kWh annually.
Recommendation	This "green alternative" is not considered cost-effective for early replacement but is recommended as the replacement option when the equipment is replaced based on capital need.

6.6 Resilience Options

ECM: INSTALL SOLAR PHOTOVOLTAIC SYSTEM

Green Alternative	We analyzed the property for a potential solar PV system based on available roof space, and found the property may be a good candidate for up to 234.3 kW of installed solar capacity. A complete solar evaluation and design by a qualified contractor should be completed as part of this work scope.
Benefits Attained	By cleanly generating electricity onsite, a solar electric system would significantly reduce the property's utility electric purchase, eliminating associated carbon emissions, and reduce the property's exposure to future electric price swings. A PV system could also be paired with onsite battery storage to provide additional resilience in the case of an extended blackout (for additional cost and design considerations).
Assumptions	The solar PV system feasibility and size was assessed given available roof space, pitch and orientation and typical electricity production We modeled this EWEM using OpenSolar.
Recommendation	This "green alternative" is recommended for decarbonization and resiliency reasons.

7.0 GLOSSARY OF ABBREVIATIONS

This report may use abbreviations to describe various site or building system components. Not all abbreviations may be applicable to this report. Frequently used abbreviations are listed and defined below.

ABBREVIATIONS			
Acronym	**Description**	**Acronym**	**Description**
AC	Air Conditioner	HRV	Heat-Recovery Ventilator
ACH	Air Changes per Hour	HSPF	Heating Seasonal Performance Factor
ACH50	Air Changes per Hour at 50 Pascals Building Pressure	HUD	U.S. Department of Housing and Urban Development
ACHN	Natural Air Changes per Hour	HVAC	Heating, Ventilation and Air Conditioning
AEE	Association of Energy Engineers	HWS	Hot Water Supply
AFUE	Annual Fuel Utilization Efficiency	IAQ	Indoor Air Quality
AHU	Air Handling Unit	IBC	International Building Code
ANSI	American National Standards Institute	IECC	International Energy Conservation Code
ASHP	Air Source Heat Pump	IES	Illuminating Engineering Society of North America
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers	IMEF	Integrated Modified Energy Factor
ASTM	American Society for Testing and Materials	IPLV	Integrated Part Load Value
BEAP	Building Energy Assessment Professional (ASHRAE)	ISO	Polyisocyanurate
BESA	Building Energy Simulation Analyst (Association of Energy Engineers)	IWF	Integrated Water Factor
BMS	Building Management System	kBTU	One Thousand British Thermal Units
BPI	Building Performance Institute	kW	Kilowatt
BPI-BA	Building Performance Institute Certified Building Analyst	kWh	Kilowatt-Hour
BPI-MFBA	Building Performance Institute Certified Multifamily Building Analyst	LED	Light Emitting Diode
BTL	Building Tightness Limit	LEED	Leadership in Energy and Environmental Design
BTU	British Thermal Unit	LEED AP(BD&C)	LEED Accredited Professional - Building Design & Construction
BTUH	British Thermal Units per Hour	Low-E	Low Emissivity
CAZ	Combustion Air Zone	LPG/LP Gas	Liquefied Petrolium Gas (ex - Propane)
CDD	Cooling Degree Days	MAU	Makeup Air Unit
CEA	Certified Energy Auditor (Association of Energy Engineers)	MEF	Modified Energy Factor
CEC	California Energy Commission	MEP	Mechanical, Electrical and Plumbing
CEER	Combined Energy Efficiency Ratio	MH	Metal Halide

ABBREVIATIONS			
Acronym	**Description**	**Acronym**	**Description**
CEF	Combined Energy Factor	MMBTU	One Million British Thermal Units
CEM	Certified Energy Manager (Association of Energy Engineers)	MTCO2e	Metric Tons Carbon Dioxide Equivalent
CF	Cubic Feet	MVG	Minimum Ventilation Guideline
CFL	Compact Fluorescent Lamp	MVL	Minimum Ventilation Level
CFM	Cubic Feet per Minute	NABCEP	North American Board of Certified Energy Practitioners
CFM50	Measured Air Flow through Blower Door at 50 Pascals	NAHB	National Association of Home Builders
CMVP	Certified Measurement & Verification Professional (Association of Energy Engineers)	NFPA	National Fire Protection Association
CO	Carbon Monoxide	NFRC	National Fenestration Rating Council
CO2	Carbon Dioxide	NRA	Net Rentable Area
CO2e	Carbon Dioxide Equivalent	NREL	National Renewable Energy Laboratory
COP	Coefficient of Performance	NRSF	Net Rentable Square Feet
CPVC	Chlorinated Polyvinyl Chloride	ODS	Oxygen Depletion Sensor
CRI	Color-Rendering Index	OSB	Oriented Strand Board
CUFT	Cubic Feet	OSHA	Occupational Safety and Health Administration
DB	Dry-Bulb (Temperature)	PCA	Property Condition Assessment
DHW	Domestic Hot Water	PCR	Property Condition Report
DLC	DesignLights Consortium	PPM	Parts per Million
DWH	Domestic Water Heater	PSC	Permanent Split Capacitor
DX	Direct Expansion	PSI	Pounds per Square Inch
ECM	Electronically Commutated Motor	PTAC	Packaged Terminal Air Conditioner
EER	Energy Efficiency Ratio	PTHP	Packaged Terminal Heat Pump
EF	Energy Factor	PVC	Polyvinyl Chloride
EIFS	Exterior Insulation and Finish System	R-	R-Value
EMF	Electro Magnetic Field	RAC	Room Air Conditioner
EMS	Energy Management System	RESNET	Residential Energy Services Network
EPA	Environmental Protection Agency	RPM	Revolutions per Minute
EPDM	Ethylene Propylene Diene Monomer	RTU	Rooftop Unit
EPS	Expanded Polystyrene	RUL	Remaining Useful Life
ERV	Energy-Recovery Ventilator	R-Value	Thermal Resistance
EUI	Energy Use Intensity	SC	Shading Coefficient
EUL	Expected Useful Life	SEER	Seasonal Energy Efficiency Ratio
EWEM	Energy and Water Efficiency Measure	SF	Square Feet
FCU	Fan Coil Unit	SHGC	Solar Heat-Gain Coefficient
FHA	Forced Hot Air	SIR	Savings to Investment Ratio
FHR	First Hour Rating	SOG	Slab on Grade
FHW	Forced Hot Water	TE	Thermal Efficiency

ABBREVIATIONS			
Acronym	**Description**	**Acronym**	**Description**
FPM	Feet per Minute	TPO	Thermoplastic Polyolefin
FT	Feet	TRV	Thermostatic Regulator Valve
GA	Gross Area	TTD	Thermostatic Tub Diverter
gal	Gallons	U-	U-Factor (U-Value)
GBA	Gross Building Area	UBC	Uniform Building Code
GFCI	Ground Fault Circuit Interrupter	UL	Underwriters Labaratories
GPC	Gallons per Cycle	USGBC	U.S. Green Buildung Council
GPF	Gallons per Flush	UV	Ultraviolet
GPM	Gallons per Minute	V	Volt
GSHP	Ground Source Heat Pump	VAV	Variable Air Volume
HDD	Heating Degree Days	VFD	Variable Frequency Drive
HERS	Home Energy Rating System	VOC	Volatile Organic Compound
HHW	Heating Hot Water	W	Watt
HID	High-Intensity Discharge (Lighting)	WB	Wet-Bulb (Temperature)
HP	Horsepower	WH	Watt-hour
HPB	High Performance Building	WRT	With Reference to
HPBD	High-Performance Building Design Professional (ASHRAE)	WUI	Water Use Intensity
HPS	High-Pressure Sodium	XPS	Extruded Polystyrene

8.0 RECOMMENDED OPERATIONS AND MAINTENACE PLAN

EXHIBIT A: PHOTOGRAPHIC RECORD

Photographs

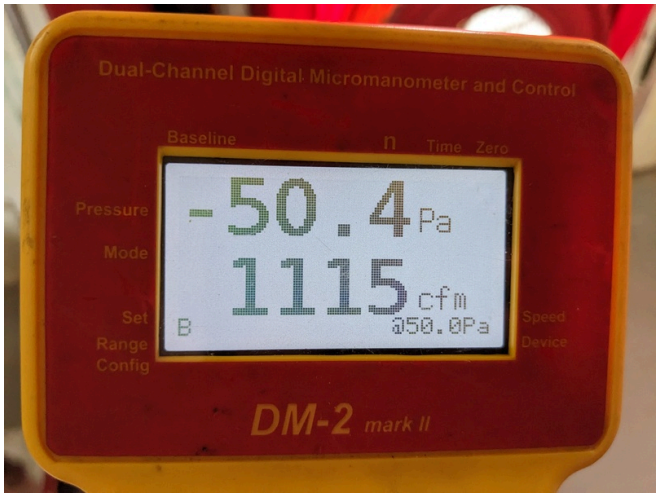
B1 Elevation South and East

B1 Elevation East and North

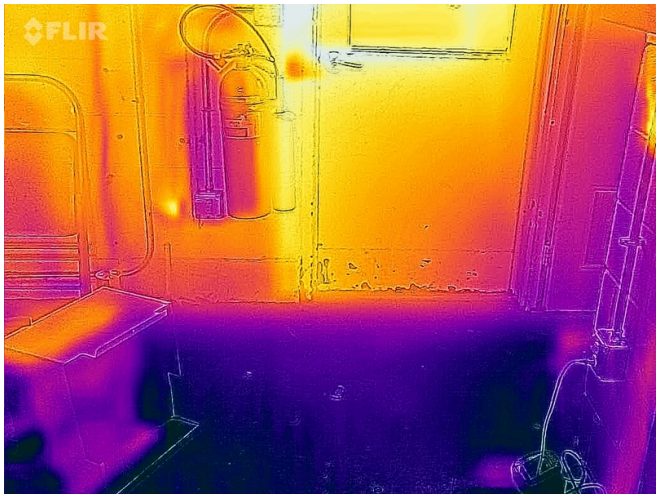
B1 Elevation North and West

B1 Window

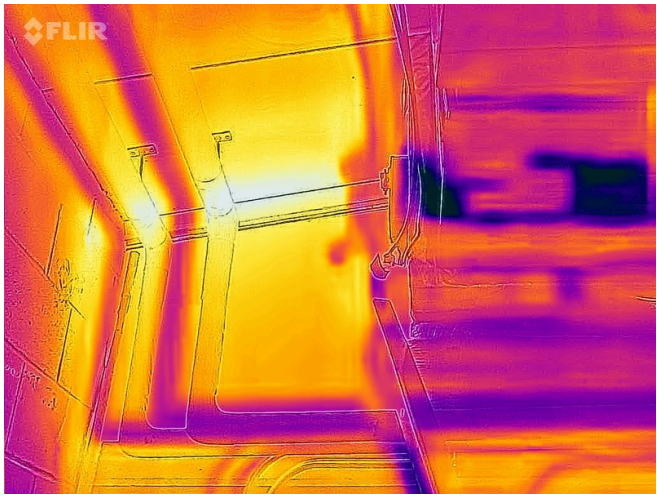
Building 1 - Blower Door Setup



Building 1 - Blower Door Results

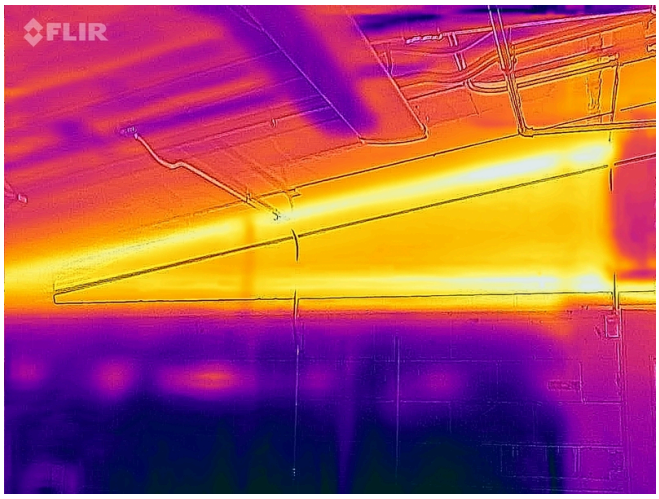


Building 1 - Interior IR - Entry Door



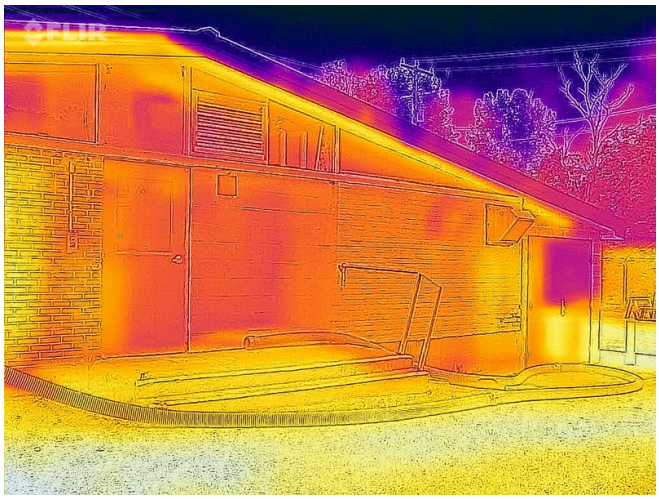
Building 1 - Interior IR - Ceiling Line, Walls, and Windows

Building 1 - Interior IR - Vaulted Ceiling

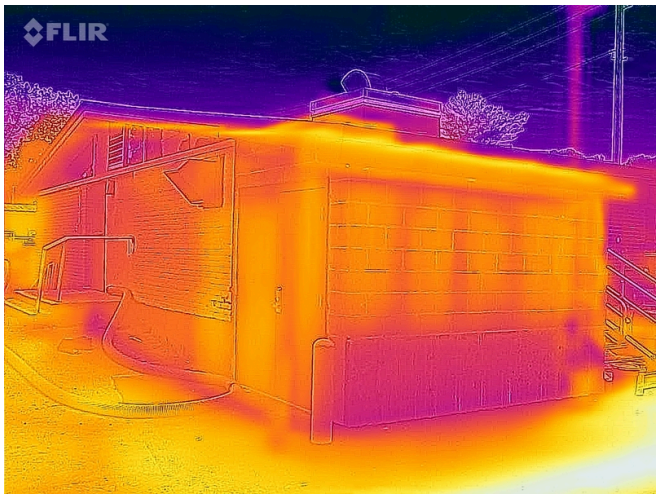


Building 1 - Interior IR - Ceiling Line, Walls, and Windows

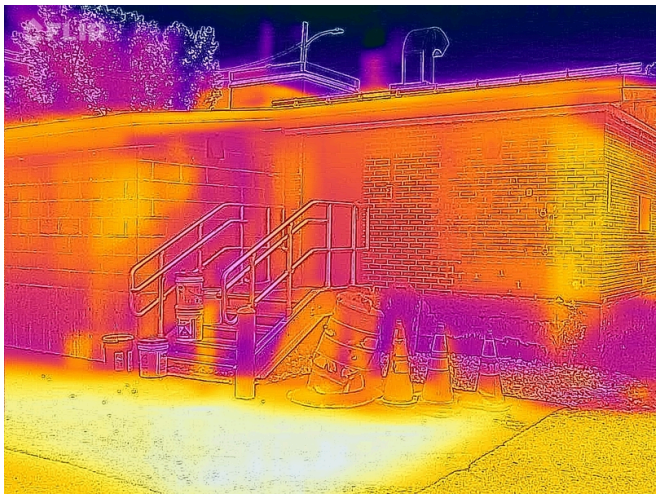
Building 1 - Interior IR - Basement Vault



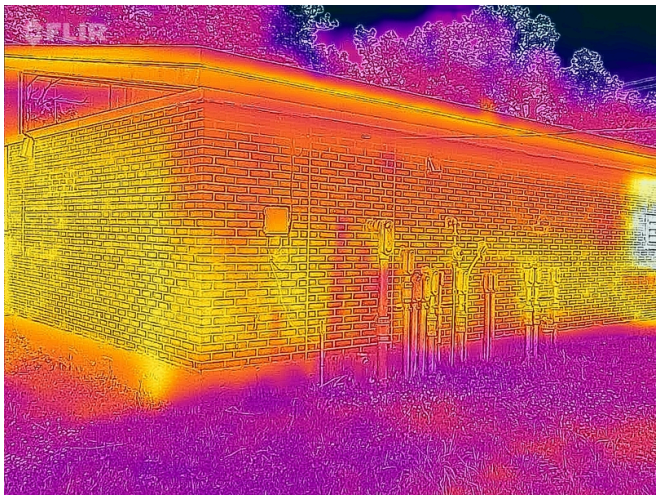
Building 1 - Exterior IR - Eastern Elevation



Building 1 - Exterior IR - Northern and Eastern Elevations

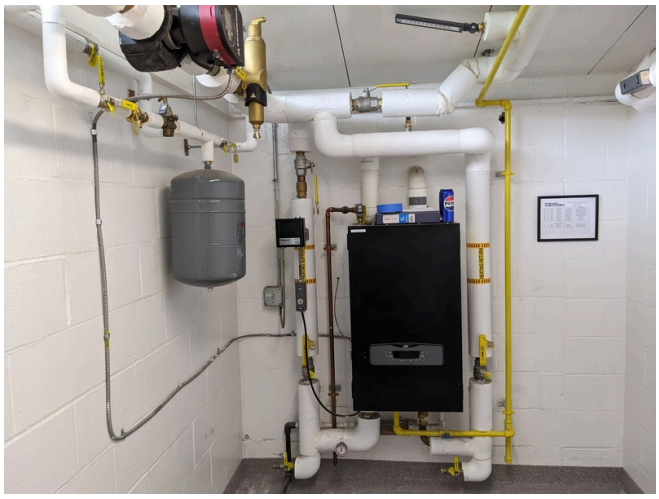


Building 1 - Exterior IR - Northern Elevation

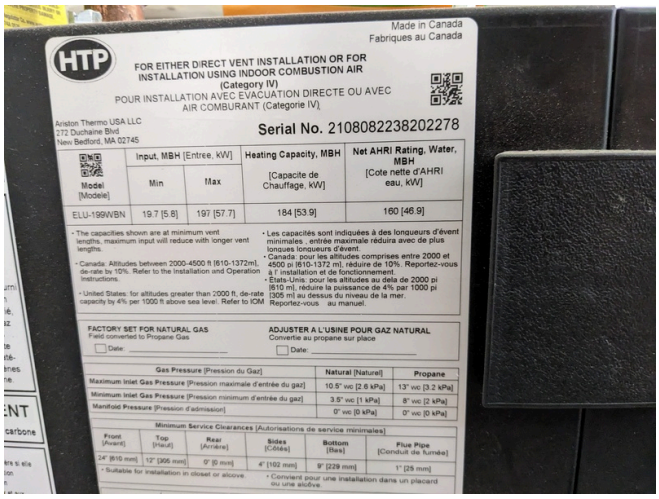


Building 1 - Exterior IR - Southern Elevation

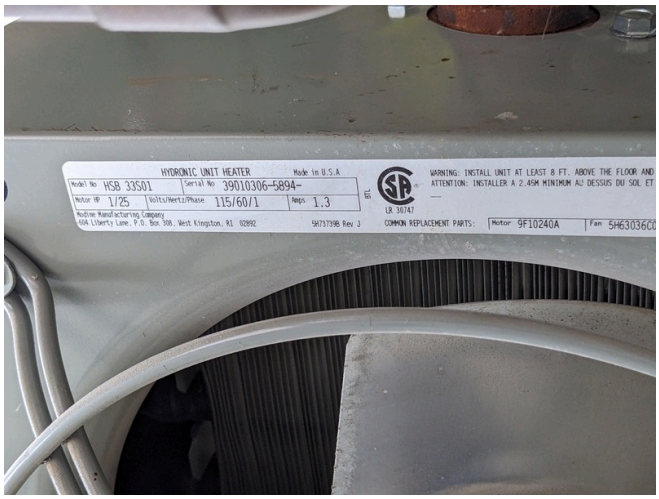
Thermostat



B1 Hydronic Boiler



Hydronic Boiler by Ariston Thermo; Model: ELU-199WBN



Hydronic Heater by Modine; Model: HSB 33S01

B1 Dehumidifier in the Basement

Dehumidifier by Kenmore; Model: 580.52300200; 1.23L/kWh

Outside Light

Lighting

Lighting

Refrigerator in Building 1

Refrigerator by Emerson; Model: CR175W

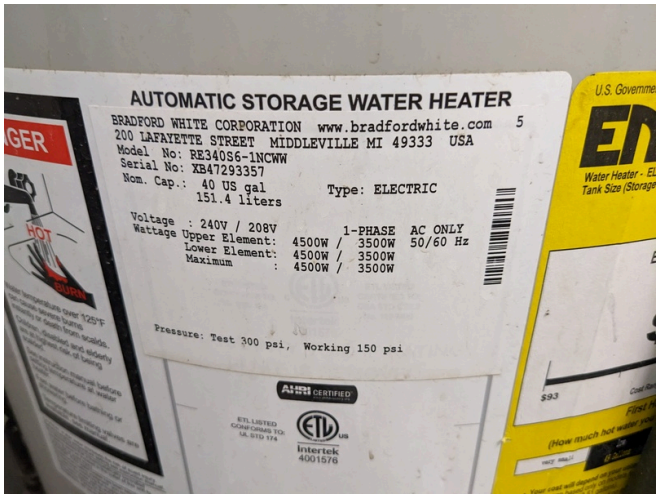
Clothes Dryer

Clothes Dryer by Sears; Model: 110.66101691

Clothes Washer

Clothes Washer by Sears; Model: 110.19101990

DHW



DHW by Bradford White; Model: RE340S6-1NCWW

1.2 GPM Measured Showerhead in Building 1

1.5 GPM Measured Flow at the Restroom Faucet in Building One (1)

1.6 GPF Toilet in Building One (1)

B1 Basement is the First Pump Room

20 HP in the B1 Pump Room

B1 Basement

15 HP Pump by Toshiba

#2 Built 1973-75

B2 Elevation North

B2 West Wall

B2 West Wall Window

B2 Elevation South

B2 Elevation East

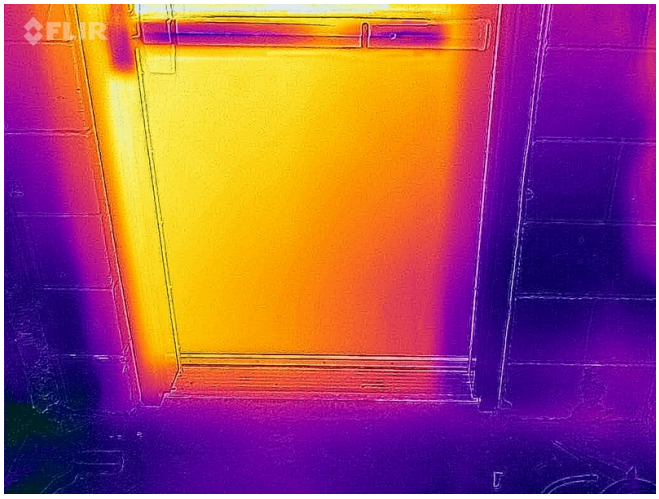
B2 East Wall Main Entry Door

B2 Back Doors

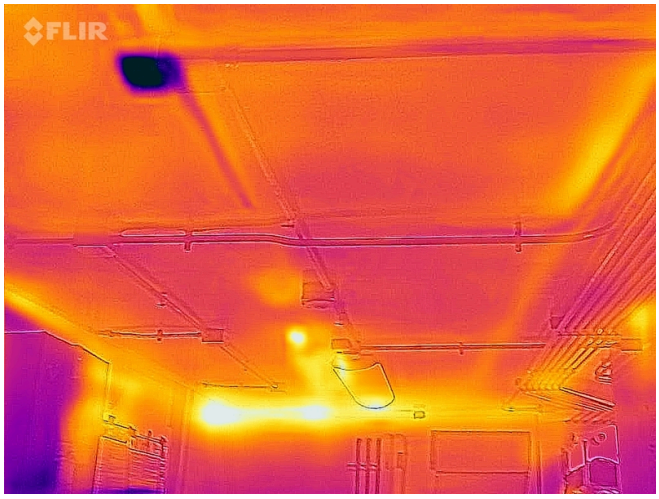
Window

Building 2 - Blower Door Setup

Building 2 - Blower Door Results

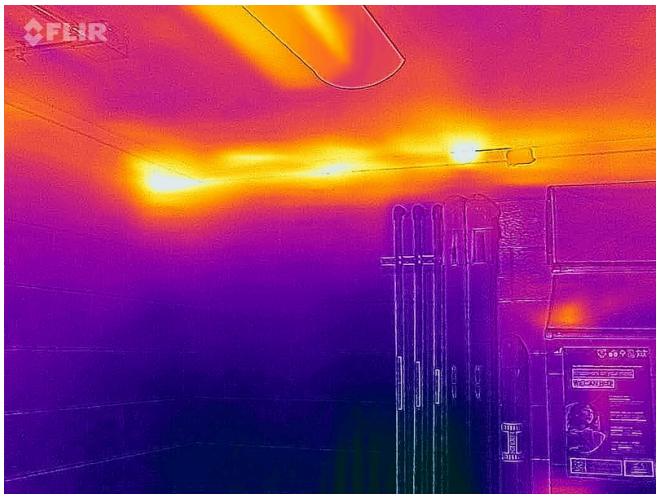


Building 2 - Interior IR - Entry Door



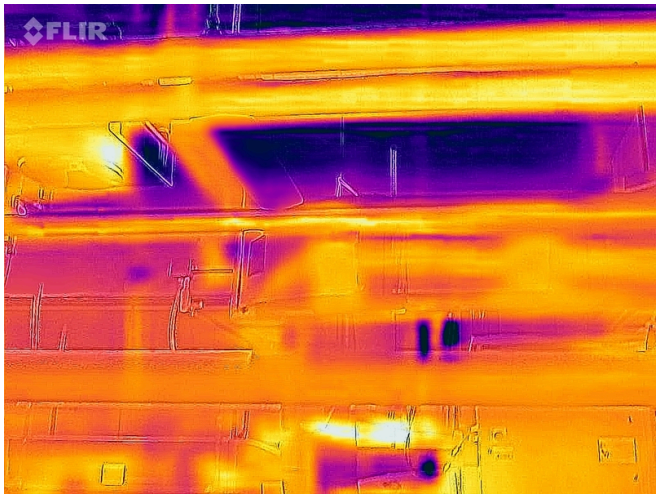
Building 2 - Interior IR - Ceiling

Building 2 - Interior IR - Entry Doors

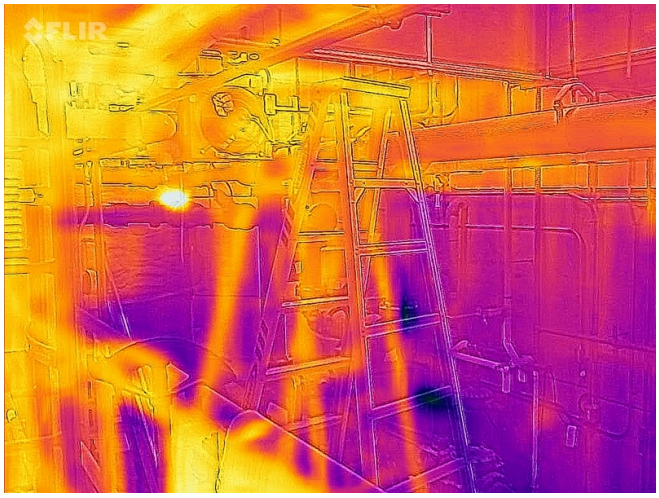


Building 2 - Interior IR - Ceiling Line

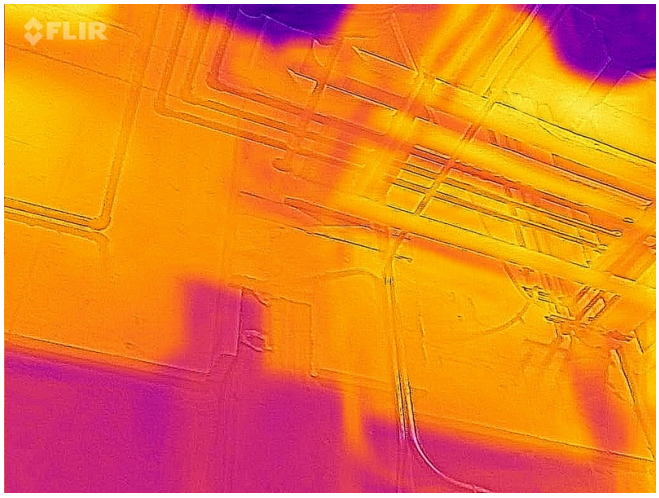
Building 2 - Interior IR - Ceiling Line and Walls



Building 2 - Interior IR - Basement Vault



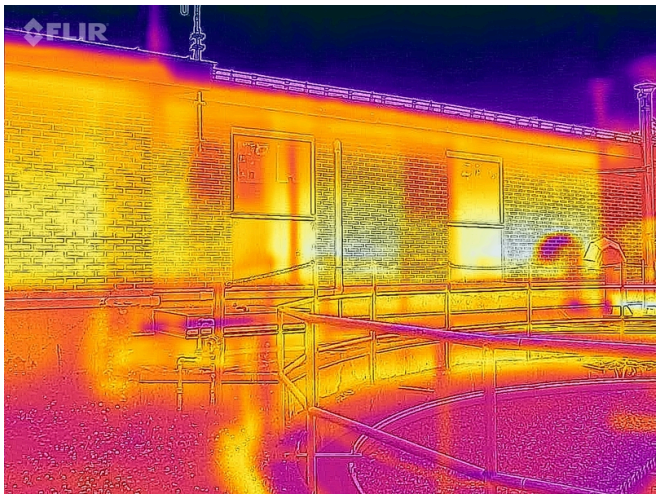
Building 2 - Interior IR - Basement Vault



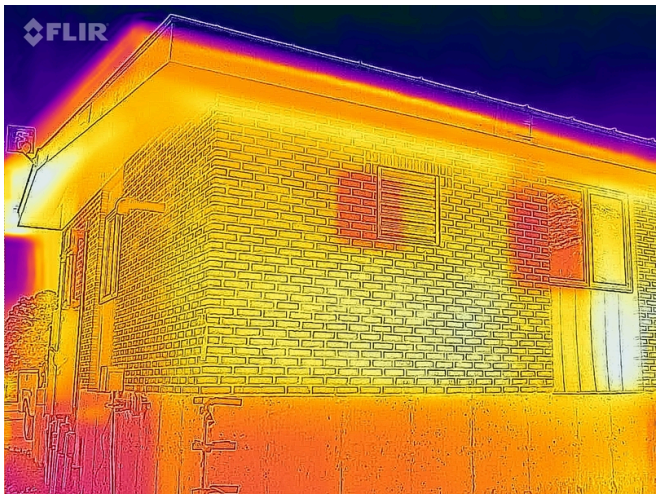
Building 2 - Interior IR - Basement Vault

Building 2 - Exterior IR - Eastern Elevation

Building 2 - Exterior IR - Southern and Eastern Elevation

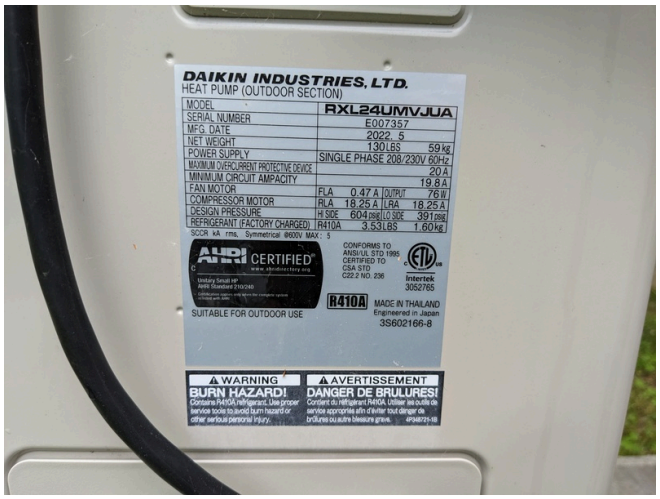


Building 2 - Exterior IR - Southern Elevation



Building 2 - Exterior IR - Western and Southern Elevation

ASPH Mini Split Condenser



ASHP Condenser by Daikin; Model: RXL24UMVJUA

ASHP Evaporator

ASHP Evaporator by Daikin; Model: FTX24UVJU

Thermostat

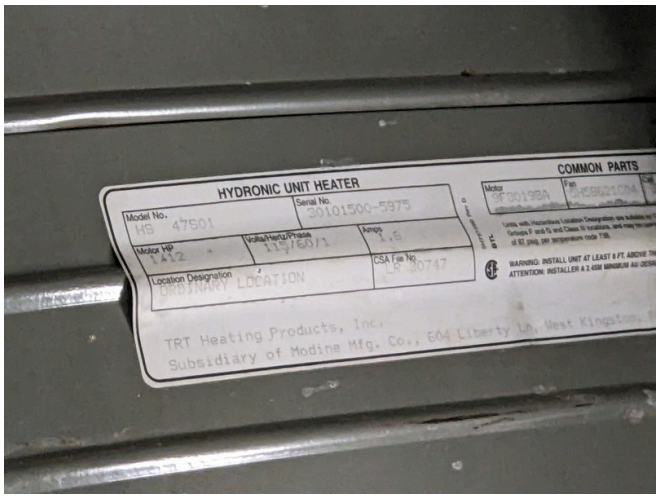
Hydronic Heater

Hydronic Boiler by Burnham; Model: V903A

Pumps

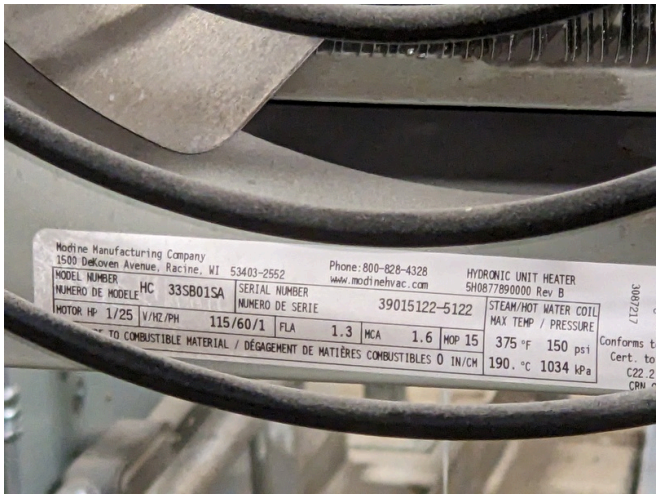
ECM Pump

Hydronic Heater



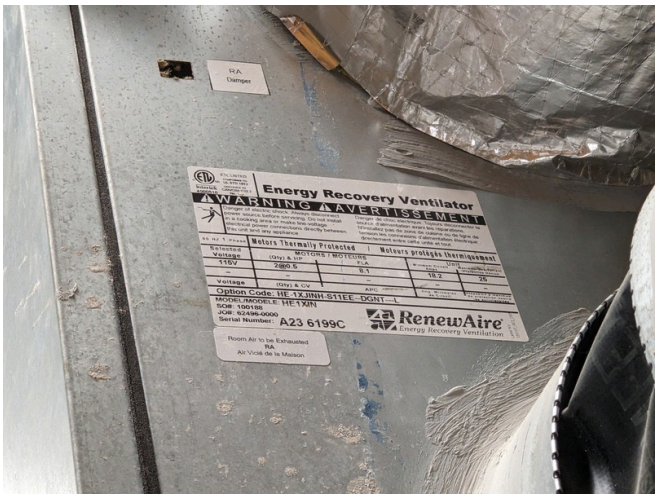
Hydronic Heater by Modine; Model: HS 47S01

Hydronic Heater



Hydronic Heater; Model: HC 33SB01SA

ERV



ERV by Renew Aire; Model: HE1XIN

Exhaust Fan

Greenheck; Model: CUBE-180-5-1-30-x-SW

Greenheck; Model: GB-120-4

Outside Lighting

Outside Light

Outside Light

Lighting

Hydronic Radiator in the Restroom for Building #2

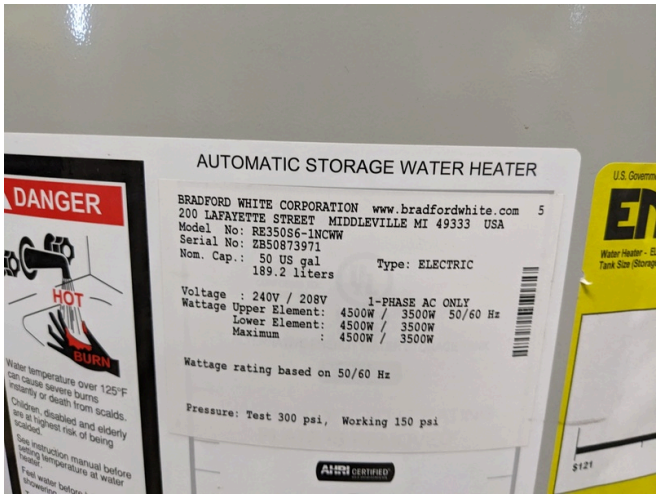
Lab Refrigerator

Refrigerator by Kenmore; Model 106.70872991

Lunch Refrigerator

Refrigerator by Sanyo; Model: SR4807X

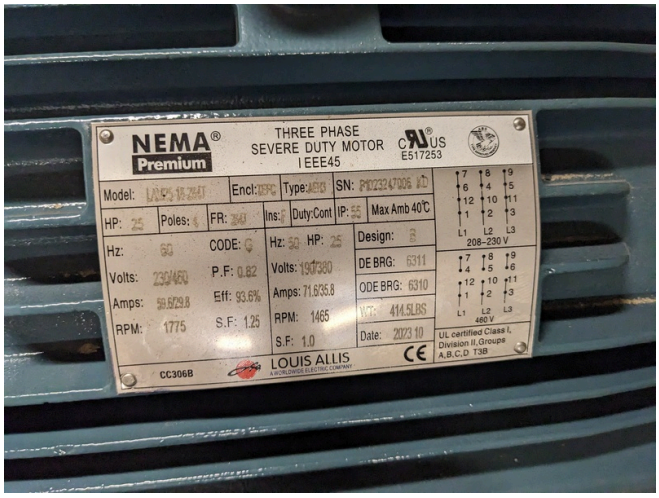
DHW in Building #2



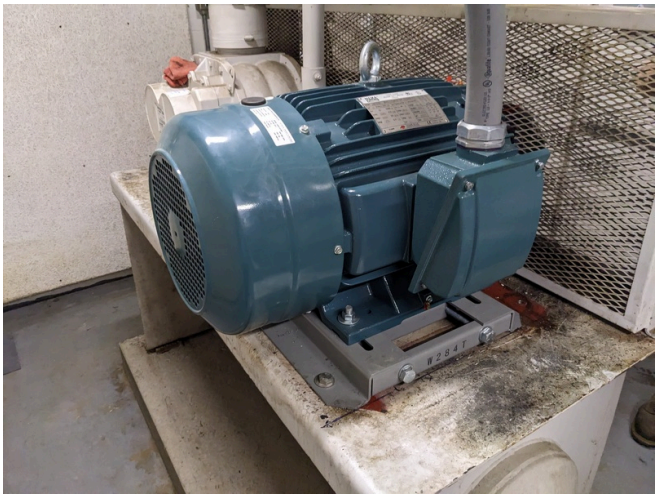
DHW by Bradford White; Model: RE350S6-1NCWW

2.0 GPM Restroom Faucet

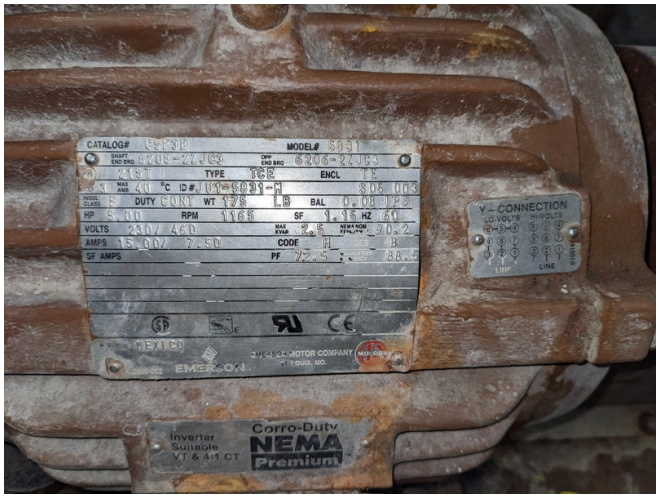
1.6 GPF Toilet



25 HP Blower Motor



25 HP Blower Motor

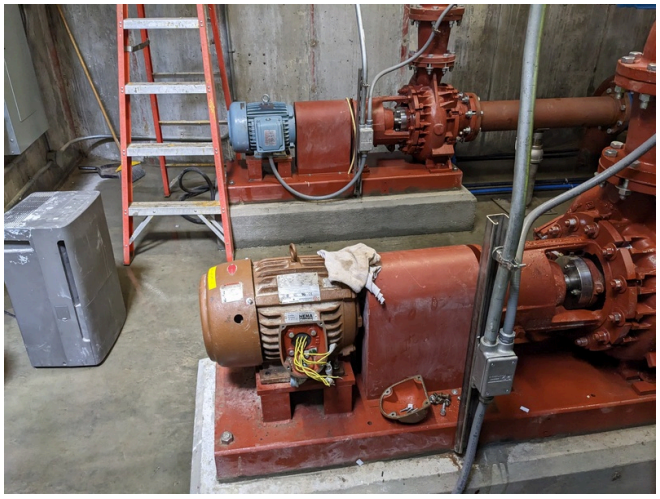


5 HP Pump by Emerson

Pump

3 HP Pump by Marathon

B6 is a Flat Black Rubber Roof, One Vent and Two Access Hatches

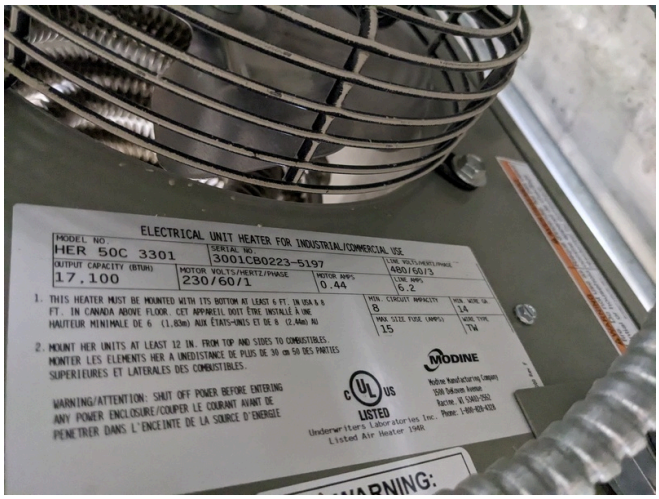


Two Pumps for the New Pond

5 HP Pump for the New Pond

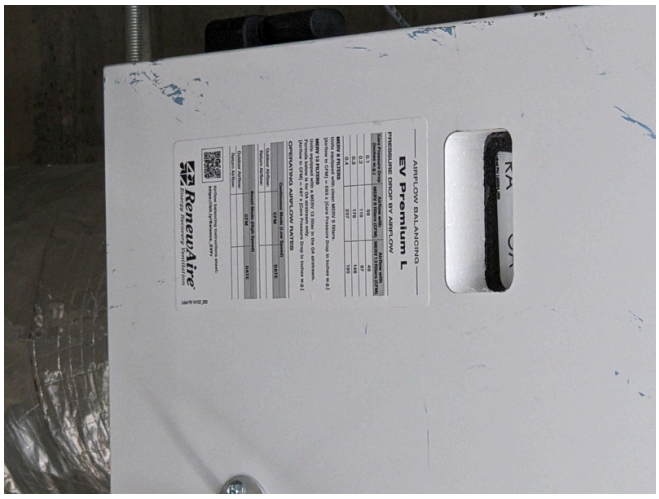
3 HP Pump for the New Pond is Insufficient So, the spare pump from the other building is being used as the primary here.

New Pond Pump Room Heater



Heater by Modine; Model: HER 50C 3301

New Pond Pump Room ERV



ERV by Renew Aire; Model EV premium L

B3 Elevation South and East

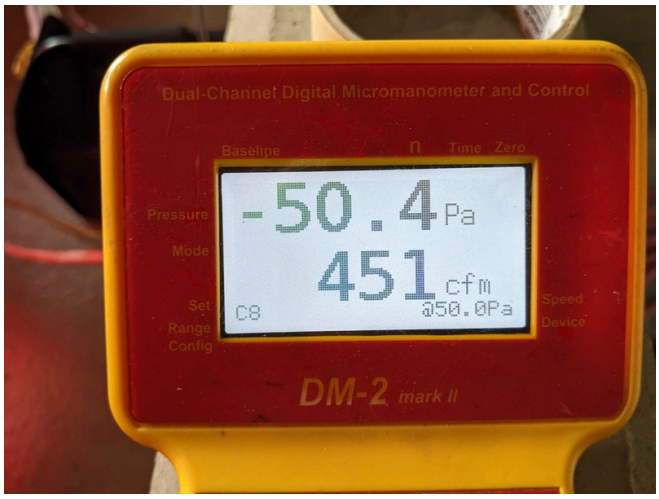
B3 Elevation North and West

B3 Window

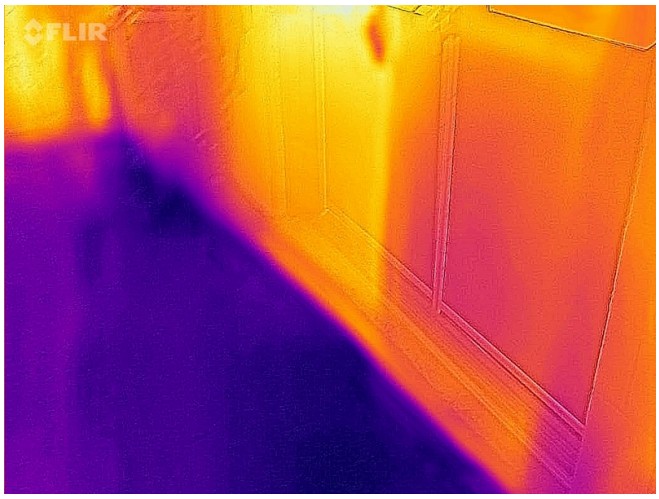
B3 Window Double Glazed Metal Frame and Handle are Oxidizing

B3 Attic

Building 3 - Blower Door Setup

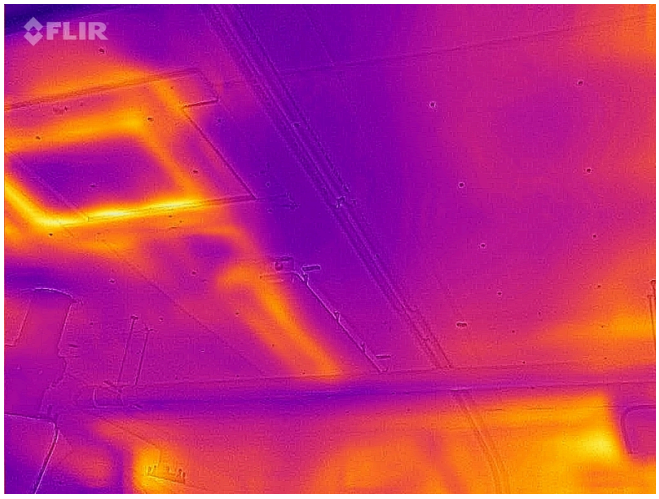


Building 3 - Blower Door Results

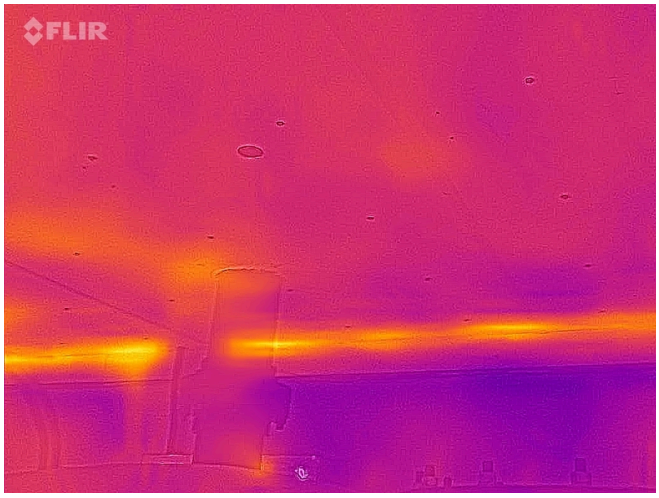


Building 3 - Interior IR - Entry Doors and Floor Line

Building 3 - Interior IR - Ceiling Line

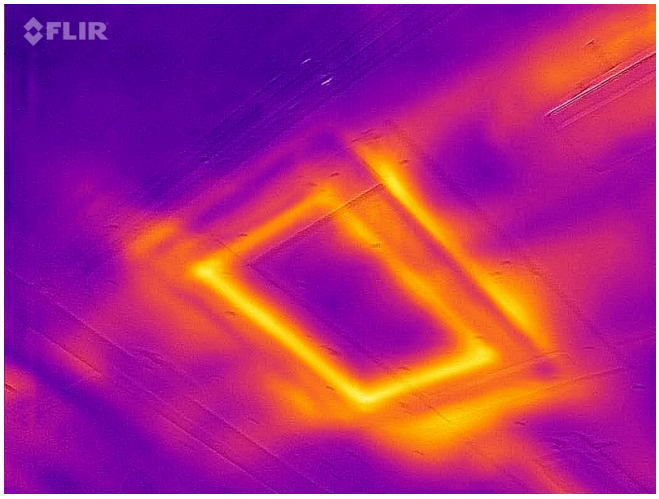


Building 3 - Interior IR - Ceiling



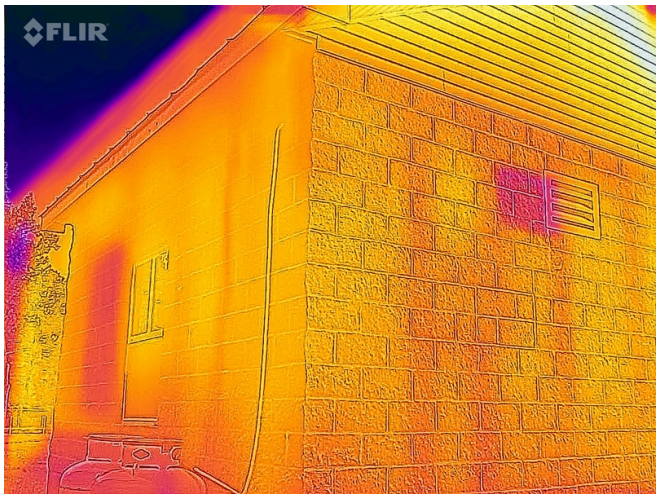
Building 3 - Interior IR - Ceiling Line

Building 3 - Interior IR - Walls and Floor Line



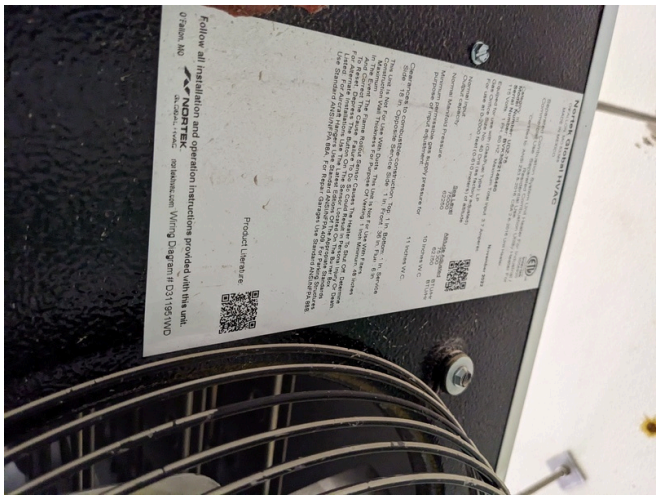
Building 3 - Interior IR - Attic Hatch

Building 3 - Exterior IR - Western Elevation



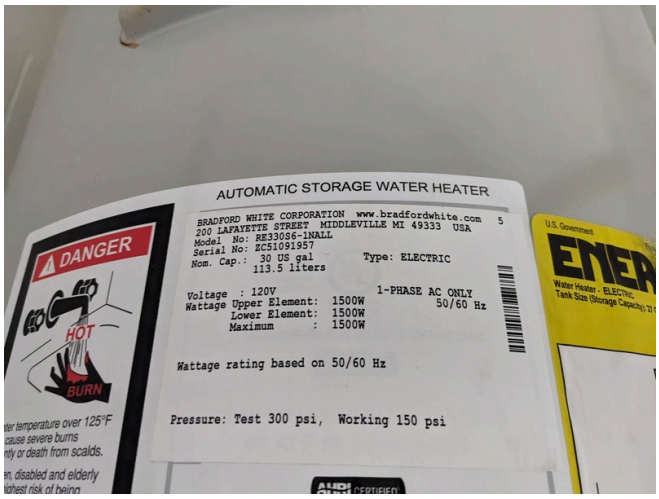
Building 3 - Exterior IR - Northern and Eastern Elevation

B3 Heater by Reznor



Heater by Reznor; Model: UDZ-75

B3 DHW



B3 DHW Nameplate

B3 South Wall Exhaust Fan

B3 Exhaust Fan by Greenheck; Model

B4 Elevation East

B4 Elevation East and North

B4 Elevation West and South

Sinding

B4 Attic

B4 Attic

B4 Garage Overhead Doors

B4 South Wall Window is Broken

Building Four (4) Lighting

B4 Heater by Modine Hot Dawg

B5 Elevation North

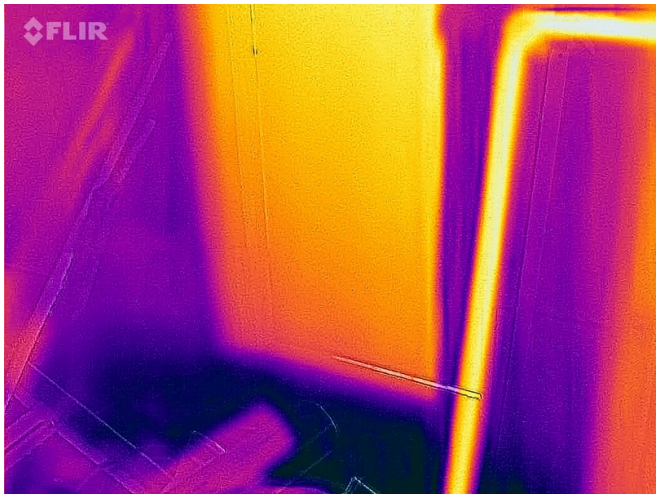
B5 Elevation West

B5 Elevation South

B5 Elevation East

Building 5 - Blower Door Setup

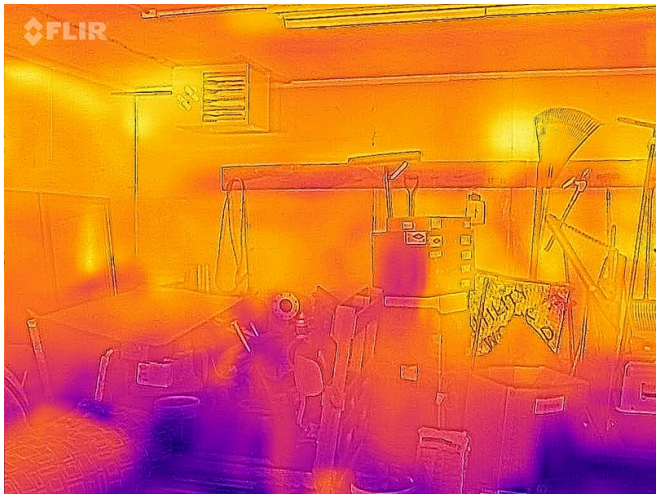
Building 5 - Blower Door Results



Building 5 - Interior IR - Entry Door

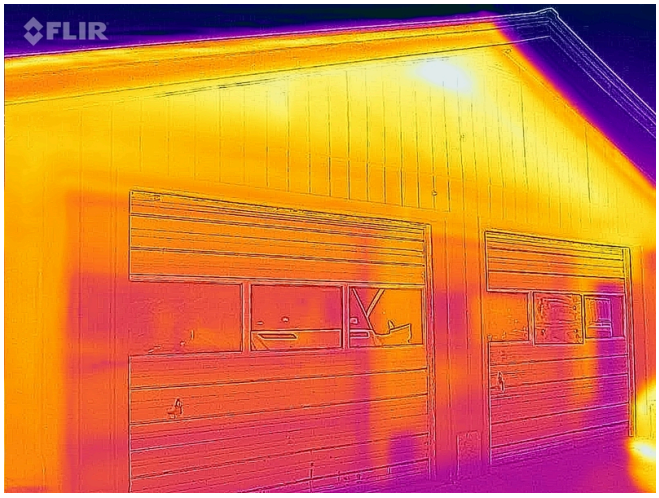
Building 5 - Interior IR - Ceilings and Walls

Building 5 - Interior IR - Overhead Doors



Building 5 - Interior IR - Ceilings and Walls

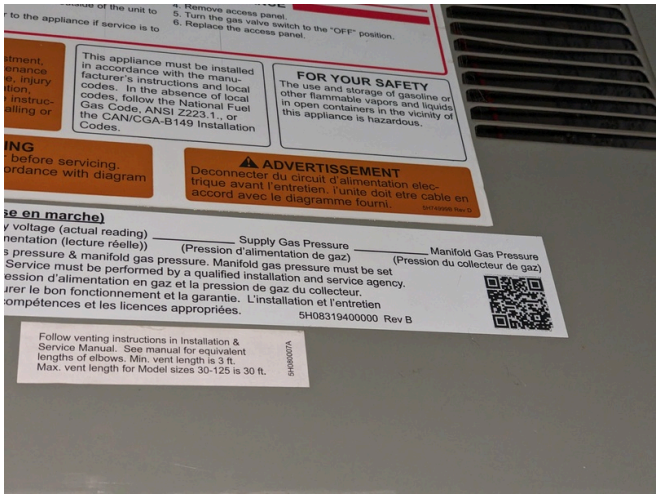
Building 5 - Exterior IR - Southern Elevation



Building 5 - Exterior IR - Western Elevation

Lighting

B5 Garage Heater is a Modine Hot Dawg with No Label

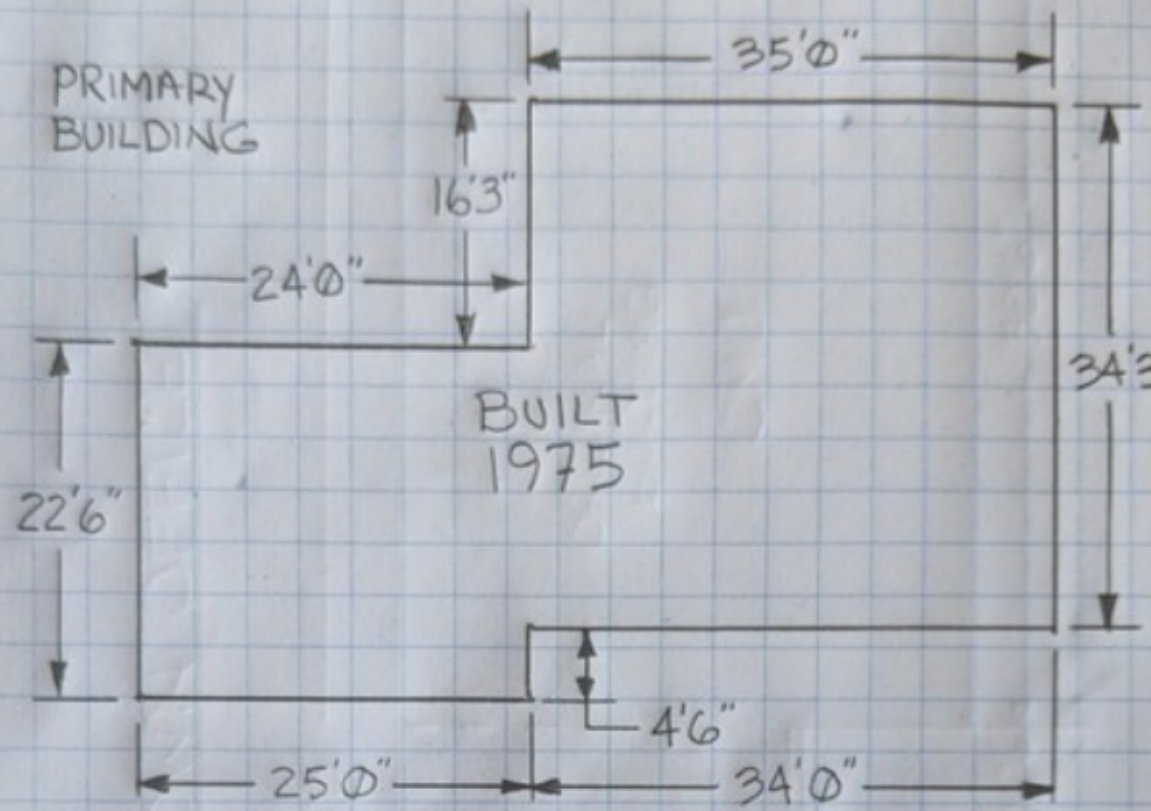


Hot Dawg has no Label

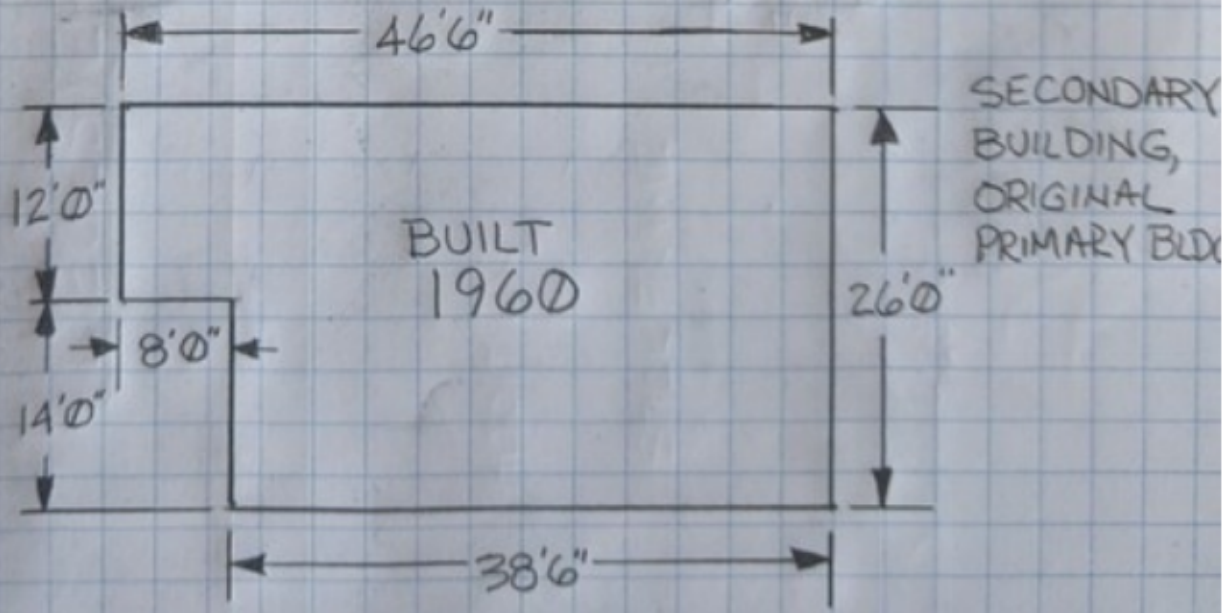
EXHIBIT B: SITE AND FLOOR PLANS

BRANDON WASTEWATER TREATMENT PLANT

BUILDING TWO



BUILDING ONE



CHEMICAL BUILDING: 18'0" x 20'0" / 360 SF
NORTH GARAGE: 39'3" x 30'9" / 1,207 SF
SOUTH GARAGE: 30'0" x 30'0" / 900 SF

BRANDON WWTP
SITE MAP

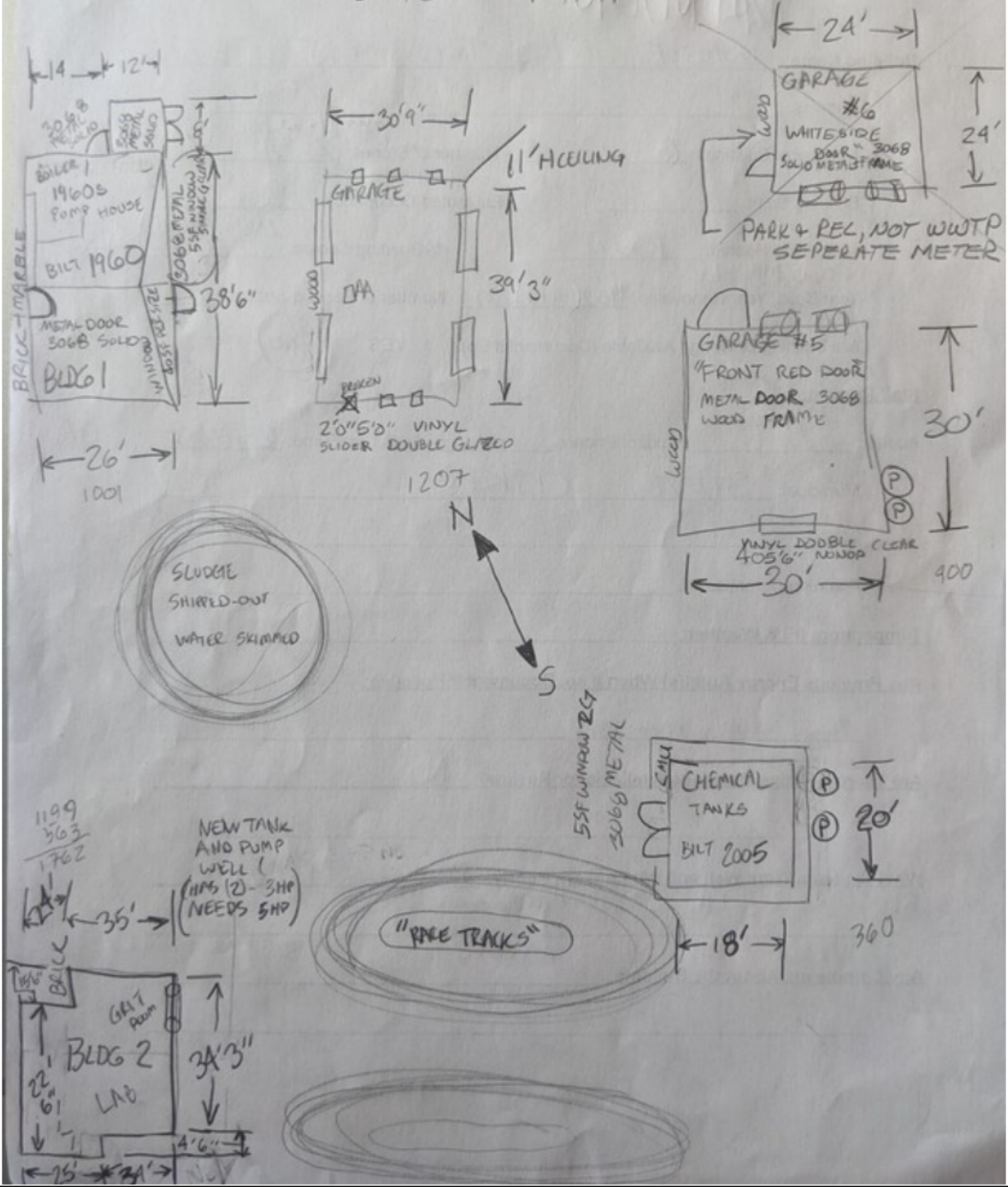


EXHIBIT C: MECHANICAL EQUIPMENT INVENTORY

VENTILATION										
Locat.	**Area Served**	**System Type**	**Make**	**Model #**	**HP**	**Air Flow (CFM)**	**Year of Mfr**	**Qty**	**Fuel**	**RUL**
RECOMMENDED FOR REPLACEMENT										
None										
NOT RECOMMENDED FOR REPLACEMENT										
Building 1	Hallway & Basement	Exhaust Fan	Greenheck	SQ-100-X	.5	770 - 1094	2005	2	Electricity	1
Building 2	Subgrade Vaults	ERV	RenewAire	HE1X1N	Two 0.5 HP motors	250-925	2023	2	Electricity	15
Building 2	Grit Room	Exhaust Fan	Greenheck	SQ-100-X	.167	459 - 1455	2022	1	Electricity	18
Building 2	Basement	Exhaust Fan	Greenheck	BSQ-90-5-X	0.5	437 - 1012	2000	1	Electricity	0
Building 2	Basement	Exhaust Fan	Greenheck	SQ-140-VG-X	1.0	911 - 2950	2022	1	Electricity	18
Building 2	Basement	Exhaust Fan	Greenheck	GB-120-4	0.25	907 - 1692	2000	1	Electricity	1
Building 2	Grit Room	Exhaust Fan	Greenheck	CUBE-180-5-1-30-X-SW	0.5	3420 - 5327	2022	1	Electricity	18
Building 3	Chemical Room	Exhaust Fan	Greenheck	CUE-090-VG1-19-X-SW	0.1	306 - 903	2022	1	Electricity	25
Building 6 - Subgrade Vault	Pump Room Vault	ERV	RenewAire	EV Premiun L	Two 0.5 HP motors	30 - 280	2022	2	Electricity	18
Building 6 - Subgrade Vault	Pump Room Vault	Exhaust Fan	Greenheck	SQ-98-V6-X	.25	459 - 1455	2022	1	Electricity	18

PUMPS AND MOTORS							
Equip. Location	**Service**	**Make**	**Model #**	**Size (HP)**	**Year**	**Quantity**	**VFD Control (Y/N)**
RECOMMENDED FOR REPLACEMENT							
None							
NOT RECOMMENDED FOR REPLACEMENT							
Building 1 - Boiler Room	Hydronic Space Heating	Grundfos	Magna 3 32-120F 165	.25	2021	1	Yes
Building 1 - Basement	Blower	Toshiba	B0154DLF2UM	15	1993 (assumption based on visual inspection)	1	Yes
Building 1 - Basement	Big Tank Pump	Baldor	A220048R-55	20	2022	3	Yes
Building 1 -Grit Room	Grit Room	Baldor	G15208041	5	2023	1	Yes
Building 2 - Boiler Room	Hydronic Space Heating	Taco	0034e-F2	0.25	2023	2	Yes

PUMPS AND MOTORS							
Equip. Location	**Service**	**Make**	**Model #**	**Size (HP)**	**Year**	**Quantity**	**VFD Control (Y/N)**
Building 2 -Grit Room	Filter	Teco Westinghouse	AEUHXG	3	2002	1	Yes
Building 2 - Grit Room	Filter	Marathon	XL184TTGN6526AAL	5	1991	1	Yes
Building Two 2 - Tank Room	Chemical Metering Pump	LMI	PD061-940SI	1/9	2020	1	No
Building 2 - Basement	Blower	Louis Allis	LAM25 18 284T	25	2023	1	Yes
Building 2 - Basement	Blower	US Electrical Motors	284T TE	25	2008	1	Yes
Building 2 - Basement	Pump for the Existing Ponds	Emerson	5831	5	2001	1	Yes
Building 6 -Additional Vault S/O Building 2	New Pond using secondary Pump for the Old Ponds	Emerson	5831	5	2011	1	Yes
Building 6 - Additional Vault S/O Building 2	New Pond Pump	Teco Westinghouse	Type: AEHH-8N	3	2023	1	Yes

HEATING EQUIPMENT													
Equip. Location	**Area Served**	**System Type**	**Make**	**Model #**	**Capacity**	**Cap. Units**	**Efficiency**	**Eff. Units**	**Year**	**Qty**	**Fuel**	**Dist.**	**RUL**
RECOMMENDED FOR REPLACEMENT													
Building 2 - Boiler Room	Building 2	Hydronic Boiler	Burnham	V903A	347	MBTUH	80%	AFUE	2017	1	Propane	Hydronic Radiator or Hydronic Coils	18
Building 3 - Ceiling Mount	Chemical Tanks Building 3	Unit Heater	Reznor	UDZ-75	62.25	MBTUH	83%	AFUE	2022	1	Propane	Point Source	18
Building 4 - Ceiling Mounted	Four Bay Garage - Building 4	Unit Heater	Modine	HD125AS111FBAN	100	MBTUH	80%	AFUE	2021 - Visual assumption	1	Propane	Point Source	17
Building 5 - Ceiling Mounted	Two Bay Garage - Building 5	Unit Heater	Modine	HD45AS0111SBAN	36	MBTUH	80%	AFUE	2021 - Visual assumption	1	Propane	Point Source	17
NOT RECOMMENDED FOR REPLACEMENT													
Building 1 - Boiler Room	Building 1	Hydronic Boiler	HTP Ariston Thermo	ELU-199WBN	184	MBTUH	95%	AFUE	2021	1	Propane	Hydronic Radiator or Hydronic Coils	22

HEATING EQUIPMENT												
Equip. Location	**Area Served**	**System Type**	**Make**	**Model #**	**Capacity**	**Cap. Units**	**Efficiency**	**Eff. Units**	**Year**	**Qty**	**Fuel**	**Dist.**	**RUL**
Building 2 - Ground Pad	Lab Office	Mini-Split Heat Pump	Daikin	RXL24UMVJUA	24	MBTUH	10.0	HSPF	2022	1	Electric	Ductless Heat Pump	13
Building 6 - S/O Building 2	Below Grade Pump Room	Unit Heater	Modine	HER 50C 3301	5	kW	97%	AFUE	2023	1	Electric	Point Source	19

COOLING EQUIPMENT												
Equip. Location	**Area Served**	**System Type**	**Make**	**Model #**	**Capacity**	**Cap. Units**	**Efficiency**	**Eff. Units**	**Year**	**Qty**	**Dist.**	**RUL**
RECOMMENDED FOR REPLACEMENT												
None												
NOT RECOMMENDED FOR REPLACEMENT												
Building 2 - Ground Pad	Lab Office	Mini-Split Heat Pump	Daikin	RXL24UMVJUA	2	Tons	18.6	SEER	2022	1	Ductless Heat Pump	13

FAN COILS									
Location/ Area Served	**Manufacturer**	**Model #**	**Year**	**Fan Controls**	**Valve Type**	**Fan Motor HP**	**Airflow (Design, CFM)**	**Qty**	**RUL**
RECOMMENDED FOR REPLACEMENT									
Building 1 - Hallway	Modine	HSB 47S01	2006	Constant Volume	2-way valve	1/12	730	2	2
Building 1 - Electrical Room	Modine	HSB 33S01	2006	Constant Volume	2-way valve	1/25	630	1	2
Building 2 - West Tank Room	Modine	HS 63S01	2000	Constant Volume	2-way valve	1/12	1120	2	0
Building 2 - West Tank Room	Modine	HSB 47S01	2000	Constant Volume	2-way valve	1/12	730	1	0
Building 2 - Basement	Beacon Morris	VB-077	2001	Constant Volume	2-way valve	1/3	1200	1	0
NOT RECOMMENDED FOR REPLACEMENT									
Building 1 - Boiler Room	Modine	HC 18SB01SA	2022	Constant Volume	2-way valve	1/60	340	1	18
Building 1 - Grit Room	Modine	HC 18SB06SA	2023	Constant Volume	2-way valve	1/6	340	1	19
Building 2 - Grit Room	Modine	HC 47SB06SA	2023	Constant Volume	2-way valve	1/6	730	2	19
Building 2 -Basement	Modine	HC 33SB01SA	2022	Constant Volume	2-way valve	1/25	630	1	18

DHW EQUIPMENT												
Equip. Location	**Area Served**	**Make**	**Model #**	**Capacity (BTUH or kW)**	**Efficiency**	**Direct or Indirect**	**Tank Size**	**Recirc. Pump HP**	**Year**	**Qty**	**Fuel**	**RUL**
RECOMMENDED FOR REPLACEMENT												
None												
NOT RECOMMENDED FOR REPLACEMENT												
Boiler Room	Building 2	Bradford White	RE350S6 -1NCWW	4.5 kW	0.92 UEF	Direct	50	None	2023	1	Electric	14
Chemical Tanks	Building 3	Bradford White	RE330S6 -1NALL	1.5 kW	0.92 UEF	Direct	30	None	2023	1	Electric	14
Boiler Room	Building 1	Bradford White	RE340S6 -1NCWW	4.5 kW	0.91 UEF	Direct	40	None	2021	1	Electric	12

INTERIOR SITE LIGHTING									
Fixture Location	**Fixture Type**	**Lamp Type**	**Fixture Count**	**Lamp Count Per Fixture**	**Existing Lamp Wattage**	**Proposed Lamp Wattage**	**Control Type**	**Daily Run Hours**	**Type of Upgrade**
RECOMMENDED FOR REPLACEMENT									
South Garage	8' Linear Ceiling	T12	2	2	75	14	Switch	7	Fixture
North Garage	4' Linear Ceiling	T8	6	2	32	14	Switch	7	Fixture
NOT RECOMMENDED FOR REPLACEMENT									
Building Two Basement	LED	LED	11	1	28	N/A	Switch	7	N/A
Building Two First Floor	LED	LED	6	1	28	N/A	Occupancy Sensor	7	N/A
Building Two First Floor Closet	LED	LED	1	1	16	N/A	Occupancy Sensor	7	N/A
Building Two Stairs	LED	LED	2	1	28	N/A	Occupancy Sensor	7	N/A
Building Two Restroom	Edison Socket	LED	1	1	9	N/A	Switch	7	N/A
Building Two Grit Room	LED	LED	4	1	28	N/A	Switch	7	N/A
New Clarifier Vault	LED	LED	3	1	28	N/A	Switch	7	N/A
New Chemical Building	4' Linerar Ceiling	LED	3	1	28	N/A	Switch	7	N/A
Original Pump Room Upstairs	LED	LED	7	1	28	N/A	Switch	7	N/A
Influent Pump Vault	LED	LED	6	1	28	N/A	Switch	7	N/A
Bar Screen Upstairs	LED	LED	2	2	16	N/A	Switch	7	N/A

INTERIOR SITE LIGHTING									
Fixture Location	**Fixture Type**	**Lamp Type**	**Fixture Count**	**Lamp Count Per Fixture**	**Existing Lamp Wattage**	**Proposed Lamp Wattage**	**Control Type**	**Daily Run Hours**	**Type of Upgrade**
Bar Screen Wheelbarrel Room	LED	LED	1	2	16	N/A	Switch	7	N/A
Headworks Basement	LED	LED	1	1	28	N/A	Switch	7	N/A

EXTERIOR SITE LIGHTING									
Fixture Location	**Fixture Type**	**Lamp Type**	**Fixture Count**	**Lamp Count Per Fixture**	**Existing Lamp Wattage**	**Proposed Lamp Wattage**	**Control Type**	**Daily Run Hours**	**Type of Upgrade**
RECOMMENDED FOR REPLACEMENT									
Building 2 - Eave	Wall Pack	Halogen	1	1	150	25	Timer	4	Lamp
NOT RECOMMENDED FOR REPLACEMENT									
Building 1 - Front Door	LED	LED	4	1	20	N/A	Switch	4	N/A
Building 1 - Exterior	LED	LED	2	2	20	N/A	Motion Sensor	4	N/A
Building 2- Roof Corners	Flood	LED	11	1	16	N/A	Timer	4	N/A
Building 2 - Entry Door	LED	LED	2	1	20	N/A	Motion Sensor	4	N/A
Building 2 -Back Door	LED	LED	1	1	20	N/A	Timer	4	N/A

REFRIGERATORS							
Location	**Make**	**Model #**	**Year**	**kWh/Year**	**Size (ft3)**	**Qty**	**RUL**
RECOMMENDED FOR REPLACEMENT							
Building 1 - Lunch Minifridge	Emerson	CR175W	2011	275 (assumption based on vinage)	1.8	1	0
Building 2 - Lab Refrigerator	Kenmore	106.70872991	2000	691	18.1	1	0
Building 2 - Lunch Minifridge	Sanyo	SR4807X	1989	325 (assumption based on vintage)	3.8	1	0
NOT RECOMMENDED FOR REPLACEMENT							
None							

CLOTHES WASHERS									
Location	**Make**	**Model #**	**Year**	**kWh/Cycle**	**Gallons Per Cycle**	**Qty**	**Style/ Config.**	**Volume (CF)**	**RUL**
RECOMMENDED FOR REPLACEMENT									

CLOTHES WASHERS									
Location	**Make**	**Model #**	**Year**	**kWh/Cycle**	**Gallons Per Cycle**	**Qty**	**Style/ Config.**	**Volume (CF)**	**RUL**
Building 1	Sears	110.19101990	1999	0.7 (assumption based on vintage)	29 (assumption based on vintage)	1	Top Loader	4.5	0
NOT RECOMMENDED FOR REPLACEMENT									
None									

FLOW RATE SUMMARY - SAMPLE			
Location	**Fixture Type**	**Qty**	**Flow (GPM or GPF)**
RECOMMENDED FOR REPLACEMENT			
Building 1 - Bathroom	Bathroom Faucet	1	1.5 GPM (measured)
Building 2 - Bathroom	Bathroom Faucet	1	2.0 GPM
NOT RECOMENDED FOR REPLACEMENT			
Building 1 - Bathroom	Janitor sink (hose bib)	1	No aerator (Assumption 5.0 GPM)
Building 1 - Bathroom	Toilet	1	1.6 GPF
Building 1 - Bathroom	Showerhead	1	1.2 GPM
Building 2 - Lab Sink	Kitchen Faucet	1	No aerator (due to lab test requirements)
Building 2 - Bathroom	Toilet	1	1.6 GPF

EXHIBIT D: SOLAR PROPOSAL

Nova Group, GBC

Proposal for Customer

Prepared by:
morgan.carson@novagroupgbc.com
4047904052
morgan.carson@novagroupgbc.com

For:
500 Union St, Brandon

Quote #: 4731446
Valid until: Sep 27 2024

Solar Energy System Proposal

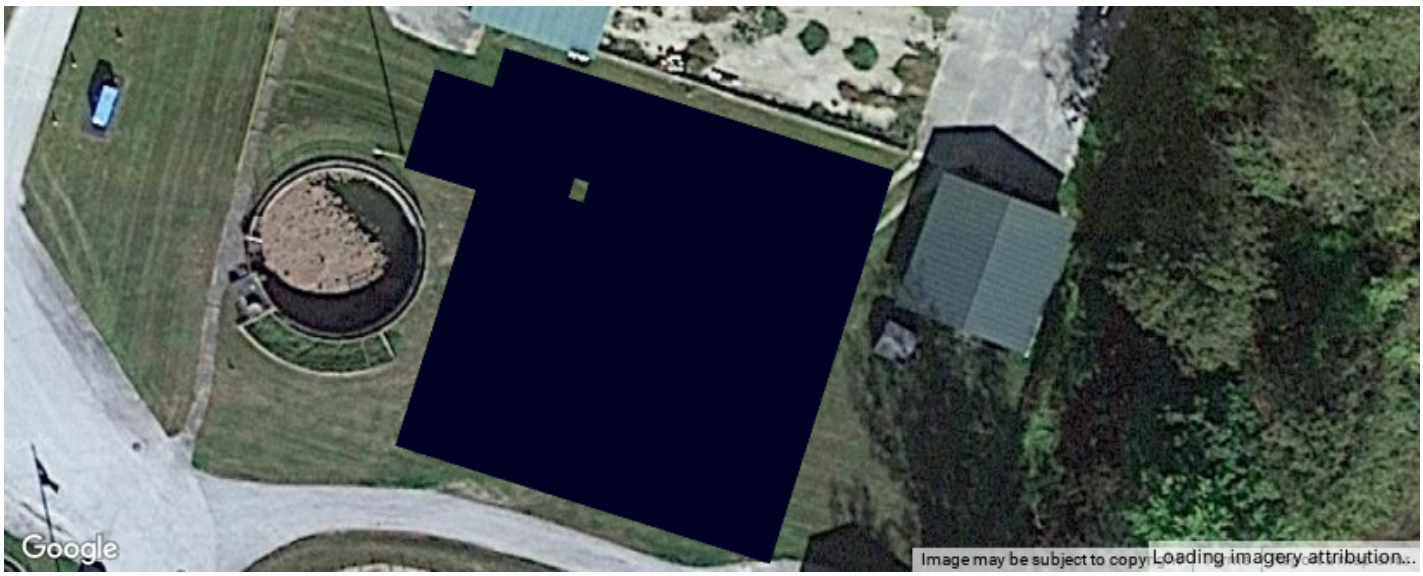
Dear ,

Thank you for the opportunity to present your Solar Energy System Proposal.

Best Regards,
morgan.carson@novagroupgbc.com
Nova Group, GBC

Recommended System Option

100%	$726,157	$997,111	$270,954
Consumption Offset	Lifetime Electricity Bill Savings	Net Cost of this solar system	Clean Energy Premium over system lifetime



Your Solution

Solaria PowerXT-370R-PD Series

546 Solaria PowerXT-370R-PD
370 Watt panels
with 25 Year Performance Warranty
Up to **20.5%** Module efficiency
251,674 kWh per year

SOLARIA

Battery

Freedom Won
400.0 kWh Total Battery Storage
1 x LiTE Commercial 400/320 HV

Battery

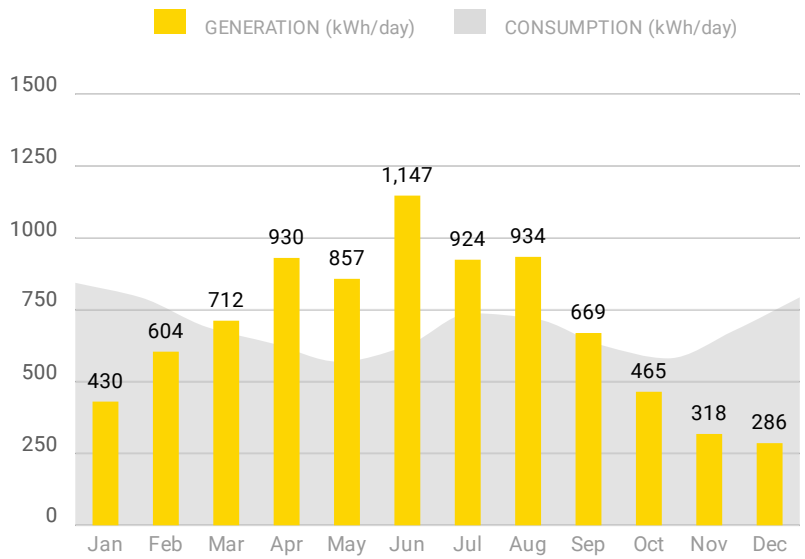
Agreate
1000.0 kWh Total Battery Storage
2 x ATEN-500-500R

Warranties: 25 Year Panel Product Warranty, 25 Year Panel Performance Warranty, 5-10 Year Battery Product Warranty

System Performance

100%

Energy From Solar



System Performance Assumptions: System Total losses: 15.3%, Inverter losses: 2.5%, Optimizer losses: 0%, Shading losses: 0%, Performance Adjustment: 0%, Output Calculator: System Advisor Model 2020.02.29.r2. Panel Orientations: 546 panels with Azimuth 197 and Slope 20.

The solar system(s) quoted in this proposal are not intended to be portable.

Environmental Benefits

Solar has no emissions. It just silently generates pure, clean energy.

Each Year

100% Of CO_2, SO_x & NO_x

7 tons Avoided CO_2 per year

Over System Lifetime

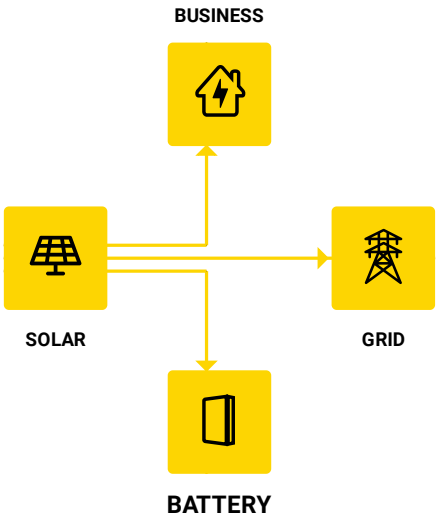
126,506 Car miles avoided

1,310 Trees planted

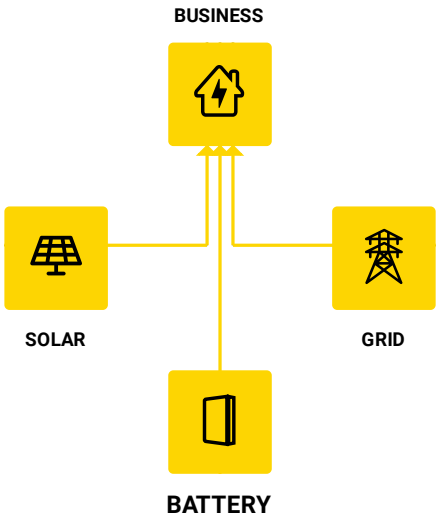
146 Long haul flights avoided

How your system works

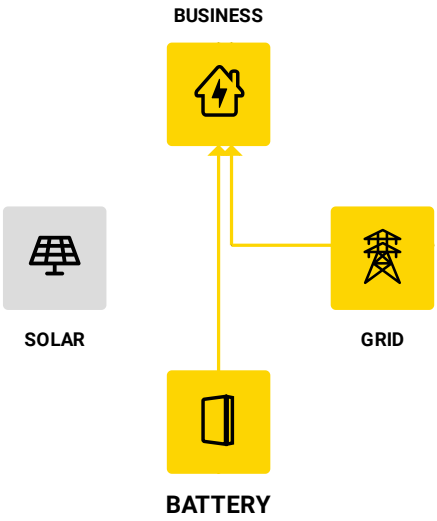
Generating Excess Solar



Partially Offset Usage

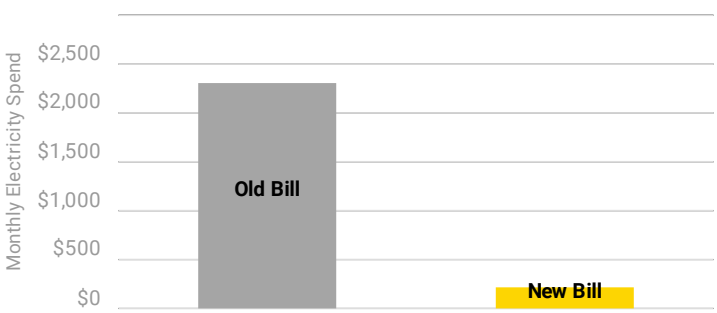


Night

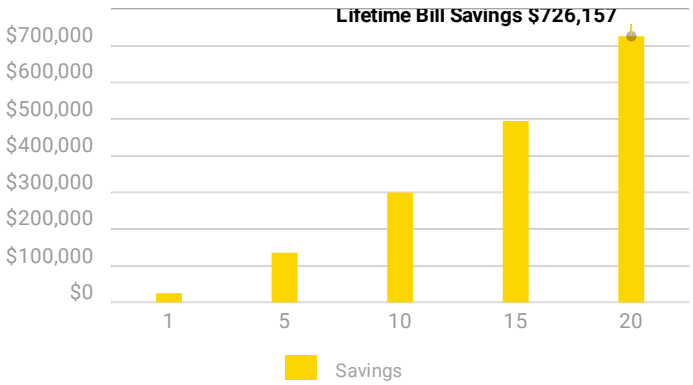


Electricity Bill Savings

First Year Monthly Bill Savings



Cumulative Bill Savings



Month	Solar Generation (kWh)	Electricity Consumption before solar (kWh)	Electricity Consumption after solar (kWh)	Utility Bill before solar ($)	Utility Bill after solar ($)	Cumulative Energy Credit ($)	Estimated Savings ($)
Jan	13,343	26,154	13454	2,866	1,489	0	1377
Feb	16,914	22,186	6416	2,436	726	0	1710
Mar	22,065	21,374	688	2,348	105	0	2243
Apr	27,905	18,969	(7461)	2,087	30	809	2057
May	26,580	17,646	(7538)	1,944	30	1,627	1914
Jun	34,409	18,638	(14765)	2,051	30	3,228	2021
Jul	28,642	22,877	(4524)	2,511	30	3,719	2481
Aug	28,949	22,246	(5736)	2,443	30	4,341	2413
Sep	20,070	18,789	(647)	2,068	30	4,411	2038
Oct	14,402	18,007	4936	1,983	30	3,876	1953
Nov	9,533	20,322	10671	2,234	30	2,718	2204
Dec	8,861	24,591	16091	2,697	30	0	2667

Rate not specified specified, using Single Phase Service based on location.

Your projected energy cost is calculated by considering a 4.0% increase in energy cost each year, due to trends in the raising cost of energy. This estimate is based on your selected preferences, current energy costs and the position and orientation of your roof to calculate the efficiency of the system. Projections are based on estimated usage of 251799 kWh per year, assuming Single Phase Service Electricity Tariff.

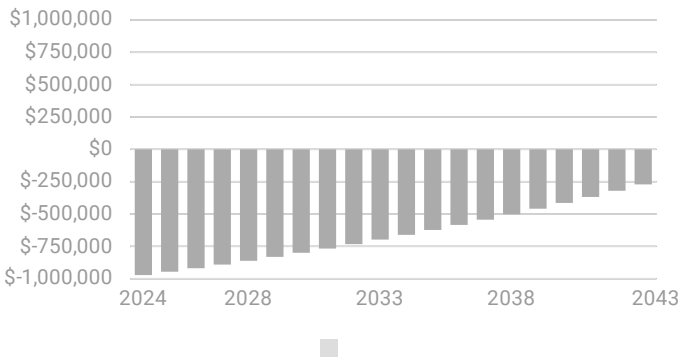
Your electricity tariff rates may change as a result of installing the system. You should contact your electricity retailer for further information.

Proposed Tariff Details - High Plains Power Inc Single Phase Service	
Energy Charges	
Usage Charge *All Day*	$0.11 / kWh
Fixed Charges	
Fixed Charge	$30.00 / month

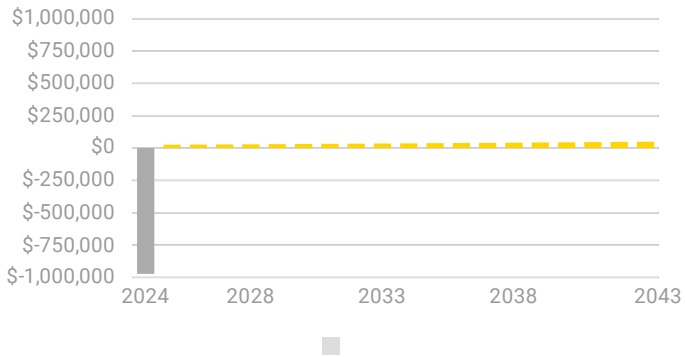
Net Financial Impact Cash

$726,157	-	$997,111	=	$270,954
Utility Bill Savings		Net System Cost		Clean Energy Premium

Cumulative Savings From Going Solar



Annual Savings From Going Solar



Estimates do not include replacement costs of equipment not covered by a warranty. Components may need replacement after their warranty period. Financial discount rate assumed: 6.75%

Quotation

Payment Option: Cash

546 x Solaria Corporation 370 Watt Panels (Solaria PowerXT-370R-PD) 1 x LiTE Commercial 400/320 HV, 2 x ATEN-500-500R (Freedom Won/Agreate)	
Total System Price	$1,424,444.00
Purchase Price	**$1,424,444.00**

Additional Incentives

Federal Investment Tax Credit (ITC) The Federal Solar Tax Credit or The Federal Investment Tax Credit (ITC) for constructions starting in 2023.	$427,333.20
Net System Cost	**$997,110.80**

Price excludes Retailer Smart Meter should you want us to install your Smart Meter it will be an additional cost.
This proposal is valid until Sep 27 2024.

Quote Acceptance

I have read & accept the terms and conditions.

Signature _____

Name _____ Date _____

SOLARIA®

Solaria PowerXT® | DC Panel

Solaria PowerXT®-370R-PD

Achieving 20.5% efficiency, Solaria PowerXT solar panels are one of the highest power panels in the residential and commercial solar market. Compared to conventional panels, Solaria PowerXT panels have fewer gaps between the solar cells; this leads to higher power and superior aesthetics. Solaria PowerXT Pure Black™ panels are manufactured with black backsheet and frames, enhancing a home or building's architectural beauty.

Developed in California, Solaria's patented cell cutting and panel assembly takes processed solar wafers and turns them into PowerXT solar panels. The process starts by creating a highly reliable PowerXT cell where busbars and ribbon interconnections are eliminated. Solaria then packages the cells into the PowerXT solar panel, reducing inactive space between the cells. This process leads to an exceptionally cost effective and efficient solar panel.

Higher Efficiency, Higher Power

Solaria PowerXT panels achieve up to 20.5% efficiency; conventional panels achieve 15% – 17% efficiency. Solaria PowerXT panels are one of the highest power panels available.

Lower System Costs

Solaria PowerXT panels produce more power per square meter area. This reduces installation costs due to fewer balance of system components.

Improved Shading Tolerance

Sub-strings are interconnected in parallel, within each of the four panel quadrants, which dramatically lowers the shading losses and boosts energy yield.

Improved Aesthetics

Compared to conventional panels, Solaria PowerXT panels have a more uniform appearance and superior aesthetics.

Durability and Reliability

Solder-less cell interconnections are highly reliable and designed to far exceed the industry leading 25 year warranty.

About Solaria

Established in 2000, The Solaria Corporation has created one of the industry's most respected IP portfolios, with over 350 issued and pending patents in PV solar cell and module technology. Headquartered in Oakland, California, Solaria has developed a technology platform that unlocks the potential of solar energy.

TOP PERFORMER 2018 DNV·GL PV MODULE RELIABILITY SCORECARD

TÜVRheinland® Precisely Right.

The Solaria Corporation 1700 Broadway, Oakland, CA 94612 P: (510) 270-2500 www.solaria.com

Rev 3D 12-2019

SOLARIA®

Solaria PowerXT®-370R-PD

Performance at STC (1000W/m², 25° C, AM 1.5)

Solaria PowerXT-		365R-PD	370R-PD
Max Power (P_{max})	[W]	365	370
Efficiency	[%]	20.2	20.5
Open Circuit Voltage (V_{oc})	[V]	48.0	48.3
Short Circuit Current (I_{sc})	[A]	9.58	9.60
Max Power Voltage (V_{mp})	[V]	39.9	40.2
Max Power Current (I_{mp})	[A]	9.16	9.20
Power Tolerance	[%]	-0/+3	-0/+3

Performance at NOCT (800W/m², 20°C Amb, Wind 1 m/s, AM 1.5)

Max Power (Pmax)	[W]	269	272
Open Circuit Voltage (V_{oc})	[V]	45.1	45.4
Short Circuit Current (I_{sc})	[A]	7.73	7.74
Max Power Voltage (V_{mp})	[V]	36.7	37.0
Max Power Current (I_{mp})	[A]	7.32	7.35

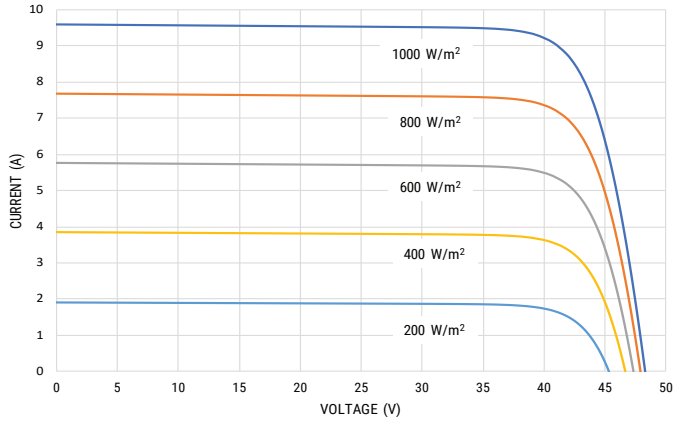
Temperature Characteristics

NOCT	[°C]	45 +/-2
Temp. Coeff. of P_{max}	[% / °C]	-0.39
Temp. Coeff. of V_{oc}	[% / °C]	-0.29
Temp. Coeff. of Isc	[% / °C]	0.04

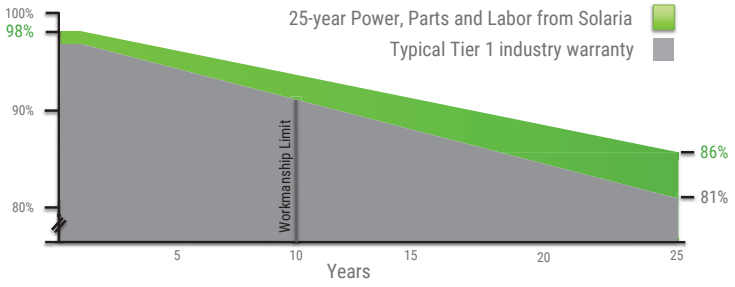
Design Parameters

Operating temperature	[°C]	-40 to +85
Max System Voltage	[V]	1000
Max Fuse Rating	[A]	15
Bypass Diodes	[#]	4

IV Curves vs. Irradiance (370W Panel)



Comprehensive 25-Year Warranty



Mechanical Characteristics

Cell Type	Monocrystalline Silicon
Dimensions (L x W x H)	63.8" x 43.9" x 1.57" 1621mm x 1116mm x 40mm
Weight	21 kg / 46 lbs
Glass Type / Thickness	AR Coated, Tempered / 3.2mm
Frame Type	Black Anodized Aluminum
Cable Type / Length	12 AWG PV Wire (UL) / 1000mm
Connector Type	MC4
Junction Box	IP67 / 4 diodes
Front Load	5400 Pa / 113 psf*
Rear Load	3600 Pa / 75 psf*

* Refer to Solaria Installation Manual for details

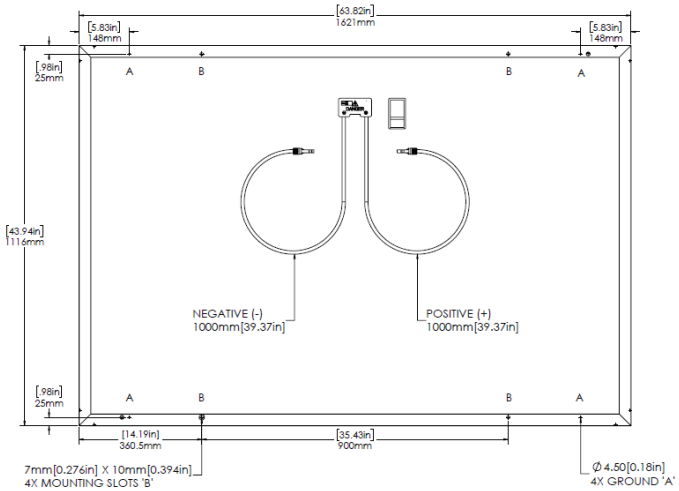
Certifications / Warranty

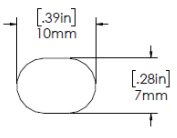
Certifications	UL 1703/IEC 61215/IEC 61730/CEC CAN/CSA-C22.2
Fire Type (UL 1703)	1
Warranty	25 years*

* Warranty details at www.solaria.com

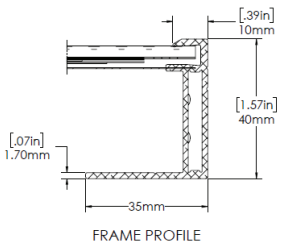
Packaging

Stacking Method	Horizontal / Palletized
Panels/ Pallet	25
Pallet Dims (L x W x H)	65.7" x 45.3" x 48.4" 1668mm x 1150mm x 1230 mm
Pallet Weight	590 kg / 1300 lbs
Pallets / 40-ft Container	28
Panels / 40-ft Container	700





MOUNTING SLOT 'B'



FRAME PROFILE

Nova Group, GBC

Proposal for Customer

Prepared by:
morgan.carson@novagroupgbc.com
4047904052
morgan.carson@novagroupgbc.com

For:
500 Union St, Brandon

Quote #: 4731446
Valid until: Sep 27 2024

Solar Energy System Proposal

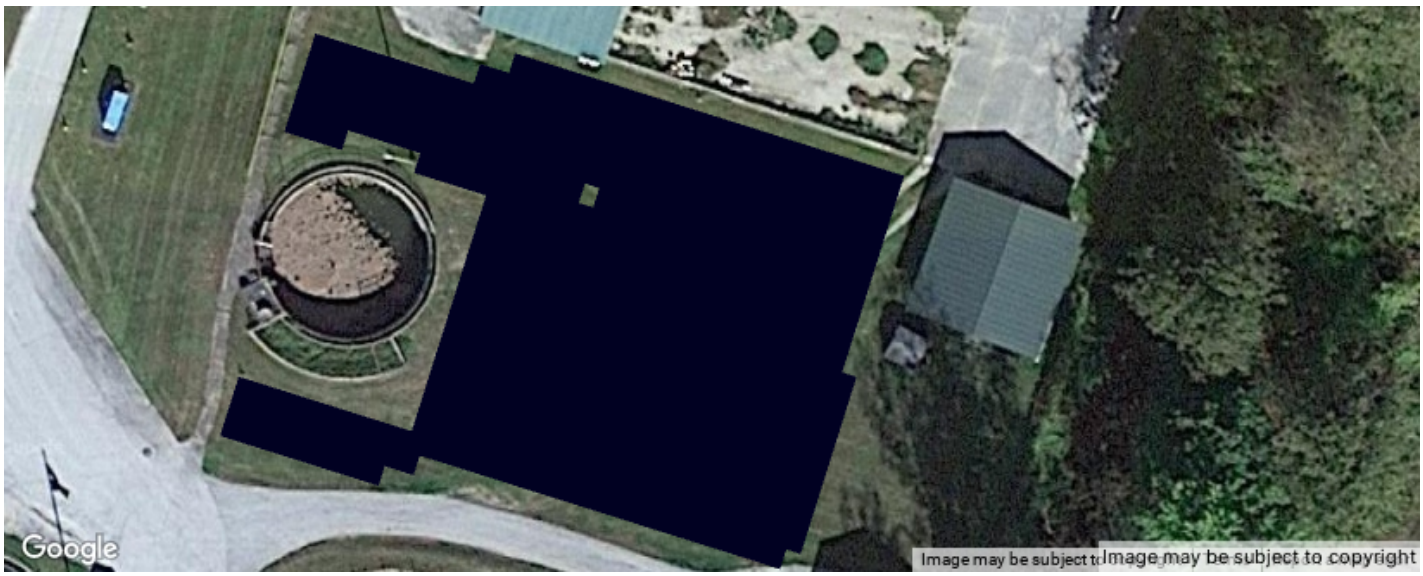
Dear ,

Thank you for the opportunity to present your Solar Energy System Proposal.

Best Regards,
morgan.carson@novagroupgbc.com
Nova Group, GBC

Recommended System Option

101 %	$840,277	$1,144,683	$304,407
Consumption Offset	Lifetime Electricity Bill Savings	Net Cost of this solar system	Clean Energy Premium over system lifetime



Your Solution

Solaria PowerXT-370R-PD Series

633 Solaria PowerXT-370R-PD
370 Watt panels
with 25 Year Performance Warranty
Up to **20.5%** Module efficiency
291,776 kWh per year

SOLARIA

Battery

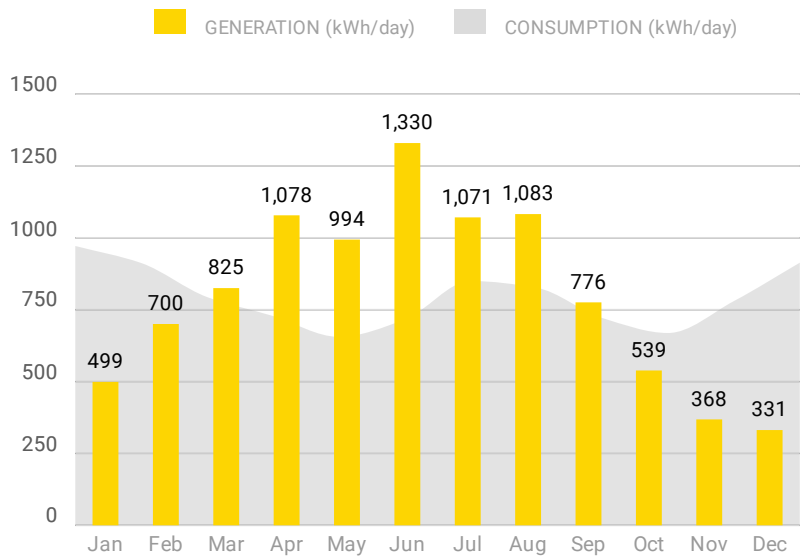
Freedom Won
1600.0 kWh Total Battery Storage
4 x LiTE Commercial 400/320 HV

Warranties: 25 Year Panel Product Warranty, 25 Year Panel Performance Warranty, 10 Year Battery Product Warranty

System Performance

101%

Energy From Solar



System Performance Assumptions: System Total losses: 15.3%, Inverter losses: 2.5%, Optimizer losses: 0%, Shading losses: 0%, Performance Adjustment: 0%, Output Calculator: System Advisor Model 2020.02.29.r2. Panel Orientations: 633 panels with Azimuth 197 and Slope 20.

The solar system(s) quoted in this proposal are not intended to be portable.

Environmental Benefits

Solar has no emissions. It just silently generates pure, clean energy.

Each Year

101% Of CO_2, SO_x & NO_x

8 tons Avoided CO_2 per year

Over System Lifetime

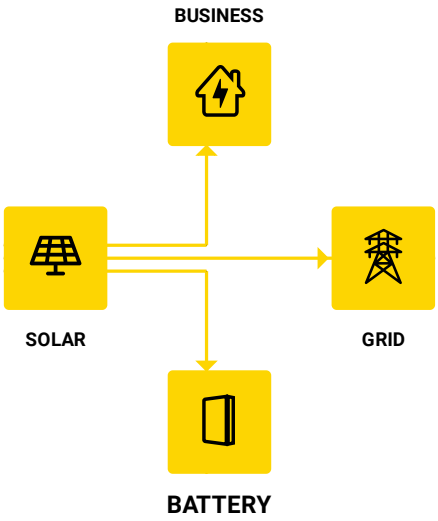
146,663 Car miles avoided

1,518 Trees planted

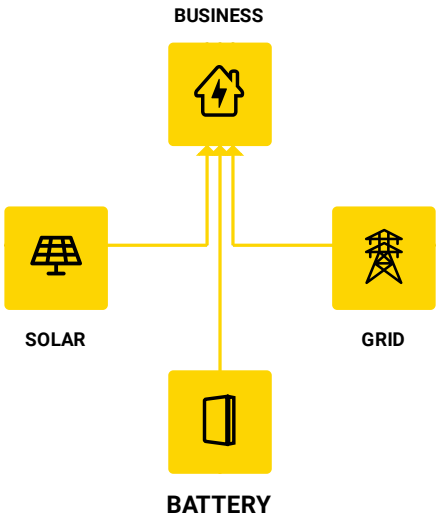
169 Long haul flights avoided

How your system works

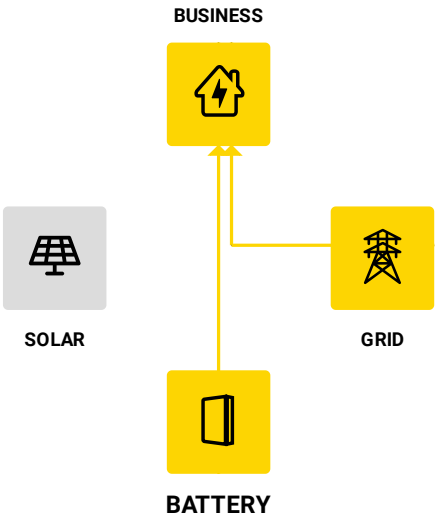
Generating Excess Solar



Partially Offset Usage

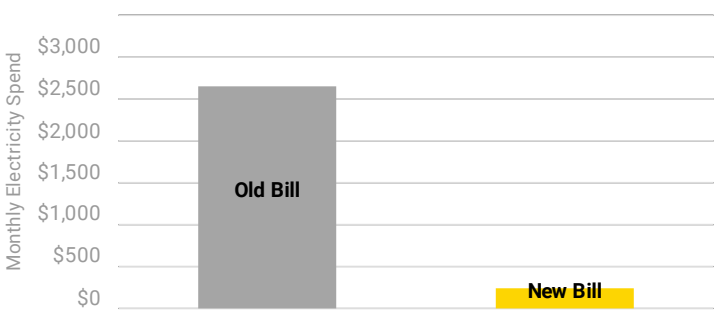


Night

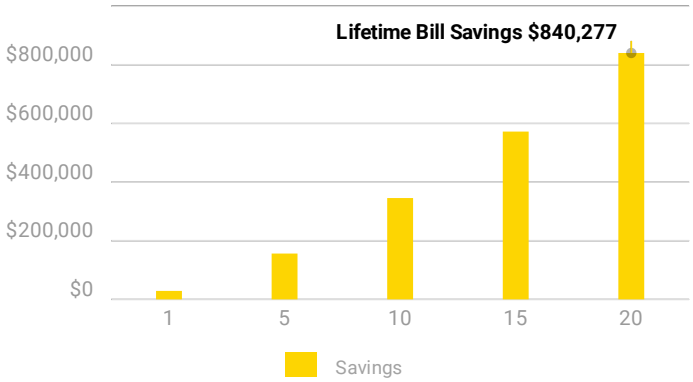


Electricity Bill Savings

First Year Monthly Bill Savings



Cumulative Bill Savings



Month	Solar Generation (kWh)	Electricity Consumption before solar (kWh)	Electricity Consumption after solar (kWh)	Utility Bill before solar ($)	Utility Bill after solar ($)	Cumulative Energy Credit ($)	Estimated Savings ($)
Jan	15,469	30,124	15404	3,297	1,701	0	1596
Feb	19,609	25,553	7279	2,801	819	0	1982
Mar	25,581	24,618	620	2,700	97	0	2603
Apr	32,351	21,848	(8810)	2,399	30	955	2369
May	30,816	20,325	(8888)	2,234	30	1,919	2204
Jun	39,892	21,467	(17268)	2,358	30	3,792	2328
Jul	33,206	26,349	(5429)	2,888	30	4,381	2858
Aug	33,562	25,622	(6813)	2,809	30	5,120	2779
Sep	23,267	21,640	(896)	2,377	30	5,217	2347
Oct	16,697	20,740	5596	2,279	30	4,610	2249
Nov	11,052	23,406	12208	2,568	30	3,286	2538
Dec	10,273	28,323	18471	3,102	30	0	3072

Rate not specified specified, using Single Phase Service based on location.

Your projected energy cost is calculated by considering a 4.0% increase in energy cost each year, due to trends in the raising cost of energy. This estimate is based on your selected preferences, current energy costs and the position and orientation of your roof to calculate the efficiency of the system. Projections are based on estimated usage of 290017 kWh per year, assuming Single Phase Service Electricity Tariff.

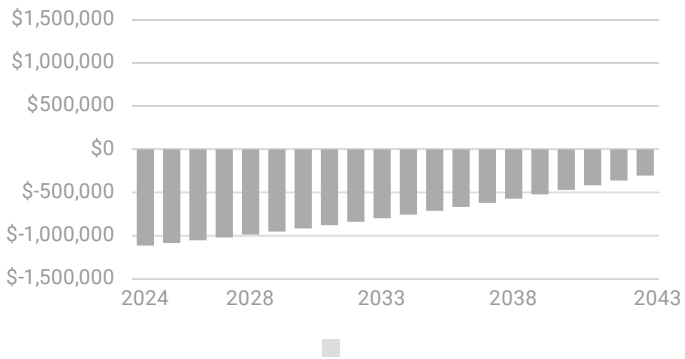
Your electricity tariff rates may change as a result of installing the system. You should contact your electricity retailer for further information.

Proposed Tariff Details - High Plains Power Inc Single Phase Service	
Energy Charges	
Usage Charge *All Day*	$0.11 / kWh
Fixed Charges	
Fixed Charge	$30.00 / month

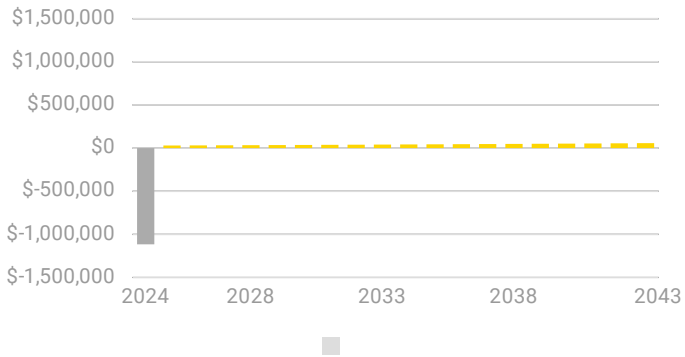
Net Financial Impact Cash

$840,277	-	$1,144,683	=	$304,407
Utility Bill Savings		Net System Cost		Clean Energy Premium

Cumulative Savings From Going Solar



Annual Savings From Going Solar



Estimates do not include replacement costs of equipment not covered by a warranty. Components may need replacement after their warranty period. Financial discount rate assumed: 6.75%

Quotation

Payment Option: Cash

633 x Solaria Corporation 370 Watt Panels (Solaria PowerXT-370R-PD) 4 x LiTE Commercial 400/320 HV (Freedom Won)	
Total System Price	$1,635,262.00
Purchase Price	**$1,635,262.00**

Additional Incentives

Federal Investment Tax Credit (ITC) The Federal Solar Tax Credit or The Federal Investment Tax Credit (ITC) for constructions starting in 2023.	$490,578.60
Net System Cost	**$1,144,683.40**

Price excludes Retailer Smart Meter should you want us to install your Smart Meter it will be an additional cost.
This proposal is valid until Sep 27 2024.

Quote Acceptance

I have read & accept the terms and conditions.

Signature _____

Name _____ Date _____

SOLARIA®

Solaria PowerXT® | DC Panel

Solaria PowerXT®-370R-PD

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Rev 3D 12-2019

SOLARIA®

Solaria PowerXT®-370R-PD

Performance at STC (1000W/m², 25° C, AM 1.5)

Solaria PowerXT-		365R-PD	370R-PD
Max Power (P_{max})	[W]	365	370
Efficiency	[%]	20.2	20.5
Open Circuit Voltage (V_{oc})	[V]	48.0	48.3
Short Circuit Current (I_{sc})	[A]	9.58	9.60
Max Power Voltage (V_{mp})	[V]	39.9	40.2
Max Power Current (I_{mp})	[A]	9.16	9.20
Power Tolerance	[%]	-0/+3	-0/+3

Performance at NOCT (800W/m², 20°C Amb, Wind 1 m/s, AM 1.5)

Max Power (Pmax)	[W]	269	272
Open Circuit Voltage (V_{oc})	[V]	45.1	45.4
Short Circuit Current (I_{sc})	[A]	7.73	7.74
Max Power Voltage (V_{mp})	[V]	36.7	37.0
Max Power Current (I_{mp})	[A]	7.32	7.35

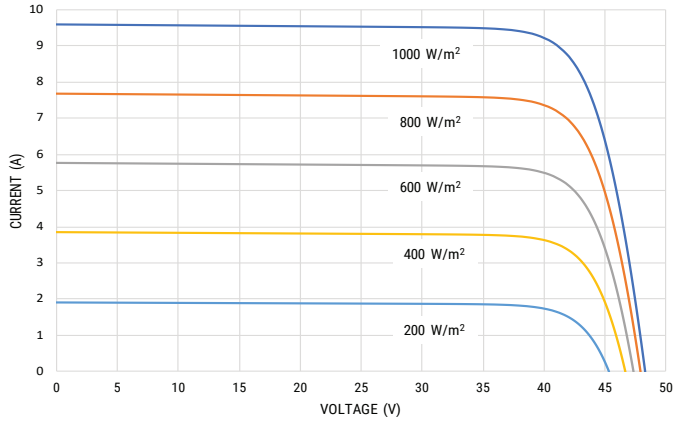
Temperature Characteristics

NOCT	[°C]	45 +/-2
Temp. Coeff. of P_{max}	[% / °C]	-0.39
Temp. Coeff. of V_{oc}	[% / °C]	-0.29
Temp. Coeff. of Isc	[% / °C]	0.04

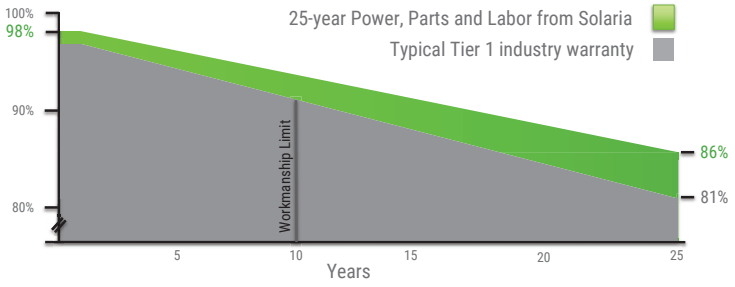
Design Parameters

Operating temperature	[°C]	-40 to +85
Max System Voltage	[V]	1000
Max Fuse Rating	[A]	15
Bypass Diodes	[#]	4

IV Curves vs. Irradiance (370W Panel)



Comprehensive 25-Year Warranty



Mechanical Characteristics

Cell Type	Monocrystalline Silicon
Dimensions (L x W x H)	63.8" x 43.9" x 1.57" 1621mm x 1116mm x 40mm
Weight	21 kg / 46 lbs
Glass Type / Thickness	AR Coated, Tempered / 3.2mm
Frame Type	Black Anodized Aluminum
Cable Type / Length	12 AWG PV Wire (UL) / 1000mm
Connector Type	MC4
Junction Box	IP67 / 4 diodes
Front Load	5400 Pa / 113 psf*
Rear Load	3600 Pa / 75 psf*

* Refer to Solaria Installation Manual for details

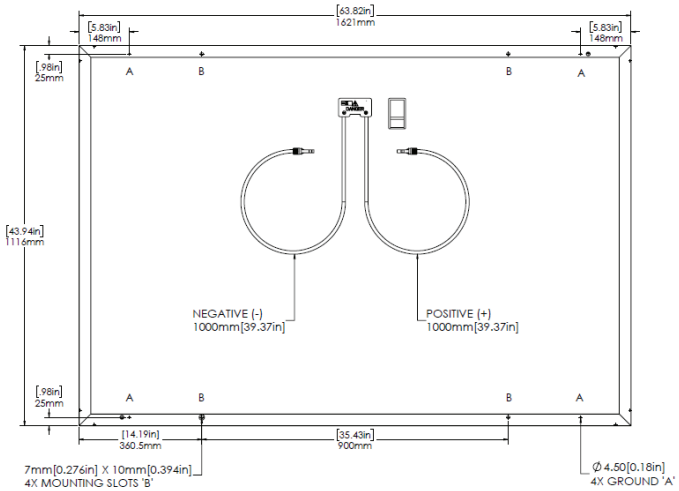
Certifications / Warranty

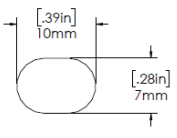
Certifications	UL 1703/IEC 61215/IEC 61730/CEC CAN/CSA-C22.2
Fire Type (UL 1703)	1
Warranty	25 years*

* Warranty details at www.solaria.com

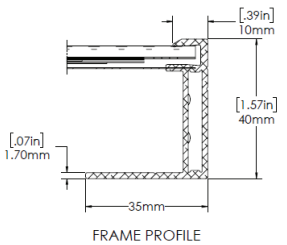
Packaging

Stacking Method	Horizontal / Palletized
Panels/ Pallet	25
Pallet Dims (L x W x H)	65.7" x 45.3" x 48.4" 1668mm x 1150mm x 1230 mm
Pallet Weight	590 kg / 1300 lbs
Pallets / 40-ft Container	28
Panels / 40-ft Container	700





MOUNTING SLOT 'B'



FRAME PROFILE

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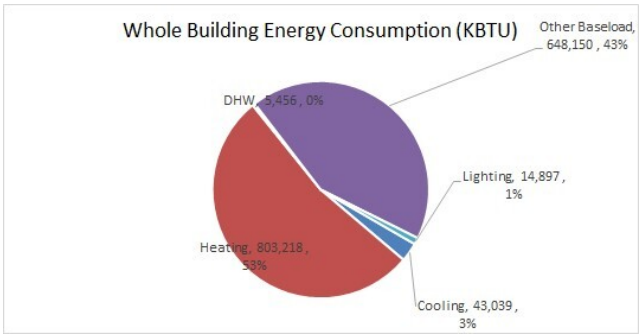
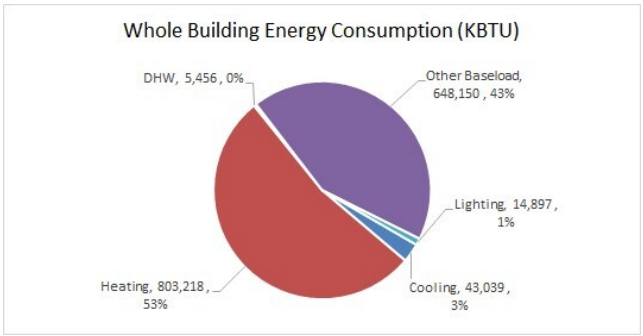
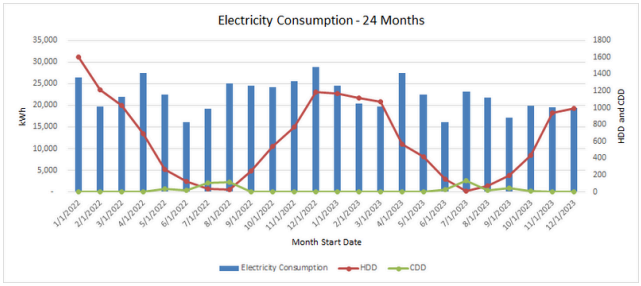
PHOTO GALLERY



1. Whole Building Energy Consumption



2. Whole Building Energy Consumption 2



3. 24 month electricity

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RESUMES OF PROJECT TEAM

EMPLOYEE RESUME

USING BUSINESS AS A FORCE FOR GOOD

KEELY FELTON, CEA
CHIEF SUSTAINABILITY OFFICER

PROFESSIONAL EDUCATION
Bachelor of Arts, Animal Behavior, Haverford College, Haverford, Pennsylvania, 2001

CERTIFICATIONS/QUALIFICATIONS
- Association of Energy Engineers (AEE) Certified Energy Auditor (CEA)
- AEE Certified Measurement and Verification Professional (CMVP), expired 2019
- Multifamily Building Analyst Training (to BPI-MFBA standard) – 36 hours
- TRUE Advisor Training Program
- Certified Water Efficiency Professional Training Program
- Certificate of Proficiency in Building Benchmarking, Consortium for Building Energy Innovation and the Department of Energy
- Certified Green Globes Professional
- Green Globes Fellow
- Certified GreenPoint Rater, Existing Home Multifamily
- Certified GreenPoint Rated, New Home
- BREEAM USA In-Use Assessor
- ASTM E1527 Environmental Site Assessment (ESA) for Commercial Real Estate Certificate
- HAZWOPER 8-hour Refresher (OSHA 29 CFR, Part 1910.120)

SELECTED EXPERIENCE
Ms. Felton oversees Nova Energy Group, a division within Nova Group, GBC. The group delivers, on average, 30 energy and water audits in addition to other green deliverables per month. In this capacity, she issues and reviews reports for the agency green lending programs (Fannie Mae Green Rewards, Freddie Mac Green Up, and HUD) while working closely with Nova's debt clients to make sure that all pertinent information is communicated throughout the due diligence process.

Additionally, Ms. Felton enjoys long-term relationships with property owners meeting more targeted energy and water goals with the group's equity energy work. These services include energy benchmarking and ongoing monitoring of utility consumption, energy modeling, strategic energy planning, project management, measurement and verification of energy savings, and ESG services.

Ms. Felton obtained her Certified Energy Auditor and Certified Measurement and Verification Professional certifications from the Association of Energy Engineers. She is highly experienced with utility data analysis for a broad spectrum of multifamily properties. Additionally, she is proficient in the use of ENERGY STAR's Portfolio Manager for obtaining benchmark scores and certification. Ms. Felton is certified as a Green Globes Professional, GreenPoint Rater, and BREEAM USE In-Use Assessor.

PROFESSIONAL ORGANIZATIONS
- Association of Energy Engineers (AEE)
- Urban Land Institute (ULI)
- Build it Green
- Green Building Initiative (GBI), Board of Directors

Nova Group

PARCEL MAP

Parcel Map

Brandon - Waste Water Treatment Plant
500 Union Street
Brandon, VT
Project Number: SE24-3892

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Nova
Group
Carbon
Neutral
Report
novagroupgbc.com/carbonneutral