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Group

Inspired Solutions
by Nova Group

MERP LEVEL 2 ENERGY ASSESSMENT

Prepared For

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



Belvidere - Town Clerk's Office
3996 VT Route 109
Belvidere, VT 05442



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Carbon
Neutral
Report

novagroupgbc.com/carbonneutral

October 19, 2023

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

Re: MERP LEVEL 2 ENERGY ASSESSMENT
Belvidere - Town Clerk's Office
3996 VT Route 109
Belvidere, VT 05442
Nova Project No.: SE23-7260

Nova Group, GBC has completed an MERP Level II Energy Assessment in accordance with the State of Vermont ACT 172 at Belvidere - Town Clerk's Office located at 3996 VT Route 109 in Belvidere, VT. Nova Group, GBC visited the site on September 20, 2023.

The assessment was performed at the Client's request using methods and procedures consistent with MERP LEVEL 2 ENERGY ASSESSMENT and using methods and 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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Field Associate



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Inspired Solutions by Nova Group

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1.0 EXECUTIVE SUMMARY

The purpose of this Level II Energy Assessment is to provide the State of Vermont – Building and General Services and Belvidere – Town Clerk's Office 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.

Building Type/Name	# Stories	Year Built/Renovated	Building Size	Estimated Occupancy
Town Clerk's Office	One (1)	Original construction date unknown, site escort stated it was likely around 1900. Renovated in 1990	1140 sqft	One (1)

The study included a review of the building's construction features, historical energy and water consumption and costs, review of the building envelope, HVAC equipment, heat distribution systems, lighting, and the building's operational and maintenance practices.

Percentage of Area Cooled	No air conditioning present
Percentage of Area Heated	80%, including the main office and back office. The vault is not conditioned.

1.1 Energy Conservation Measures

Nova Group, GBC has evaluated ten (1) Energy Conservation Measures (ECMs) for this property. The savings for each measure is calculated using standard engineering methods followed in the industry. 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.

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	
Total Projected Initial ECM Investment	\$41,400
Estimated Annual Cost Savings Related to all ECMs	\$434
Estimated Annual Cost Savings- Electricity	\$76
Estimated Annual Cost Savings- Propane	\$347
Net Effective ECM Payback	98 years

Evaluated Energy Conservation Measures: Financial Impact

Estimated Annual Energy Savings	15%
Estimated Annual Utility Cost Savings (excluding water)	16.5%

On Site RENEWABLE GENERATION Solar Photovoltaic Analysis

Estimated number of panels	Sixteen (16)
Estimated kW Rating	4
Potential Annual kWh Produced	4,700
% of Current Electricity Demand	100%
Cost of Solar Array	\$12,000
Cost of Roof Replacement if Required Prior to install	\$10,000
Total Investment Cost	\$22,000
Estimated Annual Energy Cost Savings	\$1,395
Payback without Incentives	8.60 years
Payback with All Incentives	6 years

Energy Conservation Measures Sorting:

1. 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.

Simple Payback = Initial Cost

Annual Savings

1.2 Assumptions

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

- Building operating hours are assumed to be 21 hours per week.
- The facility occupancy is assumed to be two (2) people.

Evaluated Energy & Water Conservation Measures

ECM #	Description of ECM	Projected Initial Investment (\$)	Natural Gas (therms)	Propane (gal)	No. 2 Oil (gal)	Steam (ML)	Wood (lbs)	Electricity (kWh)	Estimated Annual Water Saving (kGal)	Total Estimated Annual Cost Savings (\$)	Simple Payback (Years)
1	Improve air sealing in the Main Office area by reducing ACHn rate by an estimated 10%.	\$ 1,500	N/A	32	N/A	N/A	N/A		N/A	\$ 101	14.88
2	Improve attic insulation in the Main Office area to achieve uniform R-coverage (from R-38 to R-49)	\$ 3,420	N/A	9	N/A	N/A	N/A		N/A	\$ 28	120.63
3	Windows Option 1: Install high performance energy efficient window films on all seven (7) windows.	\$ 310	N/A	63	N/A	N/A	N/A		N/A	\$ 198	1.56
4	Windows Option 2: Install ENERGY STAR certified double-pane windows rated appropriately for this climate zone (> 0.27 U-value, 0.5 SHGC) on all seven (7) windows.	\$ 8,400	N/A	95	N/A	N/A	N/A		N/A	\$ 299	28.07
5	Install low flow 1.0 GPM EPA WaterSense-certified aerator in the bathroom	\$ 10	N/A	N/A	N/A	N/A	N/A	44	N/A	\$ 13	0.76
6	Replace the office refrigerator with an ENERGY STAR rated model	\$ 250	N/A	N/A	N/A	N/A	N/A	40	N/A	\$ 12	21.04
7	Replace the domestic hot water tank with higher efficiency (.99 EF), point of use model.	\$ 900	N/A	N/A	N/A	N/A	N/A	166	N/A	\$ 49	18.25
8	Install insulation on DHW lines to R-4	\$ 50	N/A	N/A	N/A	N/A	N/A	39	N/A	\$ 12	4.32

Evaluated Energy & Water Conservation Measures

9	Upgrade interior lighting (3) with ENERGY STAR or DLC certified LED technologies and install occupancy sensors (4)	\$ 760	N/A	N/A	N/A	N/A	N/A	147	N/A	\$44	17.41
10	Floor Option 1: Improve floor structure and comfort by removing the current floor, remediating the mold, installing a vapor barrier, installing insulation, laying a new slab, and putting down a new hardwood floor. It is strongly recommended to consult with a professional flooring / moisture remediation specialist prior to implementing this measure, as every situation is specific.	\$32,063	N/A	130	N/A	N/A	N/A	N/A	N/A	\$408	134.81
11	Floor Option 2: Improve floor structure and comfort by remediating the moisture issues, installing a vapor barrier, and installing insulation. It is recommended to consult with a professional flooring / moisture remediation specialist prior to implementing this measure, as every situation is specific.	\$ 22,800	N/A	130	N/A	N/A	N/A	N/A	N/A	\$ 408	55.88
12	Condition the vault by installing a mini-split heat pump, and adding sensors to monitor the temperature and humidity to keep the levels steady for document storage. The temperature should stay between 68°F and 76°F and the humidity should be in the 35 - 55% range. There are no energy savings associated with this measure because this is a currently an unconditioned space.	\$6,000	N/A	(121)	N/A	N/A	N/A	-	N/A	\$ (382)	(15.71)

Evaluated Energy & Water Conservation Measures

Totals (with option 1 for windows, option 2 for floor)	\$36,000	N/A	112	N/A	N/A	N/A	436	N/A	\$483	74.50
Interactive Savings Discount @ 10%			101				393		\$435	
Total Contingency Expenses @ 15%	\$41,400									
Totals for Improvements	\$41,400	N/A	101	N/A	N/A	N/A	393	N/A	\$435	95.19

2.0 SITE UTILITIES

2.1 Utility Rates

The following utility rates were used for the purposes of savings analysis.

Average Utility Rates			
Electricity	Natural Gas	Wood	Propane
Average Rate	Average Rate	Average Rate	Average Rate
\$0.19306 /kWh	N/A	N/A	\$3.44/Gal

2.2 Site Utility Analysis

Utility Analysis						
Utility Type	Utility Provider	Meter Quantity	Energy Uses	Annual Consumption	Est./Act.	Annual Cost
Electric	Green Mountain Energy	One (1)	Plug load, lighting, DHW, appliances	2,597 kWh	Actual	\$771
Propane	Not Reported	N/A	Heating, DHW	566.7 Gal	Actual	\$1,784

2.3 On-Site Utility Storage

Onsite Utility Storage	
Battery Storage	
Storage Capacity	No battery storage installed
Year Installed	N/A
Location Installed	N/A
Space Served	N/A
Fossil Fuel Storage	
No. 2 Oil	No. 2 oil is not used at this site

Onsite Utility Storage

Propane Gas	Two (2) – fifty seven (57) gallon above ground propane tanks were observed on site
Wood Chips/Pellet	Wood/pellet fuel not used at this site

2.4 On-Site Generation

Site Utilities

Facility Electric Service Size	100AMPS/240V
Onsite Transformer	No onsite transformer observed
Electric Meter Location	Exterior wall mount

Solar Rooftop Photovoltaic System

Installed Capacity	No solar PV panels installed
Year Installed	N/A
Location Installed	N/A
Space Served	N/A

Emergency Backup Generators

Generator Capacity	No emergency backup generators on site
Year Installed	N/A
Location Installed	N/A
Space served	N/A
Generator Fuel	N/A
Make	N/A

2.5 On-site Electric Vehicle Charging

Onsite Electric Vehicle Charging

Installed Chargers	No electric vehicle charging on site
Electrical Charger Type	N/A
Location Installed	N/A

Onsite Electric Vehicle Charging

Charger Manufacturer	N/A
Electric Metering to Chargers	N/A
Recommendations	Electrical vehicle charging is not recommended for this site due to limited available parking and electrical capacity.

3.0 INTRODUCTION

The purpose of this Energy Assessment is to provide the State of Vermont - Building and General Services and Belvidere - Town Clerk's Office 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.

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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.

4.0 FACILITY OVERVIEW AND EXISTING CONDITIONS

4.1 Building Occupancy and Point of Contact

Facility Schedule	
Hours of Operations/Week	8:30 AM to 3:30 PM, Monday, Wednesday, Friday
Operational Weeks/Year	48
Estimated Facility Occupancy	Average of one (1) person per day, unless there is a board meeting, which can be up to ten (10)
Parking	Two (2) parking spots in front of the building, and six (6) additional spots in a remote lot 100' away

Facility Schedule	
Point of Contact Name	Cathy Mander-Adams
Point of Contact Title	Town Clerk
Point of Contact - Contact Number	802-644-6621
Point of Contact Name	Ken Adams Jr.
Point of Contact Title	Belvidere Select Board
Point of Contact - Contact Number	802-644-6621

4.2 Building Envelope

The building envelope consists of the exterior shell, made up of the walls, windows, roof, and floor. The envelope provides building integrity and separates the exterior from the interior conditioned space.

Building Foundation

Foundation Type	Building foundations appear to be crawl spaces that are unvented during the winter and vented during the summer.
Basement/Crawl Space	There is crawl space with a dirt floor and no moisture barriers under the building. The access to the crawl space is in the back room. Significant moisture issues and mold were observed in the crawl space.
Basement/Crawl Space Insulation	No insulation present

Primary Roof

Finish	Building sloped roofs are metal standing seam.	Coatings	No coatings visible
Roof Type/Geometry	Buildings on site are constructed with gable roofs	Roof Drains	Gutter installed over the back door
Maintenance	Not provided	Main Ventilation Source	Venting through building eaves
Insulation	Mineral Wool blow-insulation	Roof/Attic Insulation	R-38

Exterior Walls

Primary Finish	Facades are finished with painted wood siding.
Wall Insulation	6" Fiberglass Batt, R-13

ENVELOPE INSULATION

Slab	Basement Walls	Above Grade Walls	Roof/Attic
N/A	N/A	6" Fiberglass Batt, R-13	12" Mineral Wool, R-38

Exterior Windows

Location	Window Framing	Glazing
Main Office	Windows are wood framed.	Windows are double glazed.

Exterior Windows

Location	Window Framing	Glazing
Back Room	Windows are wood framed.	Windows are double glazed.

Exterior Doors

Building Doors	Material	Quantity
Main Entrance Doors	Metal Frame, Insulated, Fiberglass, No Glazing	1
Secondary Entrance Doors	Metal Frame, Insulated, Fiberglass, Double Glazed Glass Panel	1
Service Doors	No Service Door Present	0
Overhead Doors	No Overhead Door Present	0

Blower Door Testing

Blower Door Equipment	Minneapolis blower door system
Building Volume	9,120 Cubic Feet
Leakage Rate @ -50 Pa (CFM50)	726.5CFM/hr
Leakage Rate ACHN50	4.66 Air changes per hour
Noted areas of infiltration	Crawl space (uninsulated), moderate air flow from the floor thought the baseboard. No sealing from foundation to sill plate.

Infrared Imaging

Infrared Equipment	Flir iPhone compatible camera
Outdoor temperature	63°F
Indoor space temperature	66°F
Infrared Comments	IR camera indicates DHW heater is radiating 73.8°F, the windows read 76°F, and there is an indication of air intrusion in the northeast corner of the main office, reading at 62°F. All of this indicates a need to examine air sealing and window issues, as well as insulating specific equipment.

Envelope Comments:

The crawl space contains moisture that is leading to mold and wood decay. The addition has rigid foam insulation between the floor joists, however the original building does not contain insulation underneath the floor. The town clerk shared that her comfort is affected during the winter months by the lack of insulation in the crawl space. There is interest in repairing the water-damaged floor joists, along with insulating the floor. Another idea is to remove the existing floor and its moisture-laded supports, and in-fill the crawl space with concrete. This will allow for installation of a vapor barrier and to seal the underside of the building.

4.3 Building Heating, Ventilation and Air Conditioning (HVAC)

Overall System Description:

Ductless, Propane Gas, Direct-Vent Wall Furnace. No Air Conditioning Present

Building Central Heating System	
Primary Heating System Type	Rinnai Powered Heating System
Heating Fuel	Propane
Location of Major Equipment	Main Office
Spaces Served by System	The entire building, including the additions. The heater is located in the main office and predominantly conditions that space
Heating System Input/Output Capacity	36,500 BTU
Manufacturer's Rated Efficiency	80.3%
Heating System Age	Site escort states 2023 installation
Heating System Condition	System is in excellent condition
Building Central Cooling System	
Primary Cooling System Type	No cooling system present on site
Refrigerant	N/A
Cooling Towers	N/A
Location of Major Equipment	N/A
Spaces Served by System	N/A
Cooling System Input Capacity	N/A
Manufacturer's Rated Efficiency	N/A
Cooling Plant Age	N/A
Cooling Plant Condition	N/A

HVAC Comments

A Rinnai direct wall furnace was recently installed. This heating system services the entire building. The Town Clerk commented that she is cold during the winter months. This is largely due to lack of insulation in the floor as noted in the Envelope section. Additionally, the vault where town records are stored is not conditioned; a request was made to condition the vault space to accommodate the preservation of records and paper documents stored at the facility.

4.4 Building Lighting

Space Lighting:

Troffer drop ceiling light fixtures containing retrofitted 34w LED bulbs provide interior lighting in the buildings. The office, vault, and back room, all have troffer lighting. The single bathroom contains one 60W incandescent bulb. The back room has not been converted to LED.

Lighting Controls:

The facility does not have any automatic lighting controls on internal light fixtures.

Emergency Lighting:

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

Exterior Lighting:

Property-owned metal light poles provide site lighting, while surface-mounted light fixtures on the exterior walls provide the exterior building with site illumination. Recessed light fixtures are located in the exterior soffits.

The exterior lighting primarily consists of LED fixtures.

4.5 Building Appliances & Laundry

Appliances are typically replaced on as needed basis.

Breakroom Appliances

Item	Type	Estimated Age & Condition (per sampling)
Refrigerator (mini-fridge)	This unit is not Energy Star qualified 2.5 cubic feet Freezer location: N/A Manufacturer/s: Sanyo Electric Co. Estimated Annual Consumption: 320 KWh	1 unit - 100% 20+ years (Poor)

Laundry Equipment

Equipment	Comment
Commercial Washing Machines	No washing machines present on site
Commercial Dryers	N/A
Residential Washers	N/A
Residential Dryers	N/A

4.6 Building Domestic Water

Domestic Water Distribution & Common Area Fixtures

Type	Description
Restroom Fixtures	Toilet, Hand Sink, Water Heater
Common Area Toilet GPF	1.6 GPF
Common Area Faucet GPM	2.0 gpm
Well Pressure Tank	WellxTroll 4.5 Gal, Factory Precharge 28PSI
Well Pump	GE 1/2HP Motor, 115V, Single Phase

Central Domestic Hot Water

Components	Tank - Direct
Fuel	Electricity
Age	Age unknown, site escort estimates 40 years old
Distribution Pumps	None
Supplementary Storage Tanks	None
Domestic Hot Water System Capacity	2.5 gal
Manufacturer's Rated Efficiency	0.68 EF
Hot Water Piping	Domestic hot water piping was observed to be uninsulated where exposed.
Quantity	One (1)

Plumbing Comments:

The water supply from the local spring is non-potable. The site contact shared that she keeps the hot water heater on at all times. It was also expressed that they would like to figure out how to have potable water on site.

5.0 RECOMMENDED OPERATIONS AND MAINTENANCE PLAN

The quality of the maintenance and the operation of the facility's energy systems have a direct effect on its overall energy efficiency. Energy-efficiency needs to be a consideration when implementing facility modifications, equipment replacements, and general corrective actions. The following is a list of activities that should be performed as part of the routine maintenance program for the property.



BEST PRACTICES TO IMPROVE ENERGY PERFORMANCE

LOW-COST O&M CHECKLIST

Use the following checklist of low-cost O&M practice to identify opportunities, assign responsibility and track progress toward goals at your facility.

	Opportunity Exists	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
OPERATIONS & MAINTENANCE						
Ensure all equipment is functioning as designed	Y					
Calibrate thermostats	Y					
Adjust dampers						
Implement janitorial best practices	Y					
Properly maintain existing equipment	Y					
Review ENERGY STAR Registry of Labeled Buildings for ideas	Y					
OCCUPANTS' BEHAVIOR						
Turn off equipment	Y					
Institute an energy awareness program	Y					
Adopt a procurement policy for ENERGY STAR qualified equipment	Y					
Maximize use of daylight	Y					
Install task lighting	Y					
Train staff	Y					
LIGHTING						
Change incandescents to CFLs						
Change T12s to T8 or T5	Y					
Install occupancy sensors in back-of-the house, infrequently used areas						
Install high efficiency LED exit signs						
Periodically clean the bulbs with a dry cloth	Y					
De-lamp where illumination is excessive	Y					
Only use lights that are needed	Y					

www.energystar.gov/benchmark

E-mail: energystarbuildings@epa.gov

	Opportunity Exists?	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
KITCHENS						
Pre-heat ovens no more than 15 minutes prior to use	N/A					
Keep refrigerator coils clean and free of obstructions	N/A					
Bleach clean with warm water	N/A					
Use fan hood only when cooking	N/A					
Purchase ENERGY STAR commercial cooking equipment	N/A					
COMPUTERS AND OFFICE EQUIPMENT						
Utilize power down feature on computers	Y					
Purchase ENERGY STAR office equipment	Y					
Install energy control devices on vending machines						
HVAC AND PLANT SYSTEMS						
Adjust thermostats for seasonal changes and occupancy	Y					
Balance air and water systems	N/A					
Replace boiler burners	N/A					
Unblock air flow from unit ventilators	N/A					
Clean centrifugal chiller water tubes	N/A					
Clean and repair chilled water plants or package units	N/A					
Repair leaking steam traps	N/A					
Repair pipe and vessel insulation from steam and hot water distribution lines	N/A					
Repair malfunctioning dampers on unit ventilators	N/A					
Chemically treat feedwater	N/A					
Annually test combustion efficiency	N/A					
Clean and lubricate moveable surfaces and check actuator movement and set-points in the damper and economizer	N/A					
Perform boiler tune-ups	N/A					
Clean filters and fans	N/A					
Clean air conditional evaporator and condenser coil fins	N/A					
Align and adjust belts	N/A					

	Opportunity Exists?	Target Reduction	Who is Responsible?	Target Date to Complete	Actual Date Completed	Notes
HVAC AND PLANT SYSTEMS (CONTINUED)						
Check for air leaks in equipment cabinets and ducts	N/A					
Ensure proper operation of air damper	N/A					
Clean condenser and evaporator coils	N/A					
Properly charge refrigerant	N/A					
Install VFDs and energy efficient motors	N/A					
FANS						
Clean fan blades	N/A					
Inspect bearings	N/A					
Adjust/change belts	N/A					
Check fan current	N/A					
BUILDING ENVELOPE						
Regularly inspect doors and windows for air leaks	Y					
Periodically inspect building for water leaks	Y					
Check the caulking and weather stripping for leaks	Y					
WATER HEATING						
Adjust water temperature to lower legal limit	Y					
Periodically check the hot water systems for leaks	Y					
Test the burners of gas or oil fired water heaters annually	N/A					
Periodically flush fixtures to prevent bacteria growth	Y					
Annually flush storage-type hot water tanks	N/A					
Periodic maintenance on the hot water system	Y					
Install or repair pipe insulation	Y					

APPENDIX A: PHOTOGRAPHIC RECORD

Photographs



West facing view



Town Clerk main entrance, facing south



East facing view



North facing view



Exterior electrical meter



Exterior wall facing east



Cellar windows, typical



Meter, reading 25565 kWh



Typical double hung window, wood frame, double pane



Double hung glazing detail



Kitchen, double hung window, double pane



Secondary/side entrance exterior door, metal door



Main entrance exterior light bulb, recessed



Vault, not conditioned



Back room lighting



Back room lighting, not yet converted to LED



Fluorescent bulb detail



Main office lighting, LED



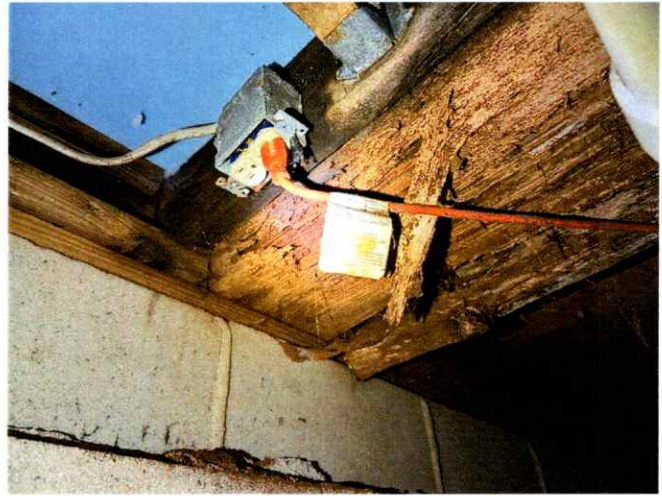
LED upgraded lighting



Underneath building addition, showing two (2) inch blue foam insulation between rafters. No tag or R value visible



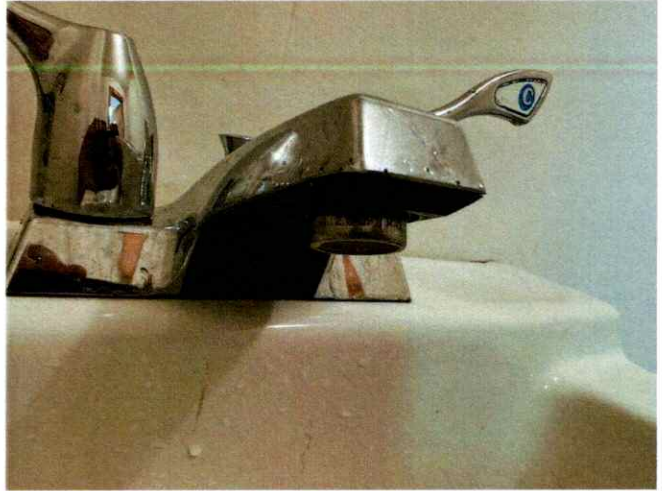
View from crawl space entrance, looking to inside of the front of the building



Noting moisture conditions of the joists



Bathroom sink and building water heater



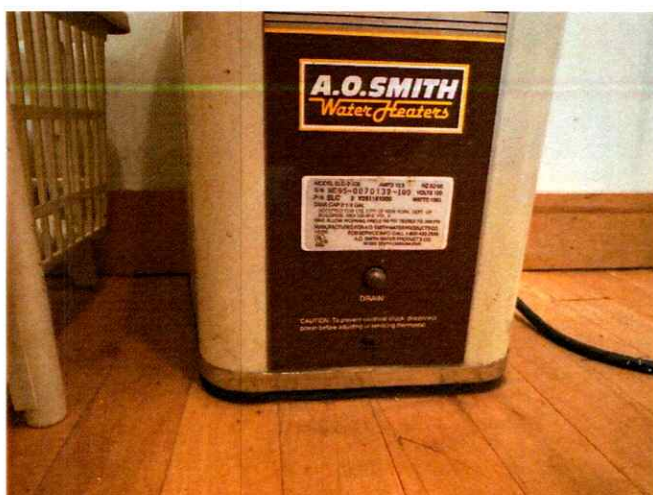
Aerator detail shot



Hot Water System



Copper plumbing penetration from the well pump and tank, to the water heater



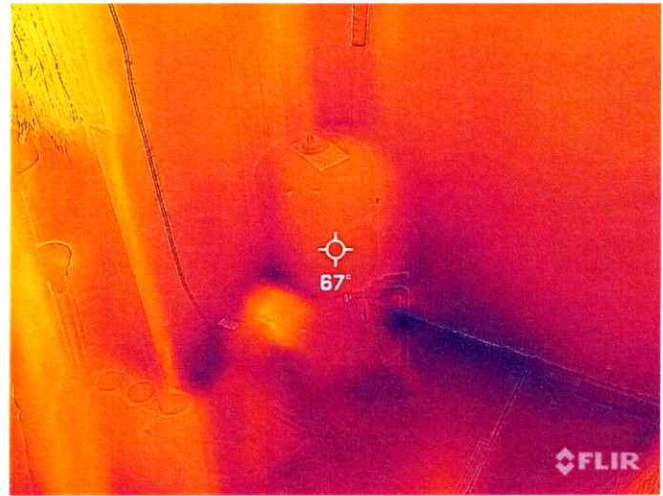
Hot Water System



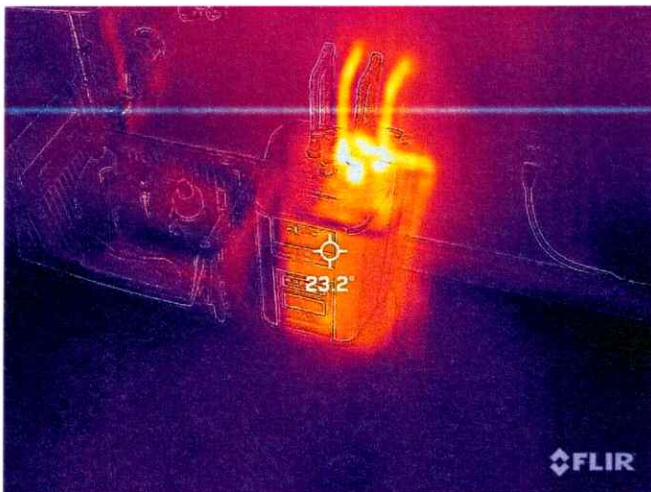
Rinnai propane powered heater in the main office



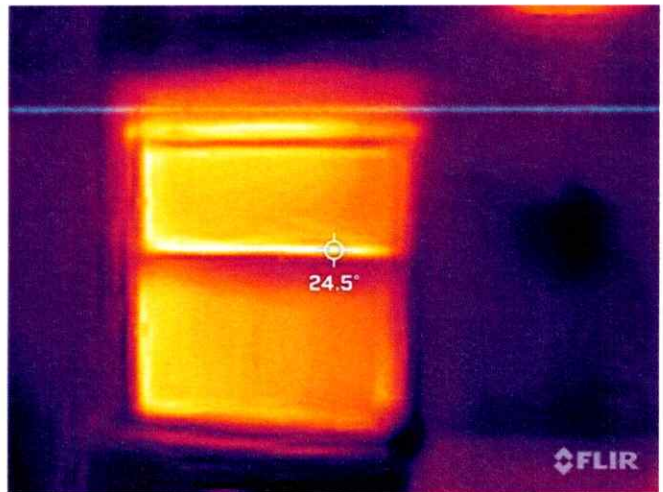
Well water pump assembly



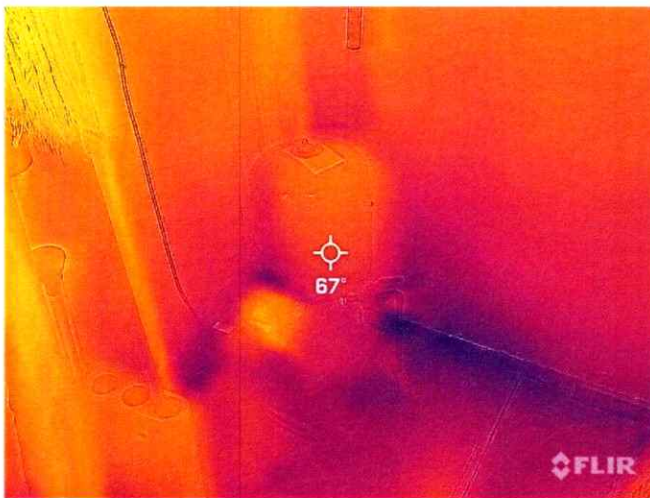
IR photo, well water pump assembly



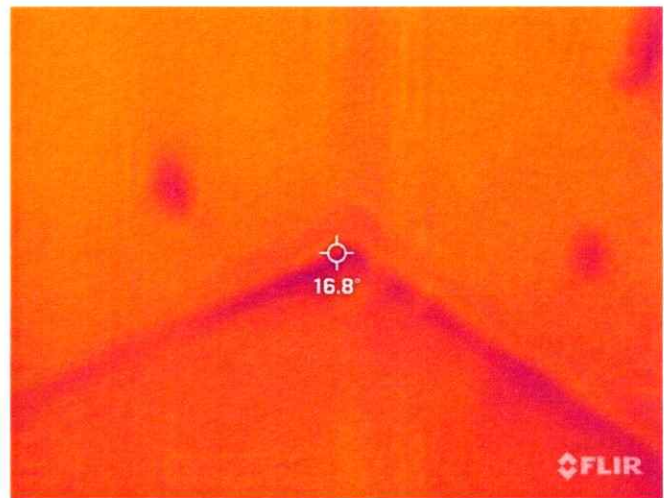
IR photo of water heater, temperature measured in celcius



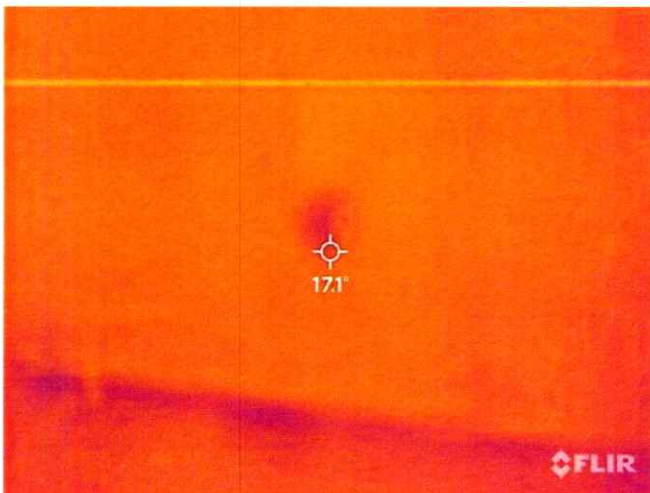
IR photo of double hung window, typical reading



IR photo of well pump and storage tank



Indication of exterior air intrusion, main office, north east corner



Indication of exterior air intrusion, east wall



Town office main entrance, showing two (2) onsite parking spots



Main office layout, facing away from entry door



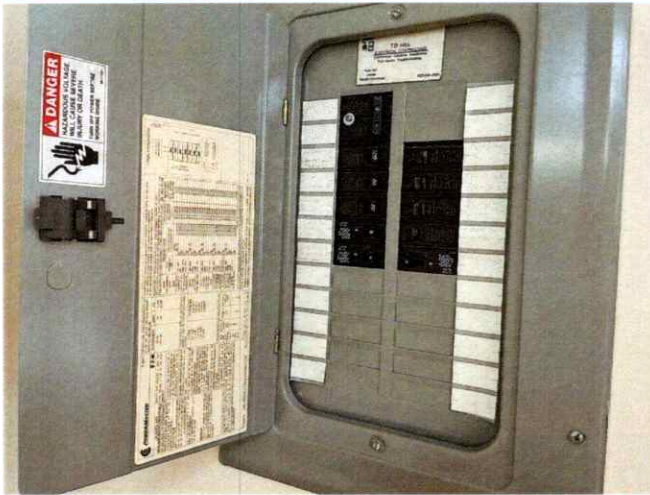
Mini fridge and microwave



View of the addition from the main office space, facing north. Exterior door and crawl space hatch are to the right of the door



Main office



Electrical panel



Blower door setup



Office copier, Canon Advance DX C3826i



Town Clerk Office Hours

APPENDIX B: SITE AND FLOOR PLANS

Site plans were not made available.

APPENDIX C: MECHANICAL EQUIPMENT INVENTORY

HEATING EQUIPMENT

Equip. Location	Area Served	Make	Model #	Year	Capacity	Rated Eff.	Dist.	Fuel	RUL
Main Office	Building	Rinnai	EX38DTP	2023	36,500BT UH	83%	Point Source	Propane	25 years

COOLING EQUIPMENT

Equip. Location	Area Served	Make	Model #	Year	Capacity (Tons)	Rated Eff.	Dist.	RUL
N/A								

DHW EQUIPMENT

Equip. Location	Area Served	Make	Model #	Year	Capacity	Rated Eff.	Direct or Indirect	Recirc. Pump HP	Fuel	RUL
Bathroom	Building	A.O. Smith	ELC-2-100	1980 (assumed)	2.5 gallons	68%	Direct	N/A	Electric	N/A

APPLIANCES

Type of Appliance	Location	Make	Model #	Year	kWh/Year	Size (ft3)	RUL
Refrigerator (mini-fridge)	Breakroom	Sanyo Electric Company	W-375	2000 (assumed)	320	2.5	N/A

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
Bathroom	Bulb	INC	1	1	60	9	Switch	7	LED
Main Entrance	Exterior Fixture, 2,001-5,000 lumens	LED_Exterior	1	1	9	9	Switch	7	N/A
Vault	1x4 Troffer, >4,501 lm	LED_Interior	2	1	18	18	Switch	7	N/A

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
Main Office	2x4 Troffer, 4,501-6,000 lm	LED_Interior	13	2	18	18	Switch	7	N/A
Back Room	2L F32 (32W) w/ Elec Ballast - 4'	T8	2	2	59	18	Switch	7	LED

APPENDIX D: ABBREVIATED ECM CHECKLIST

Address	Responsibility	Benefits	Type of Expense	Q
Improve air sealing in the Main Office area by reducing ACHn rate by an estimated 10%.	Owner	Owner	Envelope	
Improve attic insulation in the Main Office area to achieve uniform R- coverage (from R-38 to R-49)	Owner	Owner	Envelope	
Window Option 1: Install high performance energy efficient window films on all seven (7) windows.	Owner	Owner	Envelope	
Window Option 2: Install ENERGY STAR certified double-pane windows rated appropriately for this climate zone (> 0.27 U-value, 0.5 SHGC) on all seven (7) windows. *	Owner	Owner	Envelope	
Install low flow 1.0 GPM EPA WaterSense-certified aerator in the bathroom	Owner	Owner	Plumbing	
Replace the oldest refrigerator with ENERGY STAR rated models	Owner	Owner	Misc	
Replace the domestic hot water tank with higher efficiency, point of use model.	Owner	Owner	Plumbing	
Improve insulation on DHW lines to R-4	Owner	Owner	Plumbing	
Upgrade lighting (3) with ENERGY STAR or DLC certified LED technologies and install occupancy sensors (3)	Owner	Owner	Lighting	
Floor Option 1: Improve floor structure and comfort by removing the current floor, remediating the mold, installing a vapor barrier, installing insulation, laying a new slab, and putting down a new hardwood floor. Many attempts were made to obtain solid specs and cost for this proposal, however, it is strongly recommended to consult with a professional flooring / moisture remediation specialist prior to implementing this measure, as every situation is specific.	Owner	Owner	Envelope	
Floor Option 2: Improve floor structure and comfort by remediating the mold, installing a vapor barrier, and installing insulation. Many attempts were made to obtain solid specs and cost for this proposal, however, it is strongly recommended to consult with a professional flooring / moisture remediation specialist prior to implementing this measure, as every situation is specific.	Owner	Owner	Envelope	

APPENDIX E: OTHER SUPPORTING DOCUMENTS

No additional supporting documents.

Glossary of Terms and Acronyms - Energy Assessment

Glossary of Terms and Acronyms - Energy Assessment

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period – The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost – The sum of the present values of (a) Investment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs; (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity – The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity – This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions – Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy assessments focuses on carbon dioxide (CO₂). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).



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Carbon Neutral Report

novagroupgbc.com/carbonneutral