ON-SITE INSIGHT
A RECAP REAL ESTATE ADVISORS COMPANY

CHFA Energy Audit

PRELIMINARY REPORT

Prepared for:

WELCOME TO THE DIOCESE OF BRIDGEPORT

238 Jewett Avenue
Bridgeport, CT 06606

Augustana Bishop Curtis Congregate

Bethel, CT

December 29, 2023

RECAP
REAL ESTATE ADVISORS

Executive Summary

This energy audit (EA) of Augustana Bishop Curtis Congregate has been undertaken on behalf of the Diocese of Bridgeport. It is aimed at analyzing existing building performance and identifying replacement and repair opportunities to reduce energy and water usage. Overall, the energy audit aims to:

- improve energy and water efficiency,
- reduce operating and capital costs through improved maintenance,
- safeguard indoor environmental quality (IEQ) for residents, and
- reduce the property's environmental impact.

Energy and Water Conservation Measures (EWCMs):

In the report, OSI has presented findings for **8** energy and water conservation measures (EWCMs). Total savings after implementation of all **8** measures is estimated at $**14,978** per year, based on current utility costs.

Energy and water conservation measures are upgrades and improvements to existing mechanical and electrical systems that have a direct impact on energy consumption, and therefore potential utility (electric, gas, oil, water, sewer) savings if implemented appropriately. As part of the assessment process, the property's utility data was analyzed. This information is then used as part of the EWCM recommendation and calculation process.

Certain EWCMs are interactive. In order to achieve the projected annual energy savings for an interactive group, the EWCMs must be implemented in concert with one another. If any of the interactive EWCMs are deferred or foregone, there may be a significant impact on the utility savings outlook. For example, replacement of an inefficient boiler system may not achieve projected utility savings associated with that system if inefficient windows remain in place.

The energy conservation measure specifications (i.e., boiler efficiencies, R-values, U-values) presented in this plan are mostly derived from the International Energy Code and the American Society of Heating, Refrigeration and Air-Conditioning (ASHRAE) Handbook. These measures represent one conceptual option; various alternatives may yield different results. It must be noted that a number of factors may affect the estimated annual energy savings and simple payback periods, and therefore the figures outlined in this report are not guaranteed.

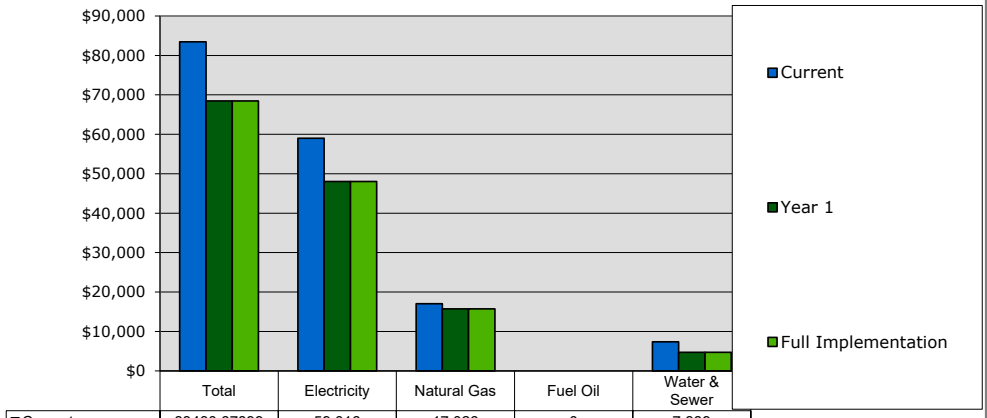
Executive Summary

Dashboard

Property Data

Location:	Augustana Bishop Curtis Congregate
Year Built:	1985
Number of Units:	44
Number of Buildings:	1

Current and Projected Energy Cost



	Total	Electricity	Natural Gas	Fuel Oil	Water & Sewer
Current	83430.67899	59,016	17,026	0	7,389
Year 1	68,453	48,036	15,719	0	4,697
Full Implementation	68,453	48,036	15,719	0	4,697

Environmental Impact

(Total Carbon Release Based on Current Annual Energy Usage)

Building Square Footage: **30,216**

Resident Population *(estimated):* **44**

	BTUs/yr	Conversion	lbs CO2	lbs CO2 / Res
Heating	381,600,000	x 11.023000	42,064	956
DHW	390,000,000	x 11.023000	42,990	977
Electricity	825,703,759	x 1.582903	382,950	8,703
Total	**1,597,303,759**		**468,004**	**10,636**

Energy Usage Summary

Utility	Current Usage		Current Cost	Projected Usage		Projected Cost	% Savings
Electricity	241,990	kWh	$59,016	196,966	kWh	$48,036	18.6%
Natural Gas	10,884	therms	$17,026	10,049	therms	$15,719	7.7%
Oil	0	gallons	$0	0	gallons	$0	n/a
Water & Sewe	642,000	gallons	$7,389	408,167	gallons	$4,697	36.4%
Total			**$83,431**			**$68,453**	**18.0%**

Executive Summary

Green Improvement Plan

EWCM #	Measure	Optimal Product Choice	Remaining Useful Life	Baseline Required Cost	Recommended Upgrade Cost	Total Cost	Annual Savings	Simple Payback	Notes
Recommended EWCMs:									
7	Replace Dwelling Unit Toilets	Green	0	$15,400	$0	$15,400	$473	0.0	Install 1.28 gallon per flush toilets
6	Replace Dwelling Unit Shower Heads	Green	0	$0	$880	$880	$3,525	0.2	Install 1.5 gallon per minute showerheads
1	Replace Pole-Mounted Lighting	Green	0	$7,150	$2,200	$9,350	$1,763	1.2	Install pole-mounted light-emitting diode (LED) fixtures
2	Replace Building-Mounted Lighting	Green	0	$4,200	$700	$4,900	$307	2.3	Install building-mounted light-emitting diode (LED) fixtures
4	Replace Interior Common Lighting	Green	0	$0	$25,000	$25,000	$7,156	3.5	Install interior common area light-emitting diode (LED) fixtures
5	Replace Dwelling Unit Refrigerators	Green	0	$24,200	$4,400	$28,600	$797	5.5	Install Energy Star refrigerators
3	Replace Circulation Pumps	Green	0	$9,700	$3,300	$13,000	$322	10.2	Install high efficiency circulation pumps with VFD's
8	Replace Dwelling Unit Lighting	Green	0	$0	$18,550	$18,550	$636	29.2	Install dwelling unit light-emitting diode (LED) fixtures
Total of All EWCMs				**$60,650**	**$55,030**	**$115,680**	**$14,978**	**3.7**	

Definitions:

Optimal Product Choice *is the most cost effective product of Green vs. Conventional.*

Remaining Useful Life *is the estimated number of years remaining before the existing item needs to be replaced.*

Baseline Required Cost *is the required cost, taking into account Remaining Useful Life. For example, if the Remaining Useful Life is 0, the Baseline Required Cost will reflect the cost of a Conventional replacement.*

Recommended Upgrade Cost *is the difference between the Total Cost and the Baseline Required Cost. This is the additional amount that OSI is recommending to spend for efficiency reasons.*

Total Cost *is the cost of completing the measure.*

Annual Savings *is the difference between the existing utility cost and the utility cost after completing the measure..*

Simple Payback *is calculated as Annual Savings / Recommended Upgrade Cost. In the case of measures that are "Not Recommended", it is calculated as Annual Savings / Total Cost.*

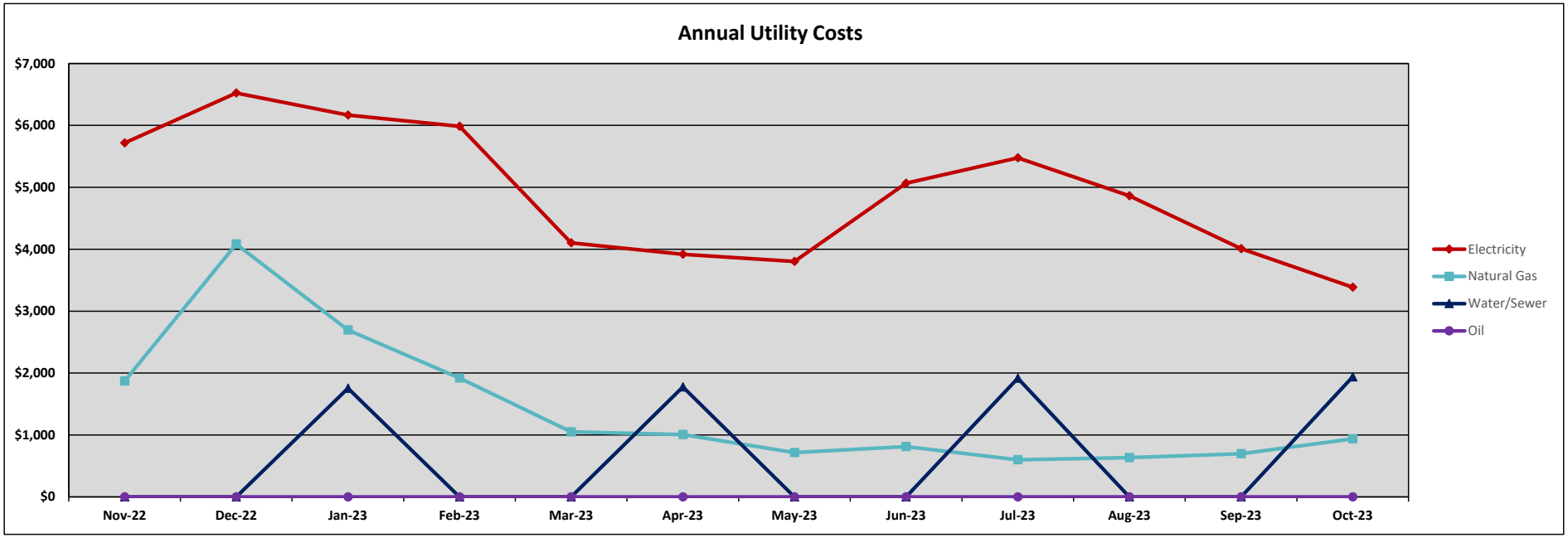
Energy Analysis

Utility Usage

Augustana Bishop Curtis Congregate

The energy analysis portion of this Energy Audit examines utility bills for the most recent 12 months to summarize electricity, natural gas, and water/sewer use at this development. The following table and charts show the utility information by utility source, and by monthly and annual consumption.

	ELECTRICITY		NATURAL GAS		WATER / SEWER				OIL		TOTAL
	kWh	$	Therms	$	Gallons	Water $	Sewer $	Total $	Gallons	$	
Oct-23	18,160	$3,386	796	$938	171,000	$1,940	$0	$1,940	0	$0	**$6,264**
Sep-23	19,360	$4,009	674	$698	0	$0	$0	$0	0	$0	**$4,708**
Aug-23	24,550	$4,862	568	$634	0	$0	$0	$0	0	$0	**$5,496**
Jul-23	25,200	$5,475	472	$600	168,500	$1,918	$0	$1,918	0	$0	**$7,992**
Jun-23	24,800	$5,066	617	$812	0	$0	$0	$0	0	$0	**$5,878**
May-23	20,960	$3,804	617	$717	0	$0	$0	$0	0	$0	**$4,522**
Apr-23	19,760	$3,919	738	$1,007	152,500	$1,776	$0	$1,776	0	$0	**$6,702**
Mar-23	16,960	$4,102	1,121	$1,050	0	$0	$0	$0	0	$0	**$5,152**
Feb-23	16,720	$5,986	1,329	$1,921	0	$0	$0	$0	0	$0	**$7,907**
Jan-23	16,400	$6,168	1,207	$2,696	150,000	$1,754	$0	$1,754	0	$0	**$10,618**
Dec-22	19,680	$6,523	1,563	$4,083	0	$0	$0	$0	0	$0	**$10,606**
Nov-22	19,440	$5,716	1,181	$1,870	0	$0	$0	$0	0	$0	**$7,586**
Total	**241,990**	**$59,016**	**10,884**	**$17,026**	**642,000**	**$7,389**	**$0**	**$7,389**	**0**	**$0**	**$83,431**
Unit Cost		*$0.244*		*$1.564*				*$0.01151*		*n/a*	

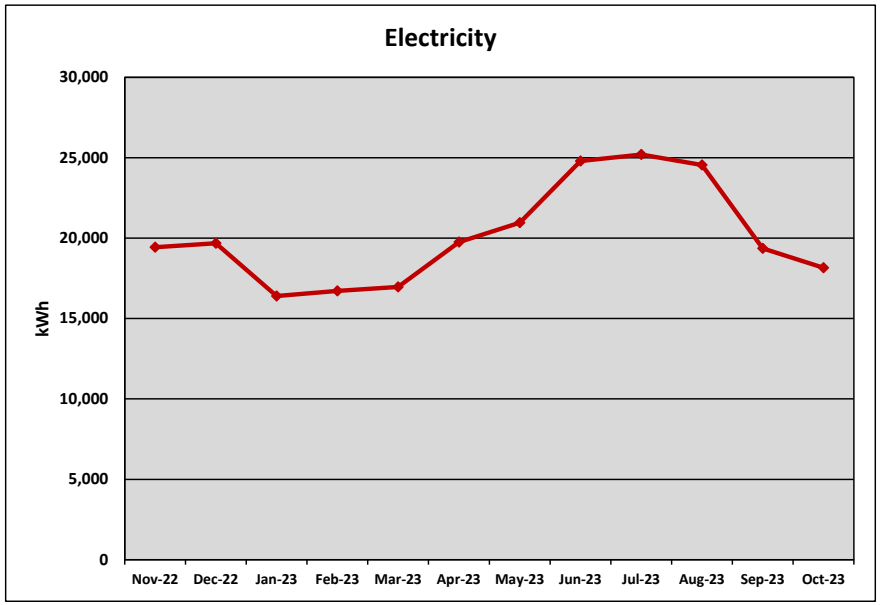


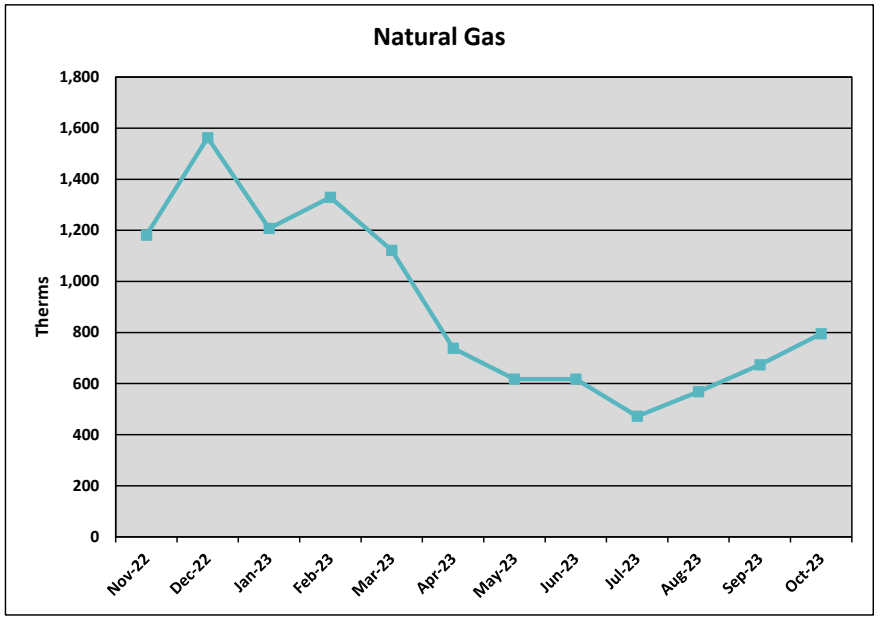
Energy Analysis

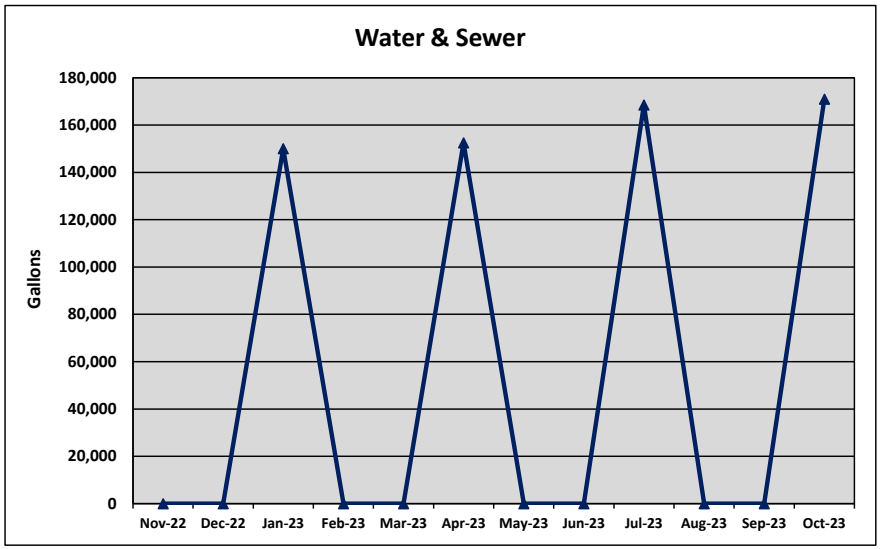
Utility Usage, By Type

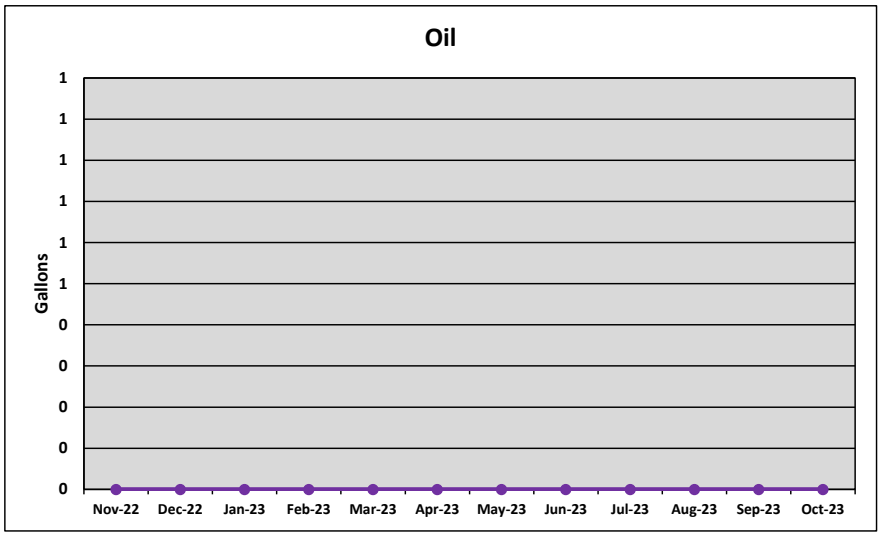
Augustana Bishop Curtis Congregate

Below are graphic presentations of annual usage by utility type for the property.









Energy Analysis

Notes

Augustana Bishop Curtis Congregate

Below are notes regarding the property metering schedule, general billing information, and specific usage details by utility type.

General

The property is master metered for natural gas, water and sewer, and common and dwelling unit electricity. Dwelling unit electricity is paid for by the development.

Natural Gas

Natural gas shows a normal consumption pattern, with spikes during the heating season since the property utilizes natural gas for heating purposes.

Electricity

Electricity is generally higher in the summer months, presumably due to a higher demand for air conditioning. January shows the lowest electricity usage for the 12-month period.

Water and Sewer

Water and sewer usage is billed quarterly. Generally, water and sewer usage remains steady for the available data period. The property does not have any water consuming systems that may cause seasonal shifts in usage, such as a swimming pool or site irrigation.

Narrative

General Overview

Augustana Bishop Curtis Congregate is a three-story residential development constructed for congregate/elderly use. The building contains a total of 44 efficiency units (5 of which are designated as accessible) and is located in a mixed-use neighborhood of Bethel, CT. The development was originally constructed circa 1985 and is therefore approximately thirty-nine years of age.

The building is located on a moderate to steeply sloped parcel in a mixed-use neighborhood of Bethel, CT. The building abuts a family development comprised of single-story walk-up buildings (excluded from this study) and shares a common entry roadway for site access (e.g., Simeon Road – reportedly not development responsibility). Asphalt-paved surface parking areas are present along the south end of the building. Concrete walkways and steps provide pedestrian access throughout the site including to the bus shelter. Pole-mounted high intensity discharge (HID) light fixtures facilitate site illumination. Additional site elements include a metal chain-link dumpster enclosure, metal wire fencing (rear of building), a wood-framed storage shed, entry signage, landscaping comprised of lawn areas, shrubs, and trees, as well as site distribution systems.

The exterior walls are predominantly clad in exterior insulation and finish systems (EIFS). Metal-framed full-lite glass doors are present at the main entrance, vestibule, as well as the side and rear emergency exits; the remaining service doors are hollow metal models (including north end egress doorway). Exterior caulking is present at window and door perimeters as well as at air conditioning unit sleeves. Exterior windows are vinyl-framed double-hung models containing insulating glass units (IGU's). Building-mounted high intensity discharge (HID) and compact fluorescent light (CFL) fixtures facilitate illumination along the building perimeter. The building contains a pitched roof structure covered in architectural asphalt roofing shingles. Aluminum gutters and downspouts facilitate stormwater drainage.

The building's central mechanical room houses the heating and domestic hot water (DHW) generation equipment. A pair of Lochinvar natural gas-fired condensing boilers (500 MBH energy input each) facilitate hydronic heat generation for the building. Augmenting the boilers are fractional horsepower inline boiler water circulation pumps as well as a pair of inline, vertically-mounted hydronic heat circulation pumps (1 currently removed/offline – 2-horsepower rating). The boilers work in concert with indirect-fired domestic hot water (DHW) storage tanks (119-gallon storage tank capacity) and fractional horsepower circulation pumps for DHW generation.

Major building systems include the fire sprinkler system (equipped with a backflow preventer), distribution piping for domestic hot and cold water, hydronic heat, sanitary wastewater, and natural gas services, heating, ventilation and air conditioning (HVAC) services. The building is equipped with a wet fire suppression system (city pressure supply) serving service spaces. This system also includes a backflow preventer, a device designed to keep stagnant sprinkler water from flowing back into the potable water system. A ductless mini-split system air conditioner facilitates space cooling for the community room. Thru-wall air conditioners facilitate zone-type space cooling for select common areas; a limited packaged terminal air conditioner (PTAC) serves the main lobby.

Narrative

The apartment units are master metered for electricity consumption. A Silent Knight SK-5208 fire alarm control panel monitors hardwired end devices at the development. An entry intercom system regulates visitor access into the building. A diesel-fueled emergency generator (125 kW rating) provides emergency power to key building systems in the event of a power failure. A 2,000-gallon underground fuel oil storage tank also serves the generator. A hydraulic-type elevator provides vertical access to each building level. The elevator is reportedly maintained under the terms of a full-service contract.

Apartment units are serviced by common electrical circuit breaker panels present within the electrical service rooms; these panels are discussed in the Building Electrical section of the report. Each apartment unit contains a hardwired, battery-backup, local-ring smoke detection device. Unit living areas and bathrooms also contain an emergency call assistance pull-cord (local-ring system). Unit-level light fixtures are predominantly T8 fluorescent tube or compact fluorescent light (CFL) fixtures. Each apartment unit contains hydronic baseboard radiators governed by thermostatic radiator valves. Electric unit heaters facilitate space heating within the unit bathrooms. Thru-wall air conditioners (8,000 BTU) facilitate space cooling for the apartment units.

The building has undergone limited energy efficiency upgrades over the past several years including installation of high efficiency natural gas-fired condensing heating boilers as well as installation of limited light-emitting diode (LED) lamps/fixtures within interior common spaces and dwelling units.

Photo 1: *Building architecture as seen at the front elevation*

Narrative

Recommended Energy and Water Conservation Measures:

EWCM 1: Replace Site Lighting

Existing Conditions	Potential Improvement
Pole-mounted high intensity discharge (HID) light fixtures facilitate illumination for the parking areas and pedestrian walkways (estimated to be ~250 Watt lamps).	Replace existing HID fixtures with light-emitting diode (LED) fixtures as an energy efficiency measure.

EWCM 2: Replace Building-Mounted Light Fixtures

Existing Conditions	Potential Improvement
Building-mounted high intensity discharge (HID) and compact fluorescent light (CFL) fixtures facilitate illumination along the building perimeters (estimated 50-Watt lamps at HID fixtures and 13 Watt lamps at CFL fixtures). Management reports quotes have been obtained to replace these fixtures with LED models.	Replace existing HID and CFL fixtures with light-emitting diode (LED) fixtures as an energy efficiency measure.

Narrative

EWCM 3: Install High Efficiency Circulation Pumps

Existing Conditions	Potential Improvement
Each heating boiler is equipped with a conventional, inline fractional horsepower boiler water circulation pump. Heating water pumps are 2-horsepower, 86.5% efficiency models. Domestic hot water circulation pumps are conventional, inline, fractional horsepower models.	Replace existing conventional pumps with models that are high efficiency and governed by a variable frequency drive (VFD) controller to reduce energy usage as well as utility and operating costs.

EWCM 4: Replace Interior Common Area Lighting

Existing Conditions	Potential Improvement
Interior common area lighting is predominantly comprised of 4-feet T8 fluorescent tube light fixtures. Screw-in compact fluorescent light (CFL) fixtures are present at select interior common spaces (e.g., select offices, main lobby, and community/dining room). Management reports select CFL fixtures have been retrofitted with LED.	Replace existing fluorescent tube and CFL fixtures with light-emitting diode (LED) fixtures as an energy efficiency measure.

Narrative

EWCM 5: Replace Dwelling Unit Refrigerators

Existing Conditions	Potential Improvement
Dwelling unit refrigerators are a mix of manufacture/models (i.e., 9.7 to 11.9 cubic feet and 297 to 409 kWh ratings).	Install Energy Star refrigerators.

EWCM 6: Replace Dwelling Unit Showerheads

Existing Conditions	Potential Improvement
Apartment units contain 2.0 gallon per minute showerheads.	Install 1.5 gallon per minute showerheads in place of the 2.0 gallon per minute showerheads.

EWCM 7: Install Low-Flow Toilets

Existing Conditions	Potential Improvement
Dwelling unit bathrooms predominantly contain original non-low-flow ~2.0+ gallon per flush toilets.	Install 1.28 gallon per flush models in place of the ~2.0+ gallon per flush models.

Narrative

EWCM 8: Replace Dwelling Unit Lighting

Existing Conditions	Potential Improvement
Dwelling unit light fixtures are comprised of a mix of 4-feet T8 fluorescent tube, 2-feet T12 fluorescent tube, compact fluorescent light, or light-emitting diode (LED) fixtures.	Replace existing fluorescent tube and CFL fixtures with light-emitting diode (LED) fixtures as an energy efficiency measure.

Additional Notes:

1. The Physical Inspection of the property was conducted on December 18th, 2023. Additional information was provided to ON-SITE INSIGHT by site staff and others. OSI was represented on this assignment by Matthew Chown. We would like to thank site staff for their assistance.
2. Regular updates of this Energy Audit are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.

Simple Payback Analysis

EWCM	#1	Replace Pole-Mounted Light Fixtures	

Replacement Costs

A. Total cost to replace pole-mounted high intensity discharge (HID) light fixtures with new LED fixtures: $9,350.00

Utility Cost

Electricity: $0.24
Natural Gas:

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	HID's	250	11	12	365	12,045	$2,937.51
Type 2:						0	$0.00
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	12,045	$2,937.51

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED	100	11	12	365	4,818	$1,175.00
Type 2:						0	$0.00
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	4,818	$1,175.00

Annual Electric Savings

24,658,524 BTUs

7227.00 kWh

Savings = 7,227.00 x $0.24 = $1,762.50 /yr

Annual Natural Gas Savings[1]

0 BTUs

0.00 therms

Savings = 0.00 x $0.00 = $0.00 /yr

Annual Net Cost Savings

$1,762.50 + $0.00 = $1,762.50

5. Simple Payback

$9,350.00 / $1,762.50 = 5.30 yrs

Additional Notes/Comments:

Simple Payback Analysis

EWCM	#2	Replace Building-Mounted Lighting	

Replacement Costs

A. Total cost to replace building-mounted high intensity discharge (HID) light fixtures with new LED fixtures: $4,900.00

Utility Cost

Electricity: $0.24
Natural Gas:

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	HID's	50	7	12	365	1,533	$373.86
Type 2:	CFL's	13	7	12	365	399	$97.20
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	1,932	$471.07

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED	15	7	12	365	460	$112.16
Type 2:	LED	7	7	12	365	215	$52.34
Type 3:						0	$0.00
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	675	$164.50

Annual Electric Savings

4,289,089 BTUs

1257.06 kWh

Savings = 1,257.06 x $0.24 = $306.57 /yr

Annual Natural Gas Savings[1]

0 BTUs

0.00 therms

Savings = 0.00 x $0.00 = $0.00 /yr

Annual Net Cost Savings

$306.57 + $0.00 = $306.57

5. Simple Payback

$4,900.00 / $306.57 = 15.98 yrs

Additional Notes/Comments:

Simple Payback Analysis

EWCM	#3	Replace Pumps with VFD's	

Description: This worksheet calculates the annual savings and simple payback of replacing existing circulation pumps with premium efficient motors/models containing VFD's.

Methodology: Energy usage for each motor is calculated by converting the motor's horsepower (hp) rating to kilowatts (kW), and multiplying the kW value by the annual hours of use, and dividing this amount by the motor's efficiency:

{(hp) x (0.746 kw/hp) x (hours)} ÷ (Motor efficiency)

Replacement Costs

	Type	Cost
A. Proposed Conventional:	Standard Efficiency Pumps	$9,700.00
B. Proposed Green:	High Efficiency Pumps with VFD's	$13,000.00
C. Incremental Cost Between Proposed Conventional and Proposed Green:		$3,300.00

Utility Cost

Electricity: $0.24

Existing Conditions

Existing Motor	Quantity	Size: hp	Conversion Factor kW/hp	kW per Motor	Usage hrs/Yr	Load	Existing Efficiency	Total Usage kWh	Operational Cost $
Heat P1	2	0.4	.746	0.2984	3504	100%	85.0%	2,460	$600
Heat P2	1	2	.746	1.4920	3504	100%	86.5%	6,044	$1,474
Heat P3			.746	0.0000		100%		0	$0
Heat P4			.746	0.0000		100%		0	$0
DHW P1	1	0.1667	.746	0.1243	4380	100%	65.0%	838	$204
DHW P2	2	0.4	.746	0.2984	4380	100%	85.0%	3,075	$750
DHW P3			.746	0.0000		100%		0	$0
							Totals:	12,417	$3,028

Proposed Green Conditions

Existing Motor	Quantity	Size: hp	Conversion Factor kW/hp	kW per Motor	Usage hrs/Yr	Load	Proposed Efficiency	Total Usage kWh	Operational Cost $
Heat P1	2	0.4	.746	0.2984	3504	100%	95.0%	2,201	$537
Heat P2	1	2	.746	1.4920	3504	100%	95.0%	5,503	$1,342
Heat P3			.746	0.0000		100%		0	$0
Heat P4			.746	0.0000		100%		0	$0
DHW P1	1	0.1667	.746	0.1243	4380	100%	85.0%	641	$156
DHW P2	2	0.4	.746	0.2984	4380	100%	95.0%	2,752	$671
DHW P3			.746	0.0000		100%		0	$0
							Totals:	11,097	$2,706

Annual Savings: Existing to Proposed Green

Savings = $3,028.28 - $2,706.22 = $322.06 / yr

Simple Payback: Existing to Proposed Green

$3,300.00 / $322.06 = 10.2 yrs

Simple Payback Analysis

EWCM	#4	Replace Interior Common Lighting	

Replacement Costs

A. Total cost to replace interior common area T8 fluorescent tube and CFL fixtures with new LED fixtures: $25,000.00

Utility Cost

Electricity: $0.24
Natural Gas:

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	Commercial Kitchen 4-feet, T8, 4L	128	3	12	365	1,682	$410.18
Type 2:	Common 4-feet, T8, 2L	64	14	12	365	3,924	$957.09
Type 3:	Stairway 4-feet, T8, 4L	128	12	24	365	13,455	$3,281.46
Type 4:	Hallway 4-feet, T8, 2L	64	61	24	365	34,199	$8,340.39
Type 5:	Common CFL	13	15	12	365	826	$201.35
					Total:	54,086	$13,190.48

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED	56	3	12	365	736	$179.46
Type 2:	LED	28	14	12	365	1,717	$418.73
Type 3:	LED	56	14	24	365	6,868	$1,674.91
Type 4:	LED	28	61	24	365	14,962	$3,648.92
Type 5:	LED	7	15	12	365	460	$112.16
					Total:	24,743	$6,034.18

Annual Electric Savings

100,121,080 BTUs

29343.81 kWh

Savings = 29,343.81 x $0.24 = $7,156.30 /yr

Annual Natural Gas Savings[1]

0 BTUs

0.00 therms

Savings = 0.00 x $0.00 = $0.00 /yr

Annual Net Cost Savings

$7,156.30 + $0.00 = $7,156.30

5. Simple Payback

$25,000.00 / $7,156.30 = 3.49 yrs

Additional Notes/Comments:

Simple Payback Analysis

EWCM	#5	Replace Refrigerators - Dwelling Units	

Replacement Costs

A. Proposed Conventional	$24,200.00
B. Proposed Green	$28,600.00
C. Incremental Cost Between Proposed Conventional and Proposed Green	$4,400.00

Electricity:	$0.24
Natural Gas:	$1.56

Existing Conditions

A. Existing refrigerator type	Top-Freezer	
B. Number of refrigerators	44	
C. Average annual energy use per refrigerator	371	kWh / Year
D. Total annual energy use	16,336.00	kWh / Year
E. Total annual operational cost	$3,983.99	$ / Year

mix of kWh models noted during assessment (average shown)

Proposed Conventional Conditions

A. Proposed standard refrigerator type	Top-Freezer	
B. Number of refrigerators	44	
C. Average annual energy use per refrigerator	371	kWh / Year
D. Total annual energy use	16,336.00	kWh / Year
E. Total annual operational cost	$3,983.99	$ / Year

Proposed Green Conditions

A. Proposed green refrigerator type	Top-Freezer	
B. Number of refrigerators	44	
C. Average annual energy use per refrigerator	297	kWh / Year
D. Total annual energy use	13,068.00	kWh / Year
E. Total annual operational cost	$3,187.00	$ / Year

Annual Savings: Existing to Proposed Conventional

Electricity:	$0.24	x	0.00	=	$0.00	$ / Year
Natural Gas[1]:	$1.56	x		=	$0.00	$ / Year
				Total:	$0.00	$ / Year

Annual Savings: Proposed Conventional to Proposed Green

Electricity:	$0.24	x	3,268.00	=	$796.99	$ / Year
Natural Gas[1]:	$1.56	x		=	$0.00	$ / Year
				Total:	$796.99	$ / Year

Annual Savings: Existing to Proposed Green

Electricity:	$0.24	x	3,268.00	=	$796.99	$ / Year
Natural Gas[1]:	$1.56	x	0.00	=	$0.00	$ / Year
				Total:	$796.99	$ / Year

Simple Payback: Conventional

$24,200.00	/	$0.00	=	0.00 yrs

Simple Payback: Green

$28,600.00	/	$796.99	=	35.88 yrs

Incremental Payback: Proposed Conventional to Proposed Green

$4,400.00	/	$796.99	=	5.52 yrs

Simple Payback Analysis

EWCM	#6	Replace Showerheads - Dwelling Units	

Installation Costs

Costs to install low-flow (1.5 gpm) showerheads:	$880.00

Utility Costs

Water & Sewer:	$0.0115
Natural Gas:	$1.56

Existing Conditions

A. Number of showerheads	44
B. Number of showers per day per showerhead	2
C. Average number of minutes per shower	12.00
D. Showerhead flowrate	2.00

Proposed Green Conditions

A. Number of showerheads	44
B. Number of showers per day per showerhead	2
C. Average number of minutes per shower	12.00
D. Showerhead flowrate	1.50

Annual Usage: Existing

Water & Sewer

365 x 44 x 2 x 12 x 2.00

Total Domestic Cold Water Usage: 770,880 gal / Year

Natural Gas

Total Domestic Hot Water Usage[1]: 616,704 gal / Year

		A		B			
616704.00	x	65	x	8.335	=	334,114,810	btus / Year[2]
		334114809.60	/	100,000	=	3341.15	therms / Year

Annual Usage: Proposed Green

Water & Sewer

365 x 44 x 2 x 12 x 1.50

Total Domestic Cold Water Usage = 578,160 gal / Year

Natural Gas

Total Domestic Hot Water Usage[1] = 462,528 gal / Year

		A		B			
462,528	x	65	x	8.335	=	250,586,107	btus / Year[2]
		250,586,107	/	100,000	=	2,505.86	therms / Year

Annual Savings: Existing to Proposed Green

Water & Sewer:	770,880.00	-	578,160.00	=	192,720.00	gal / Year
	$0.0115	x	192,720.00	=	$2,217.96	$ / Year
Natural Gas:	3,341.15	-	2,505.86	=	835.29	therms / Year
	$1.56	x	835.29	=	$1,306.65	$ / Year

Simple Payback: Green

1B			10			
$880.00	/ (	$2,217.96	+	$1,306.65	) =	0.25 yrs

Additional Notes/Comments:

[1]Total domestic hot water usage represents 80% of domestic cold water usage for showers (20% cold water and 80% hot water to reach 110° desired water temperature).

[2]btus per year calculated from the following values:

A: 65 = Temperature increase between cold water (55°) and hot water delivery (120°)

B: 8.335 = Energy (in btus/gal) to heat domestic hot water per degree Fahrenheit

Simple Payback Analysis

EWCM	#7	Replace Toilets - Dwelling Units	

Replacement Costs

A. Proposed Conventional	$15,400.00	
B. Proposed Green	$15,400.00	
C. Incremental Cost Between Proposed Conventional and Proposed Green	$0.00	

Existing Conditions

A. Total number of existing toilets	44	
B. Average gallons per flush:	2.0	
C. Estimated total number of flushes per day:	8.0	
D. Estimated total daily usage per toilet:	13	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	$0.0115	($/gal)

Proposed Conditions: Conventional Models

A. Total number of toilets	44	
B. Average gallons per flush:	1.6	
C. Estimated total number of flushes per day	8.0	
D. Estimated total daily usage per toilet:	13	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	$0.0115	($/gal)

Proposed Conditions: Green Models

A. Total number of toilets	44	
B. Average gallons per flush:	1.28	
C. Estimated total number of flushes per day	8.0	
D. Estimated total daily usage per toilet:	10	gal/day
E. Estimated number of days per year facility in use:	365	
F. Cost of water and sewer:	$0.0115	($/gal)

Annual Water Use: Existing Models

44	x	13	x	365	=	205,568	gal/yr

Annual Water Use: Proposed Conventional Models

44	x	13	x	365	=	205,568	gal/yr

Annual Water Use: Proposed Green Models

44	x	10	x	365	=	164,454	gal/yr

Annual Savings: Existing to Proposed Conventional Models

205,568	-	205,568	x	$0.01	=	$0.00	$/yr

Annual Savings: Proposed Conventional to Proposed Green Models

205,568	-	164,454	x	$0.01	=	$473.16	$/yr

Annual Savings: Existing to Proposed Green Models

$0.00	+	$473.16	=	$473.16	$/yr	

Simple Payback: Conventional

$15,400.00	/	$0.00	=	0.00	yrs

Simple Payback: Green

$15,400.00	/	$473.16	=	32.55	yrs

Incremental Payback: Proposed Conventional to Proposed Green Models

$0.00	/	$0.00	=	0.00	yrs

Simple Payback Analysis

EWCM	#8	Replace Dwelling Unit Lighting	

Replacement Costs

A. Total cost to replace all dwelling unit T8 fluorescent and CFL fixtures with new LED fixtures: $18,550.00

Utility Cost

Electricity: $0.24
Natural Gas:

Existing Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	4-feet T8 Fluorescent 2L (Kitchens)	64	29	4	365	2,710	$660.85
Type 2:	1L CFL's (Living Areas/Bedrooms)	13	66	4	365	1,253	$305.50
Type 3:	2-Feet T12 Fluorescent 2L (Baths)	40	11	2	365	321	$78.33
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	4,284	$1,044.68

Proposed Green Types / Usage

	Description	Wattage per Fixture	Number of Fixtures	Lighting Hours/Day	Usage Days/Year	Usage kWh/Year	Usage $/Year
Type 1:	LED	21	29	4	365	889	$216.84
Type 2:	LED	7	66	4	365	675	$164.50
Type 3:	LED	14	11	2	365	112	$27.42
Type 4:						0	$0.00
Type 5:						0	$0.00
					Total:	1,676	$408.76

Annual Electric Savings

8,896,995 BTUs

2607.56 kWh

Savings = 2,607.56 x $0.24 = $635.93 /yr

Annual Natural Gas Savings[1]

0 BTUs

0.00 therms

Savings = 0.00 x $0.00 = $0.00 /yr

Annual Net Cost Savings

$635.93 + $0.00 = $635.93

5. Simple Payback

$18,550.00 / $635.93 = 29.17 yrs

Additional Notes/Comments:

Statement of Delivery

ON-SITE INSIGHT, Inc. (and/or its representatives) hereby certifies that, this Green Capital Needs Assessment (the "GCNA" or the "Report") is delivered subject to the following terms and conditions:

1. This report and analysis are based upon observations for the visible and apparent condition of the building and its major components on the date of the fieldwork. Although care has been taken in the performance of this assessment. ON-SITE INSIGHT, Inc. (and/or its representatives) makes no representations regarding latent or concealed defects that may exist and no warranty or guarantee is expressed or implied. This report is made only in the best exercise of our ability and judgment.

2. We have undertaken no formal evaluations of environmental concerns, including but not limited to asbestos containing materials (ACMs), lead based paint chlorofluorocarbons (CFCs), polychlorinated biphenyls (PCBs), and mildew/mold.

3. Conclusions in this report are based on estimates of the age and normal working life of various items of equipment and/or statistical comparisons. Actual conditions can alter the useful life of any item. When an item needs immediate replacement depends on many factors, including previous use/misuse, irregularity of servicing, faulty manufacturer, unfavorable conditions, Acts of God and unforeseen circumstances. Certain components that may be working when we made our inspection might deteriorate or break in the future without notice.

4. To prepare this report, we used historic data on capital activities and costs, blueprints (when available), and current prices for capital actions. We have not independently verified this information, have assumed that it is reliable, but assume no responsibility for its accuracy.

5. Unless otherwise noted in the report, we assume that all building components meet code requirements in force when the property was built.

6. If accessibility issues are referenced in the report, the site elements, common areas and dwelling units at the development were examined for compliance with the requirements of the Uniform Federal Accessibility Standards (UFAS), and for Massachusetts properties, the Massachusetts Architectural Accessibility Board (AAB). The methodology employed in undertaking this examination is adapted from a Technical Assistance Guide (TAG-88-11) titled "Supplemental Information About the Section 504 Transition Plan Requirements" published by the Coordination and Review section of the U.S. Department of Justice Civil Rights Division, and the AAB Rules and Regulations, 521 CMR effective July 10, 1987. The Guide also incorporates the requirements of UFAS, published, April 1, 1988 by the General Services Administration the Department of Defense the Department of Housing and Urban Development, and the U.S. Postal Service. Changes in legislation and/or regulations may make some observations moot.

7. Response Actions and estimated costs of responses were developed by ON-SITE INSIGHT, Inc. If additional structural work is necessary, costs for some Response Actions may exceed estimates. Whenever the Response Action is to remove, reposition, or modify walls, a competent structural engineer should be retained before any work is done, because such investigation may disclose that a Response Action is either more costly than estimated, or is not possible.

8. Conclusions reached in this report assume current and continuing responsible ownership and competent property management.

9. Regular updates of this plan are recommended to ensure careful monitoring of major building systems and to adjust the program to accommodate unanticipated circumstances surrounding the buildings, operations, and/or occupants.

Signed,

Signature 

Name: Matthew Chown

Title: Senior Associate

Date: December 29, 2023