

ASHRAE LEVEL II ENERGY AUDIT

THE TOWNSHIP OF NORTH DUMFRIES

VICTORIA PARK STORAGE BUILDING 75 Rose Street, Ayr, Ontario

Project No.: 2018-0527-11

May 8, 2019



DISCLAIMER AND LIMITATION OF LIABILITY

This document was prepared by WalterFedy for the above stated client ("Client") for the specific purpose and use by the client, as described in the report and subsequent scope of work agreement. This report was completed based on the information that was available at the time of the report preparation and completion, and is subject to all limitations, assumptions and qualifications contained herein. Any events or circumstances that have occurred since the date on which the report was prepared, are the responsibility of the client, and WalterFedy accepts no responsibility to update the report to reflect these changes.

WalterFedy agrees that this report represents its professional judgement and any estimates or opinions regarding probable costs, schedules, or technical estimates provided represent the professional judgement in light of WalterFedy's experience as well as the information available at the time of report preparation. In addition, WalterFedy accepts no responsibilities for changes in market or economic conditions, price fluctuations for labour and material costs, and therefore makes no representations, guarantees or warranties for the estimates in this report. Persons relying on such estimates or opinions do so at their own risk.

This report may not be disclosed or referred to in any public document without the prior formal written consent of WalterFedy. Any use which a third party makes of the report is at the sole responsibility and risk of the third party.

WalterFedy agrees with the Client that it will provide under this Agreement the standards of care, skill and diligence normally provided in the performance of services in respect of work similar to that contemplated by this Agreement. WalterFedy at its own expense carries professional liability insurance to the extent that it deems prudent and WalterFedy's liability under this Agreement to the Client for any claim in contract or in tort related to the services provided under this Agreement howsoever arising shall be limited to the extent that such liability is covered by such professional liability insurance from time to time in effect including the deductible therein, and which is available to indemnify WalterFedy and in any event WalterFedy's liability under this Agreement shall be limited to loss or damage directly attributable to the negligent acts of WalterFedy, its officers, servants or agents, or its failure to provide the standards of care, skill and diligence aforesaid. In no event shall WalterFedy be liable for loss or damage caused by delays beyond WalterFedy's control, or for loss of earnings or for other consequential damage howsoever caused.

The errors and omissions policies are available for inspection by the Client at all times upon request. If the Client, because of its particular circumstances or otherwise, desires to obtain further insurance to protect it against any risk beyond the coverage provided by such policies, WalterFedy will co-operate with the Client to obtain such insurance at the Client's expense.

The Client, in consideration of the provision by WalterFedy of the services set forth in this Agreement, agrees to the limitations of the liability of WalterFedy aforesaid. The Client shall have no right of set-off against any billings of WalterFedy under this Agreement.

The Township of North Dumfries, Victoria Park Storage Building ASHRAE Level II Energy Audit

Project No.: 2018-0527-11

May 8, 2019

Shelley Stedall The Township of North Dumfries 2958 Greenfield Road Ayr, ON N0B 1E0

Dear Shelley Stedall,

RE: North Dumfries Energy Audits

WalterFedy is pleased to submit the attached ASHRAE Level II Energy Audit to The Township of North Dumfries. This report encompasses the originally agreed to scope, and has identified the potential for energy consumption and cost saving measures at Victoria Park Storage Building located at 75 Rose Street in Ayr, Ontario.

Based on the information provided by the The Township of North Dumfries, the report was completed with the data supplied and collected, as well as engineering judgement and various analysis tools to arrive at the final recommendations.

All of which is respectfully submitted,

WALTERFEDY

Josh Gibbins, P.Eng. Senior Energy Engineer Energy Management Solutions

jgibbins@walterfedy.com 519.576.2150 x480

Table of Contents

		Page
E)	XECUTIVE SUMMARY	1
1	INTRODUCTION 1.1 Objectives 1.2 Scope of work 1.3 Contact information	2 2 2 2
2	HISTORICAL ENERGY USE ANALYSIS 2.1 General information 2.2 Utility rates 2.3 Incentive summary 2.4 Data sources 2.5 Facility utility use 2.6 Energy end uses 2.7 Energy use intensity (EUI)	3 3 3 3 3 4 4 5
3	EXISTING CONDITIONS 3.1 General facility information 3.2 Facility occupancy schedule 3.3 Building envelope 3.4 Mechanical systems 3.5 Lighting	7 7 7 9 9
4	ENERGY CONSERVATION MEASURES 4.1 Building envelope upgrades 4.2 Exterior LED lighting retrofit	10 10 10
5	RECOMMENDATIONS	11

APPENDICES

EXECUTIVE SUMMARY

This report presents the results of a ASHRAE Level II Energy Audit completed by WalterFedy for The Township of North Dumfries at Victoria Park Storage Building located at 75 Rose Street in Ayr, Ontario.

The purpose of this ASHRAE Level II Energy Audit is to review how energy is currently being consumed within the facility, gain an understanding of how the facility is being operated, and provide recommendations for how energy can be saved through energy conservation measures (ECMs).

This ASHRAE Level II Energy Audit was prepared in conjunction with a Building Condition Assessment (BCA) of Victoria Park Storage Building. ECMs are based on replacement recommendations with energy savings potential in the BCA report as well as emerging and renewable energy technologies when applicable.

Victoria Park Storage Building is a 1 storey Storage Building facility built in 1960.

Table 1 summarizes the annual electricity, natural gas, and water consumption for Victoria Park Storage Building during the baseline year of 2017. The facility's energy use intensity was benchmarked against other similar arena facilities.

Table 1: Facility annual utility summary			
Annual Electricity Consumption	[kWh]	5,019	
Annual Electricity Cost	[\$]	748	

*Utility costs calculated using utility rates described in Table 4.

As the facility consumes such a low amount of energy in its current state, none of the ECMs analyzed represented reasonable payback periods. No ECMs are recommended for this facility at this time.

1 INTRODUCTION

1.1 Objectives

WalterFedy was hired by The Township of North Dumfries to complete an ASHRAE Level II Energy Audit at their Victoria Park Storage Building facility at 75 Rose Street in Ayr, Ontario. The purpose of this ASHRAE Level II Energy Audit is to review how energy and water is currently being consumed within the facility, gain an understanding of how the facility is being operated, and provide recommendations for how energy and water can be saved through conservation measures.

This report identifies and explains potential energy and water conservation measures and provides economic analyses in order to estimate utility savings, budget implementation costs, and simple payback periods. Energy savings are within an accuracy of +/-30% while implementation costs are within an accuracy of +/-50%.

The goal is to recognize ECMs with high savings and reasonable payback periods. An analysis of historical energy and water use provides insight into the consumption patterns of the facilities. The data and information pertaining to the property reflects conditions and operations at the time of the site survey on November 28, 2018.

1.2 Scope of work

The scope of work is as follows:

- Review and analyze the historical energy consumption of each building.
- Conduct an on-site survey of each building's energy consuming equipment and system areas.
- Review operating logs and interview site building operations personnel to obtain insight into operating issues and practices.
- Perform an opportunity assessment including but not limited to:
 - The estimated energy unit and cost savings identified for each Energy Conservation Measures (ECM);
 - The energy saving recommendations from current state for each new ECM identified, documenting proposed equipment or operational changes from current equipment;
 - An explanation of the methodology and calculations utilized to obtain the energy and cost saving estimates;
- and document such assessment.
- Determine the cost to implement the recommended measures, including equipment installation and significant changes to maintenance costs, and determine the simple payback period for each ECM using the estimated savings.
- Provide a ranking of ECM opportunities in order of payback period category (1 to 3 years, 3 to 5 years, and 6 to 10 years)
- Identify and include in the final Report all available grants or incentives per identified ECM available through the Independent Electricity System Operator (IESO), Local Utility or other Government programs and include identified grant.

1.3 Contact information

The contact information of the the Owner and Consultant (WalterFedy) can be found in Table 2.

Client:	Consultant:
Shelley Stedall	Josh Gibbins, P.Eng.
Treasurer, Director of Corporate Services	Senior Energy Engineer
519.632.8800 x123	519.576.2150 x480
sstedall@northdumfries.ca	jgibbins@walterfedy.com
The Township of North Dumfries	WalterFedy
2958 Greenfield Road	675 Queen Street South, Suite 111
Ayr, ON N0B 1E0	Kitchener, ON N2M 1A1

Table 2: Contact Information

2 HISTORICAL ENERGY USE ANALYSIS

2.1 General information

Electricity, natural gas, and water suppliers for Victoria Park Storage Building are summarized in Table 3.

Table 3: Facility utility information.		
Victoria Park Storage Building		
75 Rose Street, Ayr, Ontario		
Energy+		
00040187-00		

*Electrical Local Distribution Company

2.2 Utility rates

The utility rates shown in Table 4 are used throughout this report to evaluate the energy conservation measures identified in this ASHRAE Level II Energy Audit.

The electricity and natural gas rates are an average determined using the previous 24 months of utility bills. The water rate is taken from the Region of Waterloo website and current as of November 1, 2018.

Table 4: Facility utility ratesElectricity Consumption [\$/kWh] 0.15

2.3 Incentive summary

Electricity incentives

Electricity savings incentives have been calculated based on the IESO saveONenergy Retrofit Program as summarized in Table 5.

2.4 Data sources

The following data sources were used in this historical energy use analysis:

- 24 months of Energy+ monthly electricity bills.
- Daily weather data for Kitchener/Waterloo.

Table 5: Electricity savings incentives

Project Type	Demand Incentive	Consumption Incentive
Lighting	\$400 / kW	\$0.05 / kWh
Non-lighting	\$800 / kW	\$0.10 / kWh

1. The greater of the kW or kWh incentive will apply

2. Incentive capped at 50% of project cost

2.5 Facility utility use

Due to different billing periods among the utilities, monthly consumption was determined by calculating an average daily consumption over a billing period and summing the average daily consumption for each month of the year.

Electricity consumption

Table 6 summarizes the annual electricity consumption of Victoria Park Storage Building for the baseline year of 2017.

Table 6: Facility annual electricity consumption		
Annual Electricity Consumption	[kWh]	5,019
Annual Electricity Consumption Costs	[\$]	748

Electricity is used for lighting and ventilation. As seen in Figure 1, monthly electricity consumption is typically higher in summer months.



Figure 1: Monthly electricity consumption for the baseline period

2.6 Energy end uses

Table 7 summarizes the energy end uses for Victoria Park Storage Building.

End Use	Natural Gas	Electricity	Total Energy	Total Energy	Energy
	Consumption	Consumption	Consumption	Percentage	Costs
	[m ³]	[kWh]	[ekWh]	[%]	[\$]
Space Heating	-	1,407	1,407	28.0	210
Lighting		3.612	3.612	72.0	538
Totals	-	5,019	5,019	100	748

1. Refer to Table 4 for the utility rates used.

2. Total end use energy consumption matches the total baseline year energy consumption.

Calculations

- Exterior lighting estimated based on typical operating hours throughout the year.
- Space heating electricity consumption estimated as the remainder of the total annual electricity consumption

2.7 Energy use intensity (EUI)

Figure 2 compares the total annual electricity of all North Dumfries facilities.



Figure 2: Annual electricity energy use by building

3 EXISTING CONDITIONS

3.1 General facility information

Victoria Park Storage Building is a 1-storey Storage Building facility constructed in 1960. It consists mainly of a kitchen, meeting rooms, and washrooms. Table 8 summarizes the general facility information for Victoria Park Storage Building.

Table 8: Facility background information			
Facility name:	Victoria Park Storage Building		
Location:	75 Rose Street, Ayr, Ontario		
Number of floors:	1		
Facility floor area:	800 ft ²		
Year of construction:	1960		
Building type:	Storage Building		

3.2 Facility occupancy schedule

The facility is typically used only during the summer months (May - September).

Table 9: Typical weekly hours		
Monday - Friday	8:00 am - 11:00 pm	
Saturday - Sunday	8:00 am - 11:00 pm	

3.3 Building envelope

Component	Installed	Description
Foundations Roof structure	1982 1982	concrete masonry block walls supporting concrete floor slab
Exterior walls	1982	concrete block masonry
Exterior windows Exterior doors	1982 1982	painted metal concession doors hollow metal doors
Roof coverings Exterior soffits	1982 1982	standing seam metal roofing and painted wood fascia painted plywood soffits and gables

Table TT. Existing gazebo building envelope details

Component	Installed	Description
Foundations	1960	concrete foundation walls
Roof structure	1960	hipped roofing structure
Exterior walls	1960	natural stone masonry
Exterior windows	1960	openings boarded off with plywood and metal grate
Roof coverings	1960	asphalt shingles and painted wood fascia

Exterior roof

The gabled roof of the concession building is topped with a standing seam metal roofing assembly and painted wood fascia. The hipped roof of the gazebo is topped with ashpalt shingles and painted wood fascia.



(a) Concession roof (b) Gazebo roof Figure 3: Building exterior walls

Exterior walls

The exterior walls of the concession building are comprised of concrete block masonry. The exterior walls of the gazebo are comprised of natural stone masonry.



(a) Concession exterior wall (b) Gazebo exterior wall Figure 4: Building exterior walls

Exterior windows and doors

There are two concession stand windows situated along the east elevation of the concession building. There are two hollow metal doors which are situated along the south elevation of the concession building.

There are four openings in the exterior walls of the gazebo which were windows for the changerooms below. These openings are now blocked off.



(a) Concession exterior doors (b) Gazebo exterior doors Figure 5: Building exterior doors

3.4 Mechanical systems

Space heating system

Although it could not be confirmed during the site visit, the electricity consumption patterns shown in the utility bills suggest that there is electric space heating provided to the

3.5 Lighting

Table 12: Existing lighting fixtures					
Location	Fixture Type	Wattage	Quantity	Installed	
Baseball Diamond 1 Baseball Diamond 2	Spotlight Spotlight	1,000 400	6 6	N/A 1960	

Exterior lighting

The exterior lighting consists of spotlights in the baseball diamonds.



(a) Baseball diamond exterior lighting (b) Baseball diamond exterior lighting Figure 6: Exterior lighting

4 ENERGY CONSERVATION MEASURES

4.1 Building envelope upgrades

Building envelope upgrades typically include the following components:

- · Roof: Increasing insulation to reduce heat losses through the roof.
- Exterior walls: Increase insulation to reduce heat losses through the exterior walls.
- Windows: Replacing old windows with new high efficiency windows to reduce heat losses through the windows.

Building envelope upgrades are not recommended to be considered until the envelope components are due for replacement due to the high cost of implementation, and low opportunity for utility savings. A qualitative analysis of the building envelope upgrades are presented in Table 13.

Table 13: Building envelope upgrades			
Category	Description		
Building component Recommended change Impact on occupant comfort Estimated cost Estimated level of annual savings Priority	Building envelope (roof, exterior walls, windows) Increase insulation in roof and exterior walls, and replace windows Improved thermal comfort due to reduced heat loss, and increased air tightness High (> \$10,000) Low (> 100 year payback) Low		

4.2 Exterior LED lighting retrofit

An exterior LED lighting retrofit has the following benefits in addition to those described previously:

- Improved lighting levels in parking lots and areas surrounding the building for increased occupant safety.
- Increased fixture lifespan resulting in lower maintenance costs.

This report analyzes an exterior LED fixture replacement with no fixture reduction.

Assumptions

- The existing light fixtures were retrofitted on a one-for-one basis.
- LED fixture replacement costs on a per fixture basis were held constant. No economies of scale were assumed.
- · Costs include both fixture and installation costs.
- No maintenance cost savings were taken into account.

Calculations

- The existing lighting electrical demand [kW] was determined by summing the electrical demand for all lights in the building.
- The existing lighting electrical demand [kW] was multiplied by the annual operating hours to determine the annual electricity consumption [kWh] for the existing lighting.
- A review of each existing light fixture type was completed to determine a suitable LED fixture replacement (per unit basis).
- An approximate cost and electrical power [W] for each LED fixture replacement was determined.

• The annual electricity consumption and monthly demand for the LED retrofit scenario was calculated and compared to the existing conditions.

	Ta	able 14: Exte	erior LED lig	hting retrol	it	
ECM	Electricity Savings [kWh]	Nat. Gas Savings [m³]	Cost Savings [\$]	Capital Cost [\$]	Utility Incentive [\$]	Simple Payback [years]
Exterior LED lighting retrofit	2,213.6	0	330	18,000	2,100	48.2

Table 14 provides a summary of the LED lighting retrofit analysis results.

Note: Cost savings calculated using utility rates from Table 4.

5 **RECOMMENDATIONS**

Table 15 summarizes the annual energy savings and simple paybacks for the conservation measures evaluated in this report. Conservation have been sorted based on their payback period.

Table 15: Conservation measures summary table						
ECM	Electricity Savings [kWh]	Nat. Gas Savings [m³]	Cost Savings [\$]	Capital Cost [\$]	Utility Incentive [\$]	Simple Payback [years]
Exterior LED lighting retrofit	2,213.6	0	330	18,000	2,100	48.2

Note: Cost savings calculated using utility rates from Table 4.

Table 16 summarizes all ECMs which were analyzed qualitatively.

Table 16: Qualitative ECM summary table						
ECM	Estimated Cost	Estimated Annual Savings	Priority			
Building envelope upgrades	High	Low	Low			