City of New Hope

Year 1 Measurement & Verification Report

February 2014

Contents

1. Executive Summary

BACKGROUND

On March 31, 2011 the City of New Hope signed a Detailed Engineering Study Agreement with McKinstry for the purpose of developing a performance contract. A performance contract totaling $4,423,253 was signed on September 12, 2011. This report summarizes the annual savings for Year 1 of the implemented systems at City of New Hope. The project has natural gas (Therm), electric (kWh), and water (Gal) savings due to the implemented Facility Improvement Measures (FIMs).

ENERGY AND COST SAVINGS

The project is achieving utility savings through the implementation of the following FIMs:

FIM Name	Project Locations	Guaranteed Performance Savings	Performance Savings Realized
Interior Lighting	City Hall/Police, Milton Honsey Pool, Public Works, Golf Course, Ice Arena	$10,570	$12,418
Building Envelope	Ice Arena, City Hall/Police, Public Works, Golf Course	$7,686	$12,924
Exterior Lighting	Ice Arena, City Hall/Police, Milton Honsey Pool, Public Works	$3,321	$5,355
Vending Machine Controls	Ice Arena, City Hall/Police, Public Works	$706	$731
Water Conservation	Ice Arena, City Hall/Police, Milton Honsey Pool, Golf Course	$3,415	$4,778
Ice Arena North Rink Roof	Ice Arena	$484	$661
Ice Arena Refrigeration	Ice Arena	$44,370	$58,806
Traffic Lights	City Wide	$591	$708
	Total	**$71,144**	**$96,381**

The annual guaranteed performance savings of $71,144 was exceeded through the implementation of the FIMs. The following table illustrates the performance savings realized to the annual guaranteed performance savings:

Annual Guaranteed Performance Savings	$71,144
Performance Savings Realized	$96,381
Difference (Additional Savings)	$25,237

2. Operation & Maintenance

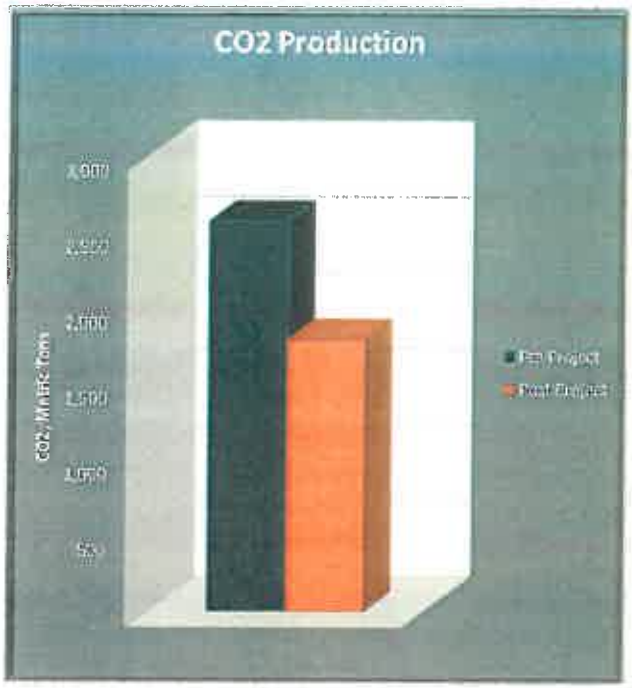
The following chart summarizes the agreed upon Operation & Maintenance (O&M) and Cost Avoidance Savings for the applicable FIMs. Operation & Maintenance Savings are a result of reduced operating costs for a particular system or piece of equipment after an upgrade has been performed. Cost Avoidance Savings can be attributed to the avoided future capital cost that would have been accumulated over time if the upgrade had not been performed. A summary of the O&M and Cost Avoidance Savings are shown in the following chart:

FIM Name	Project Locations	Annual O&M Savings	Annual Cost Avoidance Savings
Interior Lighting	City Hall, Police, Public Works, Pool, Ice Arena, Golf Course	$8,216	$0
Exterior Lighting	Public Works, Pool, City Hall, Ice Arena	$11,442	$0
Refrigeration	Ice Arena	$18,968	$21,226
Roof	Ice Arena	$60,766	$0
Traffic Lights	City-Wide	$105	$0
Data Room Cooling	Server Room	$1,500	$0
Total		**$100,997**	**$21,226**

Please see Appendix A for additional supporting information.

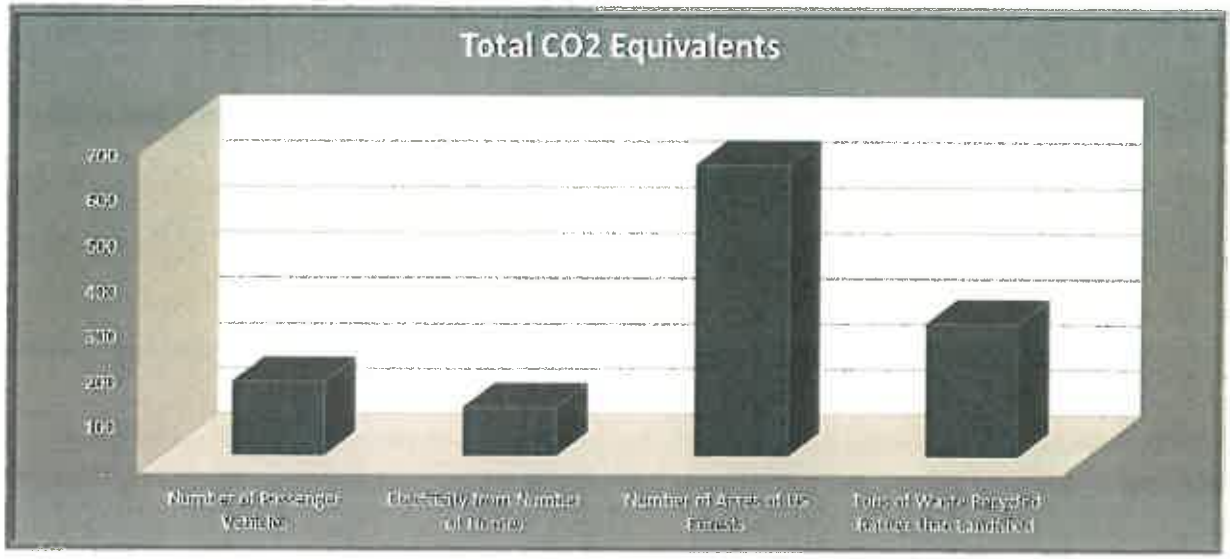
3. Environmental Impact

The first year performance savings of $96,381 equates to the reduction of natural gas, electric, and water consumption. The FIMs have a total savings of 21,358 Therms, 949,800 kWh and 4,448 gallons of water. The savings combine to a 25% reduction in total energy usage for the affected buildings.



By implementing the facility improvement measures, the City is not only saving money, but also helping to protect the environment.

- The City of New Hope lowered its annual CO2 production by 783 Metric Tons.
- The City is saving the equivalent of 0.67 Olympic-sized swimming pools' worth of water every year.



Environmental Impact information is intended for informational use only.

Please see Appendix B for additional supporting information.

4. Facility Improvement Measures

Interior Lighting Upgrades

FIM DESCRIPTION

McKinstry retrofitted the lighting in the following buildings: City Hall/Police, Milton Honsey Pool, Public Works, Golf Course, and Ice Arena. The implementation of this FIM improved the quality of light and reduced the electric utility consumption throughout the buildings. The annual electric utility consumption from lighting has been reduced by 48% which equates to $12,418 in annual utility savings.

FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Relamping 32W T8 lamps and fixtures with reduced wattage lamps.
- Replacing T12 fixtures with T8 fixtures.
- Replacing HID fixtures with T5 fixtures.
- Retrofitting incandescent lamps with CFL lamps.
- Retrofitting CFL lamps with LED lamps.

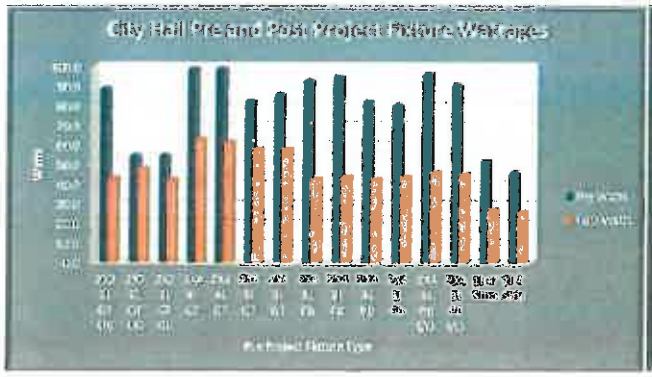
Predicted Energy Savings	Actual Energy Savings	Predicted $$	Actual $$
-1,095 Therms	-1,240 Therms	-$657	-$858
140,346 kWh	158,950 kWh	$11,227	$13,276
Additional Savings			**$1,847**

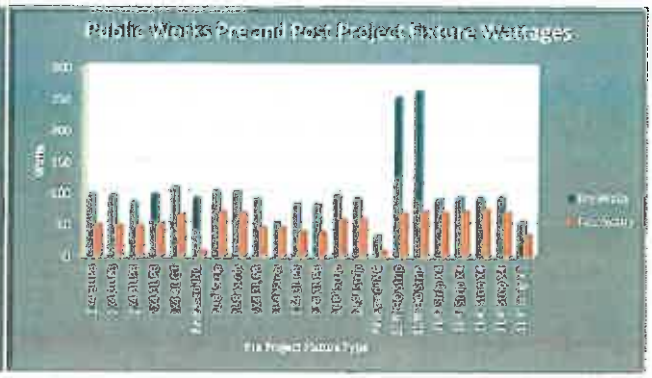
The charts below depict the pre and post interior lighting annual energy usage for each building.

4. Facility Improvement Measures

Interior Lighting Upgrades – Continued

The following charts depict actual pre and post fixture wattages for the City Hall and Public Works buildings.





The photos above show the pre and post project South Ice Arena light fixtures.

Please see Appendix C for additional supporting information.

4. Facility Improvement Measures

Building Envelope

FIM DESCRIPTION

McKinstry improved the building envelope in the following buildings: Ice Arena, City Hall/Police, Public Works, and Golf Course. Filling in cracks and crevices of each building increases the performance of the building by reducing unconditioned air leakage into the conditioned spaces of the building.

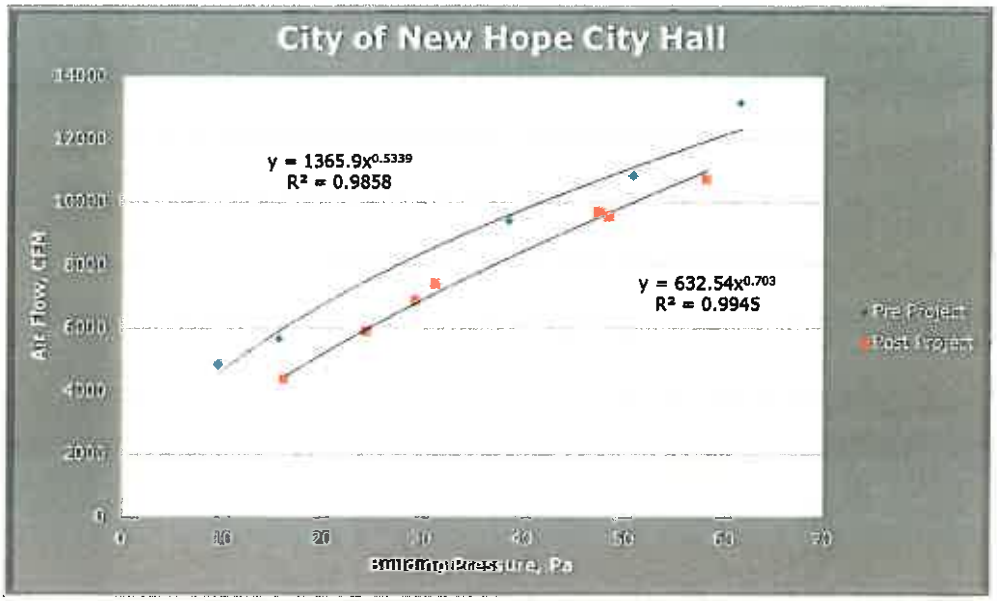
FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Sealing all exterior wall and roof penetrations to prevent air infiltration.
- Sealing exterior door sweeps and replacing weather stripping around doors.
- Caulking around window frames to ensure no air flow through cracks.
- Replacing deteriorated weather stripping around operable windows.
- Sealing roof/wall intersections to keep warm air from escaping during the winter.

Predicted Energy Savings	Actual Energy Savings	Predicted $$	Actual $$
9,653 Therms	14,178 Therms	$5,792	$10,373
23,688 kWh	31,584 kWh	$1,895	$2,551
Additional Savings			**$5,238**

The following graph depicts the pre and post blower door test results at the New Hope City Hall building.



Please see Appendix D for additional supporting information.

4. Facility Improvement Measures

Exterior Lighting Upgrades

FIM DESCRIPTION

McKinstry replaced existing exterior light fixtures with high efficiency LED fixtures. The replacements took place at the following buildings: City Hall, Ice Arena, Golf Course, Public Works, and Honsey Pool. These new LED fixtures emit a brighter, whiter light while consuming less energy than the removed light fixtures. The new LED fixtures also allow the City to save on bulb replacement due to the longer life achieved with LED technology.

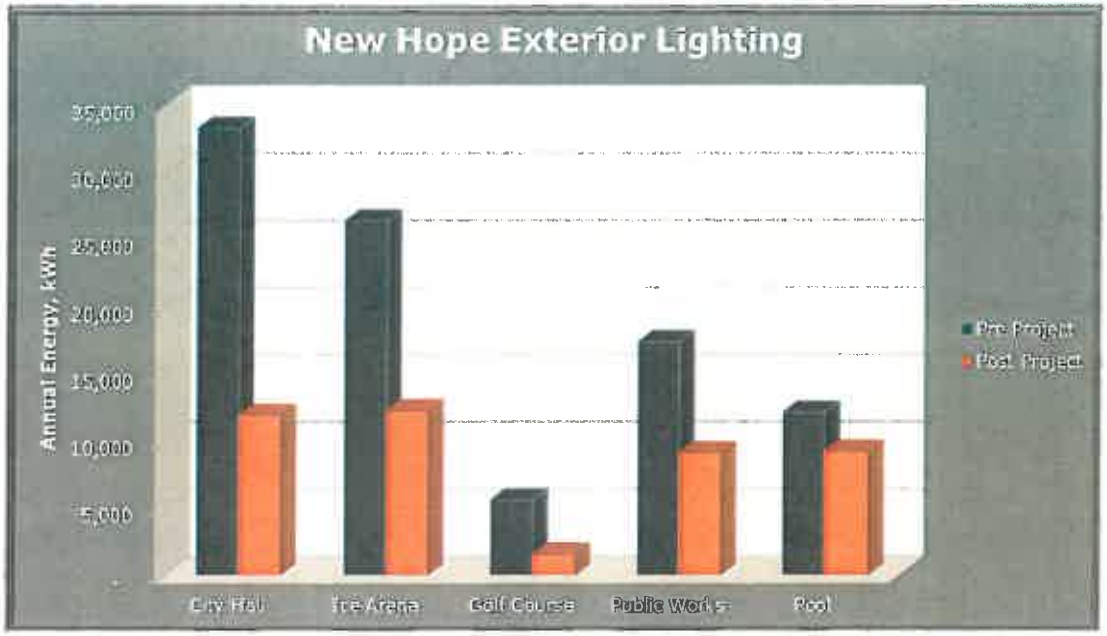
FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Replacing existing exterior metal halide, high pressure sodium, and other HID fixtures to LED fixtures.

Predicted Utility Savings	Actual Utility Savings	Predicted $$	Actual $$
41,517 kWh	59,215 kWh	$3,321	$5,355
Additional Savings			**$2,034**

The following chart depicts the pre and post exterior lighting annual energy usage.



Please see Appendix E for additional supporting information.

4. Facility Improvement Measures

Vending Machine Controls

FIM DESCRIPTION

Vending Machine Controls were implemented throughout the City buildings to lower electric utility consumption. By implementing these controls, beverage vending machines lower the frequency of compressor run-time based on the occupancy of the premises, while maintaining the required temperature inside the vending machine.

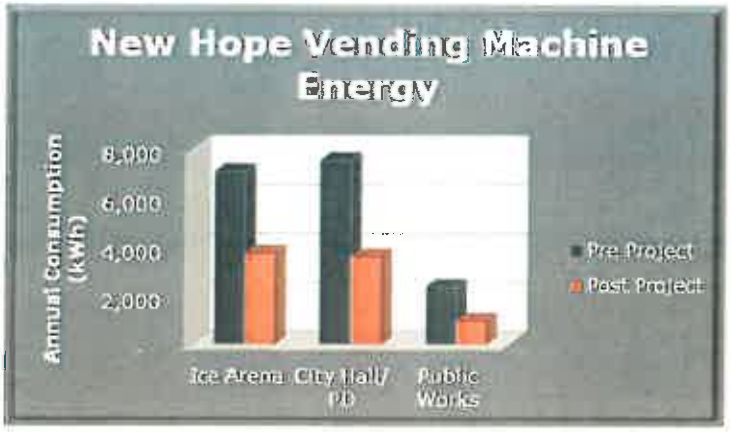
FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Implementing 6 Vending Machine Controls throughout the City.

Predicted Utility Savings	Actual Utility Savings	Predicted $$	Actual $$
8,824 kWh	8,692 kWh	$706	$731
Additional Savings			**$25**

The graph below depicts the annual pre and post project vending energy consumption per building.



The photo above shows an installed vending miser.

Please see Appendix F for additional supporting information.

4. Facility Improvement Measures

Water Conservation

FIM DESCRIPTION

McKinstry upgraded the plumbing fixtures throughout the City. These new, more efficient upgrades use less water by incorporating screens and aerators to slow the water flow down while maintaining adequate flow for general purposes. By implementing these new more efficient fixtures, the City of New Hope is saving water as well as natural gas used to heat the water.

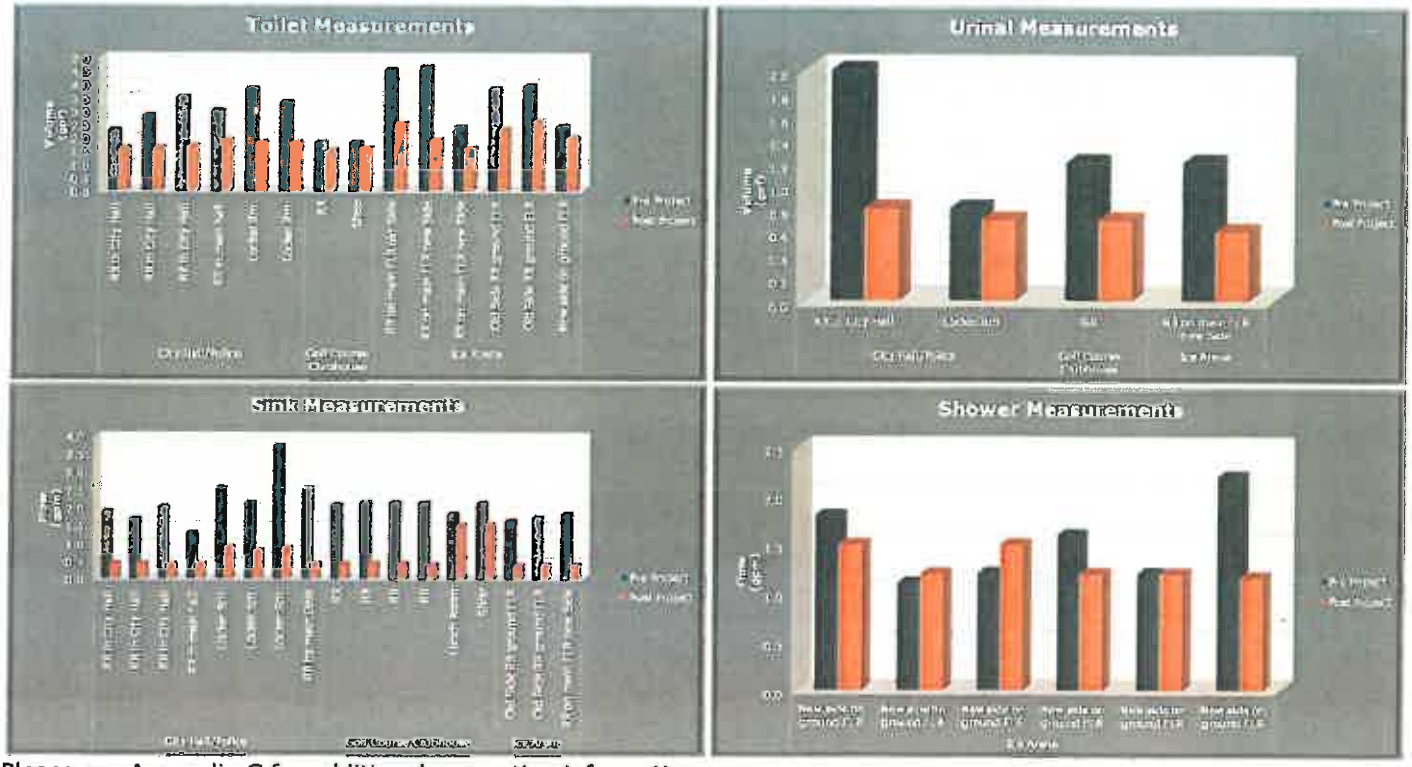
FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Conducting a diaphragm calibration or X-Body replacement of flushometers.
- Installing Vandal-Resistant flow control faucet heads throughout the City.
- Implementing retrofit upgrades to tank toilets.

Predicted Utility Savings	Actual Utility Savings	Predicted $$	Actual $$
1,035 Therms	1,203 Therms	$621	$961
326 kGal	445 kGal	$2,794	$3,817
Additional Savings			**$1,363**

The following graphs depict the pre and post project fixture flow measurements in the City facilities.



Please see Appendix G for additional supporting information.

4. Facility Improvement Measures

Ice Arena North Rink Roof

FIM DESCRIPTION

McKinstry replaced the barrel type roof on the North Rink at the New Hope Ice Arena with a new standing seam metal roof and R-33 insulation. In addition to the increased insulation, the new roof also has an S-5 snow and ice guard rail system to prevent build up in the winter months. The new roof not only saves energy, but also has decreased operation and maintenance costs necessary to maintain the roof.

FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Removing the existing roof system and replacing it with a new standing seam metal roof with R-33 insulation.

Predicted Utility Savings	Actual Utility Savings	Predicted $$	Actual $$
807 Therms	987 Therms	$484	$661
Additional Savings			**$177**

The chart below depicts the pre and post project roof insulation values

The photo above shows the new Ice Arena Roof.

Please see Appendix H for additional supporting information.

4. Facility Improvement Measures

Ice Arena Refrigeration

FIM DESCRIPTION

McKinstry replaced the refrigeration systems in the Ice Arena with a new central ammonia refrigeration system. This system has been installed and optimized to not only provide adequate cooling to the individual ice rinks but also utilize heat generated by the compressors for general heating purposes within the Ice Arena. The new system also provides operation and maintenance savings since the existing refrigeration systems were aging.

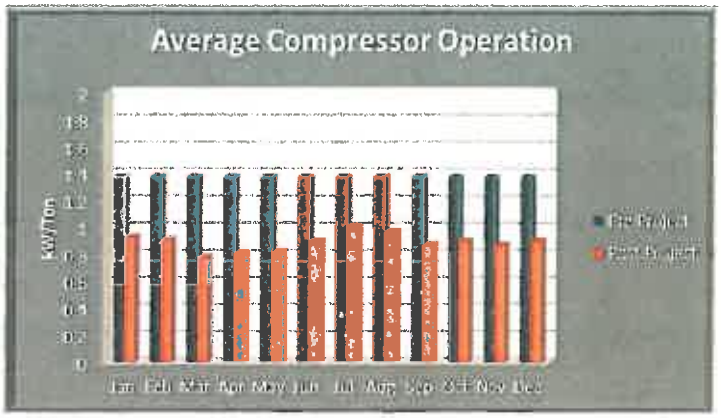
FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Replacing the existing R-22 refrigeration system with a new centralized ammonia refrigeration system.
- Balancing the heating and cooling systems within the Ice Arena to optimize energy consumed by the ice compressors.

Predicted Utility Savings	Actual Utility Savings	Predicted $$	Actual $$
1,815 Therms	6,230 Therms	$1,089	$4,175
541,013 kWh	682,506 kWh	$43,281	$54,631
Additional Savings			**$14,436**

The chart below shows the pre and post project average operating kW/ton of the refrigeration compressors.



The photo above shows the three compressors that cool both the North and South Rinks.

Please see Appendix I for additional supporting information.

4. Facility Improvement Measures

Traffic Lights

FIM DESCRIPTION

McKinstry replaced the existing incandescent traffic signal lights at the intersections of 49th Avenue North and US 169 as well as 36th Avenue North and Jordan Avenue North with LED traffic signal fixtures. These new LED fixtures are providing an efficient alternative to the existing incandescent fixtures. The new LED fixtures also have a much longer rated life expectancy, so there are also operation and maintenance savings associated with the replacement.

FIM SAVINGS VALIDATION

Annual utility savings as a result of these upgrades were achieved by:

- Removing the existing incandescent traffic signals and installing LED traffic signals at two intersections in the City.

Predicted kWh Savings	Actual kWh Savings	Predicted $$	Actual $$
7,383	8,853	$591	$708
Additional Savings			**$117**

The following graph depicts the pre and post annual energy usage for the replaced traffic signals.

The photo above shows the newly installed LED traffic signals.

Please see Appendix J for additional supporting information.

5. Conclusions and Recommendations

McKinstry recommends utilizing all systems as commissioned to maintain savings obligations. Further savings can be achieved by ensuring the light fixtures in unoccupied spaces are kept off, building set points are kept at appropriate levels for occupancy comfort and setup or setback during unoccupied periods, and the ice rink is monitored and operating as commissioned by McKinstry.

The following chart depicts the utility rates used to determine dollar savings from the calculated energy savings. The rates are taken directly from the actual billed utility information and used in the Performance Contract signed between McKinstry and the City of New Hope.

			Water	Sewer
Location	$/kWh	$/Therm	$/kGal	$/kGal
City Hall/Police	$0.086	$0.584	$ 4.32	$ 4.26
Milton Honsey Pool Pump	$0.111	$0.900	$ 4.32	$ 4.26
Public Works	$0.088	$0.866	$ 4.32	$ 4.26
Ice Arena	$0.080	$0.670	$ 4.32	$ 4.26
Golf Course Clubhouse	$0.122	$0.977	$ 4.32	$ 4.26