ASSOCIATION OF MANITOBA MUNICIPALITIES
MANITOBA MUNICIPAL ENERGY,WATER AND WASTE
WATER EFFICIENCYPROJECT
TOWN OF ROBLIN
FINAL REPORT
JULY 2006

KGS GROUP
KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

KGS GROUP

KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

July 5, 2006

File No. 05-1285-01-1000.8

Association of Manitoba Municipalities
1910 Saskatchewan Avenue West
Portage la Prairie, Manitoba
R1N 0P1

ATTENTION: Mr. Tyler MacAfee

RE: Municipal Energy, Water, and Wastewater Efficiency Studies for Roblin– Final Report

Dear Mr. Tyler MacAfee:

Enclosed is the Final Report of the Manitoba Municipal Energy, Water and Wastewater Efficiency Study for the Town of Roblin.

Included with this submission are 10 hard copies of the report (3 in color, 7 in black and white) and 10 copies on compact disk in PDF format with searchable text functionality, as requested in the "Request for Proposal". The PDF file consists of the entire report, including the Executive Summary, Sections 1 to 19 and Appendix A to G.

We thank you for giving us the opportunity to work on this project and look forward to continuing this work with the other Municipalities.

Yours truly,

for R. B. Bodnar, P.Eng.
Senior Mechanical Engineer/ Department Head

RBB/rbb
Enclosure

STRUCTURAL▪GEOTECHNICAL▪ENVIRONMENTAL▪HYDRAULICS▪HYDROGEOLOGY▪MUNICIPAL▪MECHANICAL▪ELECTRICAL
3RD FLR.–865 WAVERLEY ST., WINNIPEG, MANITOBA, R3T 5P4 PH: (204) 896-1209 FAX: (204) 896-0754
SUITE 301A, 1001 WILLIAM ST., THUNDER BAY, ONTARIO, P7B 6M1 PH:(807) 623-2195 FAX:(807) 473-5671

EXECUTIVE SUMMARY

The objective of this study was to determine energy, water and wastewater efficiency opportunities that could enable the Town of Roblin to reduce operating costs, conserve resources and reduce greenhouse gas emissions.

An energy and water audit was conducted on fourteen buildings in the Municipality of Roblin. An audit was also done on the water distribution and wastewater collection systems. Throughout the course of these audits, water, wastewater and energy efficiency opportunities were analyzed to determine the Municipality's potential for energy and water savings. The saving opportunities were separated into the following categories:

- Lighting – Replacing the interior and/or exterior lighting with more energy efficient lights and fixtures.
- Envelope – This involves measures that would reduce the heat loss through the building's windows, doors, walls and roof.
- Motors- Replacing low efficiency motors with higher efficiency motors.
- HVAC- Improving current heating, ventilating and air conditioning systems.
- Process Equipment: Potential upgrades to ice plants and water / waste water treatment plant equipment.
- Water – Replacing high flow water fixtures with water efficient fixtures.

Table E1 shows the energy consumption for each of the buildings from October 2004 to September 2005. This year was chosen as it represents the base year for energy and water consumption. This year was selected since the conditions of the buildings throughout this time most closely resemble the buildings' current conditions. All buildings included in the energy and water audit use electricity. In addition, seven of the buildings, the Swimming Pool Office/Changerooms, Community Centre, Library and Town Administration Building, Recycling Depot, Fire Hall, Public Works Shop and Water Treatment Plant also use natural gas. The "Energy Density" column in this table is the total energy consumed in the building divided by the area of the building. This is useful in comparing the energy consumption among the different building types in Roblin. The pie chart displays the percentage of total energy density for each of the buildings. It ranges from a high of 26.3% for Pumphouse #1 to a low of 0.5% for the Arena.

Tables E2 (a) and (b) show overall energy and water saving opportunities for all fourteen buildings in the Town of Roblin. These tables include approximate product and installation prices for each measure both with and without incentives (refer to Appendix D for a list of Manitoba Hydro incentives) and simple payback years. The "Simple Payback Years" column is the overall payback period and may vary for individual buildings.

From the energy saving opportunities table (Table E2 (a)) it can be seen that the total potential for energy savings in all fourteen buildings is 836,087 kWh, or 39% of the current total energy consumption.

There were three main issues that were noted during the course of this study that limited the potential for additional energy savings:

- Some buildings are infrequently used (e.g. Water Treatment Plant, Lift Stations #1 and #2, Pumphouses #1 and #2).
- Some of the buildings have little or no ventilation (e.g. Campground Office).
- Some of the buildings are unheated (e.g. Swimming Pool Office/Changerooms and Campground Office).

Water saving opportunities are shown in Table E2 (b) and are displayed as percent water savings, water savings in litres/year and cost savings. Percentages shown in the table indicate the percent water savings that would result from replacing the existing water fixtures in all the buildings with water efficient fixtures. The water savings in litres per year are based on estimates of the various buildings occupancies. The cost of water was calculated to be $0.462 per cubic metre.

The results and recommendations from the water and wastewater audit are shown in Chapter 20 of this report. From the water system audit, it was determined that Roblin's water treatment plant produced a total of 476,386 m^3 of water from January 2004 to September 2005. The total amount of water sold by the Town was 317,571 $m^{3.}$ Of the remaining amount, 149,659 m^3 is unaccounted-for water loss, 31.4% of the total water produced. Reduction in water losses would reduce chemical costs required for water treatment, reduce electrical energy consumed by the pumps and extend the longevity of the system.

Roblin's sewer collection system is a combined system collecting both sewer flow and storm water. Along with wastewater, both infiltration and runoff are collected and treated in this system. Factors such as precipitation entering through manholes, weeping tiles, sump pumps and groundwater entering the system create variations in infiltration and inflow quantities. Developing a program that would help monitor and lower the amount of unaccounted-for water loss would potentially help the Town to save in both quantity of water and costs.

In addition to energy, water and cost savings, other benefits have been identified:

- Reduction in CO_2 emissions resulting in reduced contribution to climate change– the percent reduction is shown at the bottom of each of the energy saving opportunity tables.
- Lowered maintenance costs – (e.g. replacing the current lights with longer lasting bulbs).
- Improved physical comfort – (e.g. reducing infiltration into buildings).
- Delayed need to increase water and wastewater treatment plant capacities.

Table E1: Energy Consumption for the Period from September 2004 – September 2005

Site	Energy Density (kWh/m^2)	Area (m^2)	Electricity		Natural Gas		TOTAL ENERGY	
			kWh	Cost ($)	kWh	Cost ($)	kWh	Cost ($)
Arena	99	3,835	331,062	$16,268	48,250	$2,056	379,312	$18,324
Swimming Pool Office/Changerooms	1,585	248	3,800	$187	389,283	$16,257	393,083	$16,444
Community Centre	199	1,346	77,940	$5,486	189,896	$7,842	267,836	$13,328
Library	224	234	25,110	$1,915	27,437	$1,246	52,547	$3,162
Town Administration Building	195	368	29,940	$2,242	41,802	$1,874	71,742	$4,116
Recycling Depot	281	467	690	$263	130,768	$5,415	131,458	$5,678
Fire Hall	365	446	31,000	$2,307	131,897	$5,269	162,897	$7,575
Public Works Shop	460	301	20,860	$1,617	117,645	$4,893	138,505	$6,510
WTP	2,437	110	67,310	$5,065	200,774	$8,172	268,084	$13,237
Lift Station #1	3,276	23	76,691	$5,480	0	$0	76,691	$5,480
Lift Station #2	389	21	8,100	$847	0	$0	8,100	$847
Pumphouse #1	4,813	20	96,580	$6,134	0	$0	96,580	$6,134
Pumphouse #2	3,832	20	76,900	$5,442	0	$0	76,900	$5,442
Campground Office	119	69	8,200	$775	0	$0	8,200	$775
Totals	18,275	7,509	854,183	$54,027	1,277,753	$53,024	2,131,936	$107,051

Percentage of Total Energy Density for Buildings in Roblin

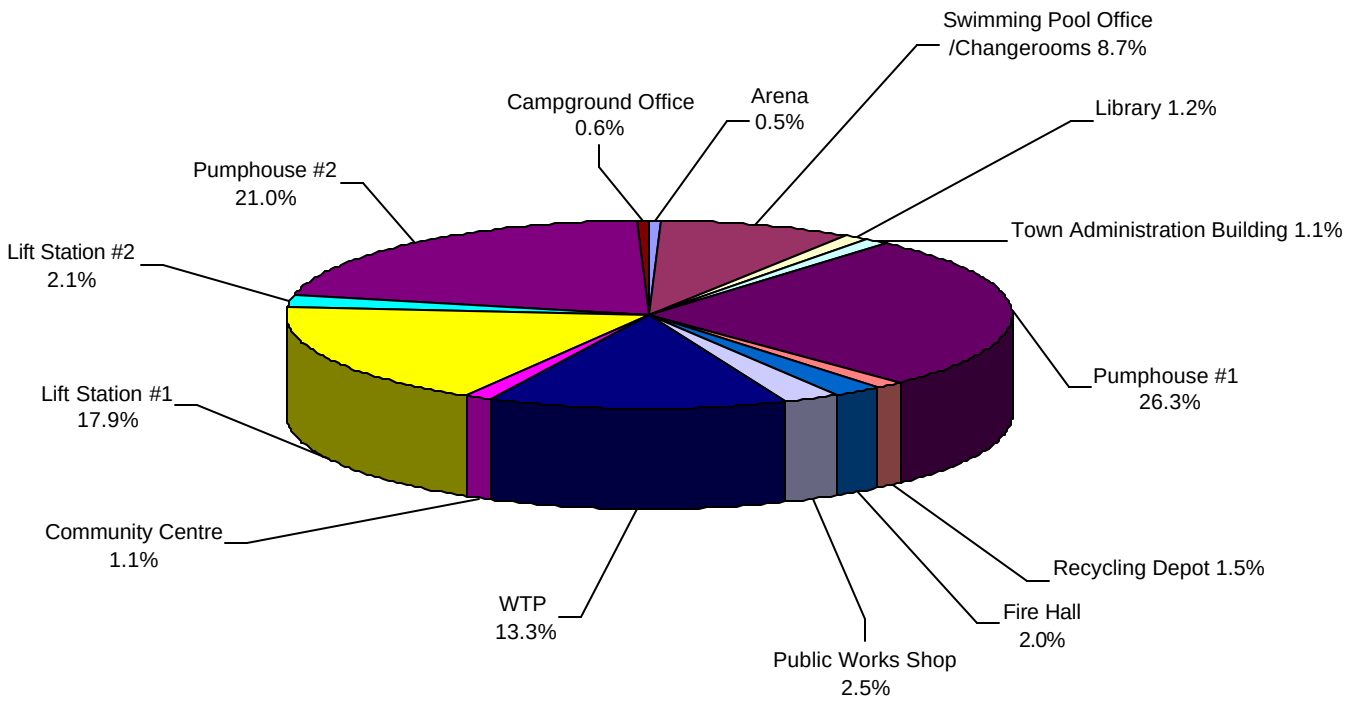


Table E2 (a): Summary of Energy Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
LIGHTING & PARKING LOT CONTROLLERS											
Replace EXIT incandescent lamps with LED modules.	7	$50	$5	$80	$1,037	$678	1,656	$99	10.4	6.8	Library, Town Administration Building & Fire Hall.
When burnt out, replace 4' x1 T12 fluorescents with T8 ballasts and tubes.	6	$41	$21	$0	$280	$144	112	$7	41.6	21.3	Recycling Depot.
Retrofit 4' x2 T12 fluorescents with T8 ballasts and tubes when burnt out.	112	$41	$21	$0	$5,235	$2,681	3,291	$198	26.5	13.6	Arena, Swimming Pool Office/Changerooms & WTP.
Retrofit 4' x 4 T12 fluorescents with T8 ballasts and tubes when burnt out.	420	$32	$12	$0	$15,322	$5,746	12,947	$777	19.7	7.4	Library & Town Administration Building.
Retrofit 8' x2 T12 fluorescents with T8 ballast and tubes when burnt out.	190	$ 41	$12	$0	$8,881	$2,599	14,144	$849	10.5	3.1	Arena, Recycling Depot & Public Works Shop.
Replace exterior incandescents with high pressure sodium incandescents	3	$125	$100	$125	$855	$770	657	$39	21.7	19.5	Lift Station #1 & Campground Office.
Replace interior incandescents with compact fluorescents.	43	$15	$10	$10	$1,245	$1,000	4,092	$246	5.1	4.1	Arena, Swimming Pool Office/Changerooms, Public Works Shop, Lift Station #2, Pumphouse #1, Pumphouse #2 & Campground Office.

Table E2 (a): Summary of Energy Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
LIGHTING & PARKING LOT CONTROLLERS											
Replace indoor 300W incandescent lights/flood lights with compact fluorescents.	8	$20	$15	$13	$301	$255	5,147	$309	1.0	0.8	Public Works Shop.
Install parking lot controller.	7	$100	$75	$131	$1,845	$1,646	3,360	$202	9.1	8.2	Library & Public Works Shop.
Lighting Subtotal					**$35,001**	**$15,519**	**45,406**	**$2,726**			
ENVELOPE											
Add weather stripping & caulking to existing pedestrian door.	21	$15	$15	$50	$1,556	$1,556	34,956	$1,639	0.9	0.9	Arena, Library, Town Administration Building, Recycling Depot, Public Works Shop, WTP, Lift Station #1 & Lift Station #2.
Seal & caulk windows.	2	$5	$5	$25	$68	$68	1,182	$54	1.3	1.3	WTP.
Replace windows & seal.[1]	32	$708	$618	$100	$29,468	$26,206	46,247	$2,492	11.8	10.5	Arena, Recycling Depot, Fire Hall, Public Works Shop, WTP, Lift Station #1 and Pumphouses #1 & 2.
Replace and weather strip vehicle door.	1	$530	$530	$100	$718	$718	8,470	$387	1.9	1.9	Recycling Depot.
Add new weather stripping & caulking to vehicle door.	9	$30	$30	$100	$1,334	$1,334	39,352	$1,798	0.7	0.7	Fire Hall & Public Works Shop.
Upgrade roof insulation.[1]	7	$3,435	$3,048	$2,383	$46,425	$43,338	92,779	$4,877	9.5	8.9	Arena, Recycling Depot, Public Works Shop, WTP, Lift Station #1 & Pumphouses #1 and #2.

Table E2 (a): Summary of Energy Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
ENVELOPE											
Upgrade wall insulation. [1]	1	$2,240	$2,240	$1,000	$3,694	$3,694	17,438	$1,047	3.5	3.5	Lift Station #1.
Envelope Subtotal					**$83,263**	**$767,915**	**240,422**	**$12,294**			
OPERATIONAL											
Dumping zamboni ice outside rather then melting it in ice-pit.	N/A	$0	$0	$0	$0	$0	111,978	$6,723	0	0	Arena
Operational Subtotal					**$0**	**$0**	**111,978**	**$6,723**			
HVAC											
Install programmable thermostat with setback function.	14	$300	$300	$300	$9,576	$9,576	130,615	$7,580	1.3	1.3	Arena, Library, Town Administration Building, Recycling Depot, Fire Hall, Public Works Shop, WTP, Lift Stations #1 and #2 & Pumphouses #1 and #2.
Install outdoor thermostat to control rink ventilation.	1	$600	$600	$600	$1,368	$1,368	13,965	$838	1.6	1.6	Arena.
Replace airconditioner with a high efficiency unit.	1	$2,500	$2,200	$1,000	$3,990	$3,648	5,025	$302	13.2	12.1	Library.
Install motorized damper.	4	$300	$300	$300	$2,736	$2,736	39,539	$1,453	1.9	1.9	Arena, Recycling Depot, Fire Hall & Public Works Shop.
Install timer for grease exhaust fan.	1	$60	$60	$125	$211	$211	3,782	$227	0.9	0.9	Arena

Table E2 (a): Summary of Energy Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
HVAC											
Install HRV.	2	$475	$475	$500	$2,223	$2,223	2,162	$96	23.1	23.1	Library & Town Administration Building.
Upgrade boiler to high efficiency boiler.	1	$3,000	$3,000	$0	$3,420	$3,420	24,688	$1,128	3.0	3.0	Swimming Pool Office/Changerooms.
Replace existing RTUs when worn out with high efficiency units c/w CO2 sensors.	6	$1,450	$1,045	$0	$9,918	$7,148	13,128	$788	12.6	9.1	Community Centre
Replace furnace/unit heater with high efficiency furnace.	12	$2,912	$2,667	$417	$45,536	$42,189	91,769	$4,194	10.9	10.1	Library, Town Administration Building, Recycling Depot, Fire Hall, Public Works Shop & WTP.
Install liquid pool covers.	3	$350	$350	$150	$1,710	$1,710	70,539	$3,224	0.5	0.5	Swimming Pool Office/Changerooms.
Install heat pump (geothermal)[2]	1	$31,140	$22,914	$0	$35,500	$26,121	114,537	$6,877	5.2	3.8	Fire Hall.
HVAC Subtotal					**$80,688**	**$74,229**	**325,216**	**$19,831**			
HOT WATER											
Install water efficient metering faucets.	7	$309	$309	$150	$3,660	$3,660	5,400	$391	9.4	9.4	Arena & Public Works Shop.
Install water efficient showers.	14	$21	$21	$50	$1,133	$1,133	9,256	$650	1.7	1.7	Arena, Swimming Pool Office & Campground Office.
Upgrade water heater boiler with a high efficiency unit.	1	$2,341	$2,341	$0	$2,669	$2,669	4,631	$212	12.6	12.6	Arena.
Replace water heater with instantaneous water heater.[3]	6	$300	$300	$400	$4,788	$4,788	6,342	$353	13.6	13.6	Library, Town Administration Building, Recycling Depot, Fire Hall, Public Works Shop & WTP.

Table E2 (a): Summary of Energy Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
HOT WATER											
Insulate piping for hot water heater tank.[1]	6	$167	$167	$167	$2,280	$2,280	9,021	$542	4.2	4.2	Arena, Community Centre, Recycling Depot, Fire Hall, Public Works Shop & Campground Office.
Water Subtotal					**$14,530**	**$14,530**	**34,650**	**$2,147**			
MOTORS[1]											
When replacing motors, install a high efficiency motor.	10	$681	$681	$0	$7,765	$7,765	8,415	$494	15.7	15.7	Arena, Swimming Pool Office/Changerooms, WTP, Lift Station #1 & Pumphouses #1 and #2.
Motors Subtotal					**$7,765**	**$7,765**	**8,415**	**$494**			

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	2,131,936	$107,050	340.0
Estimated Annual Savings	836,087	$44,215	81.8
Percent Savings	39%	41%	24.1%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) as of April 2005 and 0.0457$/kWh for natural gas.
**** This is the overall payback period and may vary for individual buildings (refer to tables throughout report for payback years for a specific building).
[1] Average capital unit cost and installation costs were used for window upgrades, roof and wall insulation upgrades, insulating piping on hot water tanks & upgrading motors.
[2] Geothermal heat pump was not included in the total costs or energy savings.
[3] Discounted to include the cost of replacement water tank in 10 years.

Table E2 (b: Summary of Water Saving Opportunities for all 14 Buildings in Roblin

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Water Savings ($)	Related Buildings
		Material	Labour					
Install water efficient metering faucets.	25	$309	$150	$13,082	80%	161,338	$75	Arena, Swimming Pool Office/Changerooms, Library, Town Administration Building, Fire Hall, Public Works Shop & Campground Office.
Install water efficient toilets.	22	$284	$150	$10,885	55%	784,233	$362	Arena, Swimming Pool Office/Changerooms, Library, Town Administration Building, Public Works Shop & Campground Office.
Install water efficient urinals	9	$344	$200	$5,581	29%	181,842	$84	Arena, Swimming Pool Office/Changerooms, Library & Campground Office.
Install water efficient showers	14	$21	$50	$1,133	29%	211,977	$98	Arena, Swimming Pool Office/Changerooms & Campground Office.

* The total cost column includes 14% taxes.

MMEP AUDITORS

Energy Audit:
Mr. Ray Bodnar
KGS Group
865 Waverley Street
Winnipeg, Manitoba, R3T 5P4
Phone: (204) 896-1209
Fax: (204) 896-0754
Email: Rbodnar@kgsgroup.com

Water and Wastewater Audit:
Mr. Tibor Takach
KGS Group
Suite 310-2365 Albert Street
Regina, Saskatchewan, S4P 4K1
Phone: (306) 545-1777
Fax: (306) 545-1829
Email: Ttakach@kgsgroup.com

MMEP PARTNERS

Association of Manitoba Municipalities
Manitoba Hydro
Manitoba Conservation
Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration
Manitoba Culture, Heritage, and Tourism

FUNDING

Federation of Canadian Municipalities/Green Municipal Fund
Sustainable Development Innovations Fund

This Study has been produced with the assistance of the Green Municipal Enabling Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the author(s), and the Government of Canada and the Federation of Canadian Municipalities accept no responsibility for them.

Additional support for the MMEP Project provided by Manitoba Conservation, Sustainable Development Innovations Fund.

ACKNOWLEDGEMENTS

KGS Group and the MMEP partners gratefully acknowledge the valuable contributions the following people have made in providing their time, helpful suggestions, and participation in this energy and water efficiency project:

- Marna Bulbuck, Chief Administrative Officer (Library & Town Administration Building).
- Clayton Paul (Arena, Swimming Pool Office/Changerooms)
- Len Addis (Community Centre)
- Don Todorovich (Recycling Depot, Fire Hall, Public Works Shop and Campground Office)
- Jason Boguski (WTP, Lift Stations #1 & #2 and Pumphouses #1 & #2)

COPYRIGHT

TABLE OF CONTENTS

PAGE

LIST OF APPENDICES

P:\Projects\2005\05-1285-01\Admin\Docs\Municipality of Roblin 1000.8\Final\05-1285-01.(Town of Roblin - Efficiency - Final Report) - July, 2006.doc

1.0 INTRODUCTION

1.1 BACKGROUND

As environmental concerns grow and energy costs increase, energy and water conservation is increasing in importance. For this reason it is essential to perform energy, water and wastewater efficiency audits to identify practical efficiency improvement opportunities and determine the capital costs and payback periods associated with these implementations.

An energy and water efficiency audit was conducted on fourteen buildings in the Municipality of Roblin to determine how these facilities could reduce both energy and water consumption. In addition, the water distribution and wastewater collection systems were audited to determine what opportunities exist for improving the systems' efficiencies.

1.2 OBJECTIVE

The objective of this study was to determine energy, water and wastewater efficiency opportunities that could enable the Town of Roblin to reduce operating costs, conserve resources and reduce greenhouse gas emissions. All fourteen buildings in the Town of Roblin were analyzed and the results are presented in separate sections throughout this report. The water and wastewater systems are discussed in Section 19.

1.3 METHODOLOGY

The buildings were toured on February 21 and 22, 2006 by Mr. Ray Bodnar, and October 25,2005 by Mr. Tibor Takach, both of KGS Group Engineering Consultants. These tours involved a walkthrough of each of the buildings to determine the current condition of the building's envelope (walls, roof, windows, and doors), lighting, water fixtures, heating, ventilation and air conditioning (HVAC) systems, and motors.

During the building tours, the auditors met with the Town of Roblin's Chief Administrative Officer Marna Bulbuck to discuss the study objectives for identifying energy, water and wastewater saving opportunities and to provide information on existing incentive programs.

While auditing the buildings, whenever possible, on-site training was done to inform the staff on energy and/or water saving opportunities in specific buildings and to point out maintenance issues where applicable.

Using the information collected during the audit, available drawings of the buildings, historical weather data, and the hydro bills from the past 12 months, calculations were performed to determine how each of the buildings are consuming energy and water. Several assumptions were made throughout these calculations including occupancies, room temperatures and envelope conditions (see Inventory Sheets in Appendix A). When no drawings were available, wall/roof R-values were assumed based on discussions with site personnel or based on knowledge of other buildings of similar type/age to the building surveyed.

Energy Saving Opportunities (ESOs) were developed for each building and are presented in tables throughout this report showing energy savings, cost savings, installation costs and simple payback periods. Simple Payback periods are calculated as the total installation cost divided by the annual cost savings. The installation costs include the material costs, both with and without incentives (see Appendix D for list of Manitoba Hydro incentives), and the labour costs for the installation using standard contractor rates. The total energy savings, the percent energy savings and the associated costs are presented at the end of each ESO table. It should be noted that the energy savings and material cost estimates are preliminary. For complex measures such as major building envelope upgrades, a more detailed investigation would be required to confirm capital and installation costs for this system.

An environmental benefit that results from reducing energy consumption is a reduction in carbon dioxide, CO_2 emissions. Carbon dioxide is a greenhouse gas and thus contributes to global warming. Although over 95% of Manitoba's electricity is produced by hydropower, which emits very little CO_2, some of the electrical generating stations in Canada and the United States burn fossil fuels and emit large quantities of CO_2 into the atmosphere. By reducing the electrical energy consumption here in Manitoba, more of Manitoba Hydro's clean hydropower is available for offsetting the fossil-fuelled electrical generating stations. At the bottom of each ESO table, the total CO_2 reduction resulting from the energy savings is shown. This was calculated using a CO_2 emissions calculator produced by Natural Resources Canada.

Many of the ESOs have low installed costs and payback periods of less than three years. Once the implementation phase begins, these ESOs are the most attractive measures. However, in order to maximize long-term savings and efficiencies for the buildings, implementation of the more capital-intensive measures with the longer payback periods are necessary. These items will become more attractive as energy costs increase in the future. It is recommended that the savings associated with the short payback ESOs be reinvested annually as a means to help finance the more expensive options.

Water Saving Opportunities (WSOs) are also presented in this report. The WSOs include installing water efficient sinks, toilets, urinals and showers. The buildings are all metered off the Town's supply. Savings are shown as percentages of the current fixtures water consumption, water savings in litres/year, cost savings and associated paybacks.

The water and wastewater systems in the Town of Roblin were analyzed and are discussed in Section 19 of this report. In addition to an overview of the water and wastewater systems, several recommendations are made to help the Town monitor water consumption and losses and reduce operating costs.

2.0 LARGE ARENA

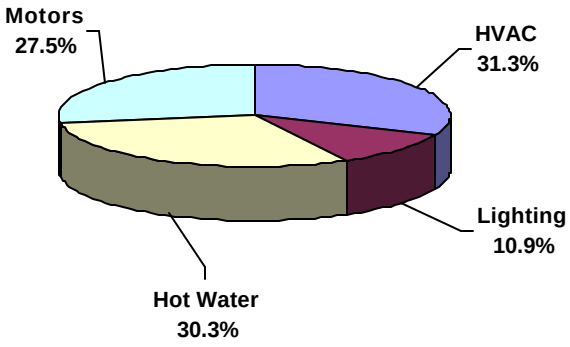
2.1 BACKGROUND

Constructed in 1970, the Roblin Large Arena is a 3,835 square meter building that houses an ice rink, waiting and concession area and a kid's rink. The kid's rink, called the Small Arena, is now strictly used as storage for the Large Arena. Since this area forms part of the main building, it has been combined with the Large Arena for the audit. The rink area is un-insulated and the heated portion of the building has a fibreglass ceiling of R-10 value. The building is heated using electric and gas unit heaters and radiant heaters. The facility is occupied for eight months of the year for approximately 45 hours per week, including two months during the summer season.

Photo 1 - Arena

In the previous year, the Arena consumed 331,062 kWh of electricity and 48,250 kWh of natural gas, costing $16,268 and $2,056 respectively. Table B.1.2 in Appendix A shows the monthly consumption of electric energy and natural gas. The following pie chart shows the breakdown for energy consumption for the Arena.

Energy Breakdown (% of Total kWh) for the Arena



The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. From this, the total annual hot water consumption was then established.

There are seven toilets, five urinals, six sinks and four showers in the building. In addition, a large portion of the annual water consumption is used to flood the rink. Based on the current water fixtures, calculations were made to determine the percent reduction in water consumption when replacing these high flow fixtures with new water efficient fixtures.

2.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 1 and 2 show a summary of both the energy and water saving opportunities for the Arena. The following assumptions were made in determining the annual savings:

- The Arena is occupied for 45 hours a week for 8 months of the year.
- The temperature of lobby area is maintained at 21°C (70°F) and the rink area is at -6°C (21°F).
- For the purpose of water consumption, the typical occupancy of the Arena is taken as 200.

Table 1 Energy Saving Opportunities for the Arena

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace incandescents with compact fluorescents	14	$15	$10	$13	$439	$359	2,020	$121	3.6	3.0
Replace 8' T12s with 8' T8s - basement and reception area (2x8') - when burnt out.	104	$47	$12	$0	$5,608	$1,458	9,865	$592	9.5	2.5
Replace 4' T12s with 4' T8s (2x4') in basement when burnt out.	18	$41	$21	$0	$845	$435	537	$32	26.2	13.5
Lighting Subtotal					**$6,892**	**$2,252**	**12,422**	**$746**		
ENVELOPE										
Replace single pane windows (96"x48") with triple pane windows c/w caulking.	7	$1,150	$912	$100	$9,975	$8,076	19,472	$1,169	8.5	6.9
Replace double pane windows (40"x46") with triple pane windows c/w caulking.	4	$110	$86	$100	$958	$848	2,999	$137	7.0	6.2
Weather strip & caulk pedestrian doors.	2	$15	$15	$50	$148	$148	2,872	$131	1.1	1.1
Weather strip & caulk pedestrian doors from reception to rink area.	8	$15	$15	$50	$593	$593	11,487	$525	1.1	1.1
Upgrade ceiling insulation in heated area.	1	$4,320	$2,935	$4,320	$9,850	$8,271	33,630	$2,019	4.9	4.1
Envelope Subtotal					**$21,523**	**$17,936**	**70,459**	**$3,981**		
OPERATIONAL										
Dumping zamboni ice outside rather then heating it inside in the pit.	N/A	$0	$0	$0	$0	$0	111,978	$6,723	0	0
Operational Subtotal							**111,978**	**$6,723**		
HVAC										
Install motorized damper in ice plant room.	1	$300	$300	$300	$684	$684	8,407	$505	1.4	1.4
Install outdoor thermostat to control rink ventilation	1	$600	$600	$600	$1,368	$1,368	13,965	$838	1.6	1.6
Install setback thermostat wired to an occupancy sensor set to 15C (59F)	1	$300	$300	$300	$684	$684	10,292	$618	1.1	1.1
Install countdown timer for greasehood exhaust fan.	1	$60	$60	$125	$211	$211	3,782	$227	0.9	0.9
HVAC Subtotal					**$2,947**	**$2,947**	**36,447**	**$2,188**		

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
HOT WATER										
Insulate 100ft of copper piping on HWTs.	1	$250	$250	$250	$570	$570	2,438	$146	3.9	3.9
Install water efficient metering faucets.	6	$309	$309	$150	$3,140	$3,140	5,023	$363	8.6	8.6
Install water efficient showers.	4	$21	$21	$50	$324	$324	6,789	$491	0.7	0.7
Replace boiler with high efficiency boiler.	1	$2,341	$2,341	$0	$2,669	$2,669	4,631	$212	12.6	12.6
Water Subtotal					**$6,702**	**$6,702**	**18,881**	**$1,213**		
MOTORS										
When replacing 100 HP ice plant motor, replace with a high efficiency motor.	1	$2,405	$2,405	$0	$2,742	$2,742	2738	$164	16.7	16.7
When replacing 20 HP brine pump motor, replace with a high efficiency motor.	1	$470	$470	$0	$536	$536	329	$20	27.2	27.2
Motors Subtotal					**$3,278**	**$3,278**	**3,067**	**$184**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	379,312	$18,323	18.66
Estimated Annual Savings	253,254	$15,036	15.21
Percent Savings	67%	82%	82%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457$/kWh.

Table 2 Water Saving Opportunities for the Arena

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	6	$309	$150	$3,140	80%	134,028	$62
Install water efficient toilets.	7	$284	$150	$3,463	70%	703,245	$325
Install water efficient showers	4	$21	$50	$324	29%	181,162	$84
Install water efficient urinals	5	$344	$200	$3,101	45%	177,145	$82

* The total cost column includes 14% taxes.

2.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis summary for the Arena is shown in Appendix B, Table B.1.3. Replacing T12 fluorescents with T8, both the 8' and 4' units, would save over 10,000 kWh per year. Upgrading the 8' T12s has a short payback period of 2.5 years; where as replacing the 4' T12s has a longer payback of 13.5 years. Another lighting ESO would be to replace the interior incandescent lights with compact fluorescents. This would save over 2,000 kWh per year, with a payback of 3 years.

Envelope

Significant energy saving opportunities can be found in the building's envelope. Replacing the single pane and double pane windows, complete with new caulking, would save over 22,000 kWh per year with payback periods of less than 7 years. Adding new weather-stripping and caulking to the existing pedestrian doors would save nearly 15,000 kWh per year with a short payback period of just over one year. Upgrading the ceiling insulation over the heated portion of the building would save over 33,000 kWh per year with a payback of under 5 years. In total, ESOs for the building envelope would save over 70,400 kWh per year, nearly 19% of the current energy consumption. Table B.1.4 shows the details for these opportunities.

HVAC

Moderate ESOs in terms of the heating and ventilation system are available for the Arena. Installing an outdoor thermostat to control the rink areas ventilation would result in substantial energy savings of 13,965 kWh in less than two years. This thermostat would monitor outside temperatures. When temperatures are between –5°C and –15°C, ventilation fans within the arena are turned on, drawing in cool air from the outside into the rink area to make ice. This air will maintain the ice rink at the desired temperature, reducing the burden on the ice plant refrigeration systems, thus reducing energy consumption. Installing temperature setback on the indoor thermostat would save over 11,033 kWh of energy per year with a payback of one year. This would allow the temperature of the facility to be reduced to 15°C (59°F) when the building

is unoccupied. Other ESOs associated with the Arena's HVAC system include replacing the existing back draft damper with a motorized damper in the ice plant room and installing a count down timer on the grease fan in the canteen. With a countdown timer, the grease fan would automatically shut off after a specified duration, saving nearly 3,800 kWh of energy per year.

Water

Water savings for the Arena are shown above in Table 2. Savings are shown as annual savings in litres, in percentage and cost. Table B.1.5 in Appendix B shows the estimated water consumption results that were calculated based on typical water fixtures and estimations on the occupancy of the Arena. Replacing existing faucets and toilets with water efficient fixtures would result in an 80% and 70% water savings respectively. Upgrading the current showers and urinals to water efficient fixtures would produce a 29% and 45% water savings respectively. In addition, insulating the copper piping on the hot water tanks would reduce heat loss, saving over 2,400 kWh per year with a payback period under four years. Replacing the existing boiler with a high efficiency boiler would save over 4,600 kWh of energy a year, with a payback period of less than 13 years.

Operational

The ice rink is currently flooded three days each day the facility is in use. Presently, the zamboni-shaved ice is deposited in an indoor pit where it is melted into water. With the number of times the ice is flooded and shaved, it is assumed the pit is filled to maximum capacity three times a day. Melting it indoors generates high humidity levels inside the zamboni room, which can cause problems with equipment corrosion and mould development. By depositing the shaved ice outside a substantial amount of energy, nearly 112,000 kWh, would be saved per year, 30% of the current energy consumption. This saving opportunity has no labour or capital expense associated with it.

Motors

When replacing the ice plant motor and the brine pump motor, upgrading the existing units to high efficiency models would save over 3,000 kWh per year. The motors would only need to be replaced when the existing units are taken out of service, saving on extra labour expenses.

2.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Clean the infrared heater intakes that are currently plugged with dirt.
- Clean combustion air intakes to the gas radiant heaters, both in the reception area and in the Arena.
- When shaving ice, take the ice shavings outside to be melted as opposed to melting the shavings in a heated area of the building. This will eliminate the energy consumed to melt this ice.
- Natural ventilation of the rink in the winter, when the outdoor temperature is between –5°C and –15°C, energy is saved by reducing the run tie of the refrigeration equipment.
- Ensure that the water used for flooding is pure –salts lower the freezing point of water and air in the water acts like an insulation, making it harder for the brine in the slab to freeze the top layer of the ice.
- Keep the ice thin (1" thick). Excessive ice thickness increases the load on the compressor. Shaving the ice helps to reduce the ice thickness and removes concentrations of impurities.
- Maintain the brine at a specific gravity of 1.2 to 1.22 for optimum energy use and maintain the brine temperature as high as possible.
- Significant amounts of energy can be saved by recovering heat from the refrigeration equipment and using it for flood water heating, space heating, domestic water heating or ice melting.

For additional information, refer to the Manitoba Hydro "Guidelines for Operators of Manitoba's Rinks and Arenas", available for downloading at the following website:

http://www.hydro.mb.ca/power_smart_for_business/recreation_manitoba_rinks.pdf

Refer to section 16 for more information.

3.0 SWIMMING POOL OFFICE/CHANGEROOMS

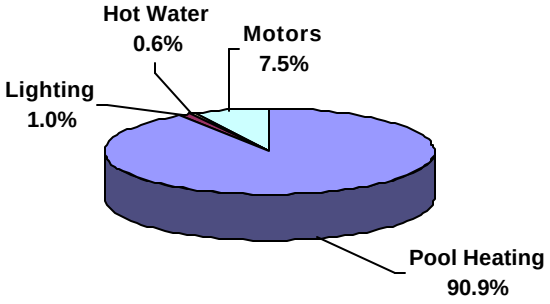
3.1 BACKGROUND

The Roblin Swimming Pool Office and Changeroom facility is a 206 square metre facility that was built in 1999. There are two outdoor pools, an adult pool and a kid's pool at this facility. The building has a 42 square metre mechanical room attached to it. The facility is open during the summer months, from June to the beginning of September for 10 hours a day, seven days a week.

Photo 2: Swimming Pool Office/Changerooms

For the previous year, the annual natural gas consumption for the Swimming Pool Office/Changerooms was 389,283 kWh at a cost of $16,257. The facility shares electric service with the Arena, using 3,800 kWh. The following pie chart shows the energy breakdown for the facility.

Energy Breakdown (% of Total kWh) for the Swimming Pool Office/Changerooms



The building is comprised of a reception area, changerooms for the pool and a mechanical room. The building has six each of toilets, sinks and showers along with two urinals. All are high flow water fixtures. Estimates were made on the frequency at which the fixtures were used. There is no space heating at this facility. Therefore all natural gas consumed is for pool heating.

3.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 3 and 4 show a summary of energy and water saving opportunities for the Swimming Pool Office/Changerooms. The following assumptions were made in the analysis:

- The Swimming Pool Office/Changerooms are occupied from June 1 until September 5, for 10 hours per day, seven days a week.
- The facility is unheated.
- There is a 42 square metre mechanical room attached to the facility that is included in the analysis.
- For the purpose of water consumption, the typical occupancy of the building is 10.
- The two pumps run for 24 hours, 7 days a week all summer.

Table 3 Energy Saving Opportunities for the Swimming Pool Office/Changerooms

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace 4' x 2 T12 fluorescents with T8 ballast and tubes when burnt out.	78	$41	$21	$0	$3,663	$1,884	2,413	$145	25.3	13.0
Replace incandescents with compact fluorescent lamps.	3	$15	$10	$13	$96	$79	303	$18	5.3	4.3
Lighting Subtotal					**$3,758**	**$1,963**	**2,716**	**$163**		
POOL HEATING										
Change current 1225 MBH gas boiler to a high efficiency unit	1	$3,000	$3,000	$0	$3,420	$3,420	25,010	$1,143	3.0	3.0
Install liquid pool covers.	3	$350	$350	$150	1,710	$1,710	70539	$3,224	0.5	0.5
Pool Heating Subtotal					**$5,130**	**$5,130**	**95,227**	**$4,352**		
HOT WATER										
Install water efficient showers	6	$21	$21	$50	$486	$486	1,615	$94	5.2	5.2
Water Subtotal					**$486**	**$486**	**1,615**	**$94**		
MOTORS										
When replacing 20HP pool skimmer pump motor, replace with a high efficiency motor.	1	$470	$470	$0	$536	$536	812	$37	14.4	14.4
Motors Subtotal					**$536**	**$536**	**812**	**$37**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	393,083	$16,444	70.0
Estimated Annual Savings	100,297	$4,626	17.6
Percent Savings	26%	28%	25%

* NI = Cost does not include incentives, WI = Cost includes incentives
* *The total cost column includes 14% taxes.
*** As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457$/kWh.

Table 4 Water Saving Opportunities for the Swimming Pool Office/Changerooms

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	6	$309	$150	$3,140	80%	3,822	$2
Install water efficient toilets.	6	$284	$150	$2,969	70%	21,089	$10
Install water efficient showers.	6	$21	$50	$486	29%	43,100	$20
Install water efficient urinals.	2	$344	$200	$1,240	45%	1,621	$1

* The total cost column includes 14% taxes.

3.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the existing 4' T12 fluorescent lights when they are burnt out with T8 lamps would save over 2,400 kWh per year. Another lighting ESO is to upgrade the indoor incandescent lights with compact fluorescent lamps. Replacing the current outdoor floodlights with high-pressure sodium lamps generates payback periods of well over 100 years. Therefore, this ESO was not included in Table 3. The lighting analysis summary table is shown in Appendix B, Table B.2.3.

Pool Heating

The greatest energy saving opportunity available for the Swimming Pool Office/Changerooms is with its pool heating system. Replacing the existing 1225 MBH gas pool boiler with a higher efficiency unit would save 24,688 kWh per year. Upgrading to a higher efficiency boiler would only increase the capital cost by $3,000, keeping the payback period to three years.

Another ESO under this component is to install pool covers to reduce evaporation losses. The specific type that has been chosen for this building is a liquid solar cover. Similar to conventional solar blankets, the purpose of liquid pool covers is to reduce evaporation. Each unit will cover 800 square feet of area for approximately one month. The liquid pool covers sink to the bottom of the pool and as the pressure increases they secrete a non-toxic chemical that forms a thin barrier on surface of the water, slowing the evaporation from the pool's surface,

reducing hourly evaporation. The chemical does not harm the pool's filtration system, chemical balance or human skin. For this particular pool, 1 liquid pool cover is needed per month for the 3 months the facility is open. Unlike solar blankets, these units are inexpensive and require no installation expense.

Water

The water analysis summary table for the Swimming Pool Office/Changerooms is shown in Table B.2.4 in Appendix B. Replacing the existing faucets and toilets with water efficient fixtures would save 80% and 70% of their respective current water consumption. Upgrading the showers and urinals would generate a 29% and 45% water consumption savings.

Motors

The facility has two pump motors that currently run for 24 hours, seven days a week for the thirteen weeks the building is operational. When it is time for replacement, upgrading the existing 20HP pool skimmer pump motor with a higher efficiency motor would save over 800 kWh per year. By waiting until replacement is required, increased capital cost would not be incurred, keeping the payback period below 15 years.

4.0 COMMUNITY CENTRE

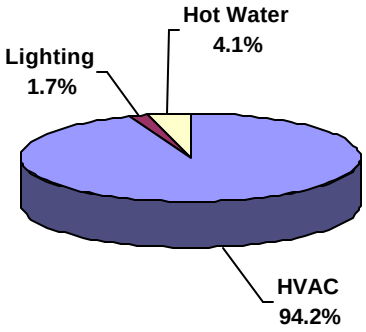
4.1 BACKGROUND

Constructed in 1995, the Community Centre is a 1,346 square metre building that is comprised of a hall, meeting rooms, kitchen, an office and washroom facilities. The meeting rooms are occupied for approximately 384 hours per year. The hall is occupied four times per month, 10 hours each session, all year long. Maximum occupancy of the meeting rooms are 80 and for the hall 600.

Photo 3 – Community Centre

The Community Centre has a metal clad exterior along with brickwork and a metal-sloped roof with a T-bar ceiling. It is a modern building, well maintained with good insulation and several energy and water saving features including: occupancy sensors to control lighting, low flow water fixtures and programmable thermostats. For the previous year, the building consumed 77,940 kWh of electric energy and 189,896 kWh of natural gas. The following pie chart illustrates the breakdown of energy use for the building.

Energy Breakdown (% of Total kWh) for the Community Centre



For the purpose of water consumption, estimates were made on the frequency at which the water fixtures are used.

4.2 ENERGY AND WATER SAVING OPPORTUNITIES

Table 5 shows the summary of energy efficiency improvement opportunities for the Community Centre. The following assumptions were made in the calculations:

- The Hall area is occupied four times a month, 10 hours each session, all year.
- The Meeting Rooms are occupied for approximately 384 hours per year.
- All existing lighting is already of energy efficient types and upgrades were not required.
- All water fixtures in the building are already low flow fixtures. Therefore, upgrades were not necessary or included.
- For the purpose of water consumption, the typical occupancy of the Hall is 600 and for the Meeting Rooms 80.

Table 5 Energy Saving Opportunities for the Community Centre

Description	Qty	Installed Cost/Unit ($)			Total Cost ** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
HVAC										
Replace existing RTUs when worn out with high efficiency units c/w CO2 sensors.	6	$1,450	$1,045	$0	$9,918	$7,148	13,128	$788	12.6	9.1
HVAC Subtotal					**$9,918**	**$7,148**	**13,128**	**$788**		
HOT WATER										
Insulate 100 ft of copper piping on HWTs.	1	$250	$250	$250	$570	$570	2,438	$146	3.9	3.9
Water Subtotal					**$570**	**$570**	**2,438**	**$146**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	267,836	$13,328	36.4
Estimated Annual Savings	15,566	$935	0.46
Percent Savings	6%	7%	1%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005 the cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457$/kWh.

4.3 GENERAL RECOMMENDATIONS

HVAC

The only upgrade recommended for the Community Centre's HVAC component is to replace the existing roof top units with high efficiency units, complete with CO_2 sensors. By waiting until the current units require replacement, additional labour expenses would not be incurred, keeping the payback period just over nine years. This ESO would generate a 13,128 kWh savings per year.

Water

As previously stated, all of the existing water fixtures in the Community Centre are low flow fixtures. Therefore, upgrades were not required. The only ESO for this section would be to

insulate the existing copper piping on the water tanks. This would reduce heat loss, saving over 2,400 kWh of energy per year with a payback of less than 4 years.

Other

There are limited energy saving opportunities for the Community Centre for the following reason:

- All existing water fixtures are low flow fixtures;
- All existing lighting are energy efficient units;
- Wall and roof insulation are already at R20 and R40 respectively, requiring no upgrades and
- Programmable thermostats with setback features are already in place and in use.
- Existing weather-stripping and caulking on doors and windows are in good condition.

4.4 OPERATION AND MAINTENANCE

The Community Centre has an existing maintenance contract where the facility is serviced four times per year.

5.0 LIBRARY

5.1 BACKGROUND

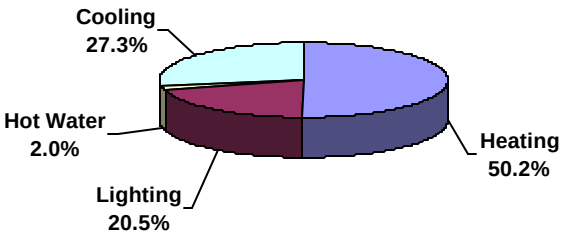
The Library and Town Administration Building share the same facility. However, each area has their own energy meters and bills, operating hours and energy consumption. For the purpose of this audit, we are analyzing the areas separately.

The entire facility was constructed in 1984 with the Library portion occupying 234 square metres in area. On average, the Library is occupied for 16 hours a week all year long. The building is constructed of masonry exterior with a drywall interior with good insulation and is metal clad on the rear and lateral sides. In addition, the roof of the building is metal with an R35 insulation value.

Photo 4: Library

For the previous year, the Library consumed 25,110 kWh of electricity and 27,437 kWh of natural gas. Total costs were $1,915 and $1,246 respectively. The following pie chart shows the breakdown of energy consumption for the Library.

Energy Breakdown (% of Total kWh) for the Library



The Library has four sinks, three toilets and one urinal, all high flow water fixtures. Water is supplied by a metered system off the town's system and assumptions were made on the frequency with the water fixtures are used.

5.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 6 and 7 show summaries of the energy and water saving opportunities for the Library. The following assumptions were made in the calculations:

- The Library is occupied for 16 hours per week, for 832 hour on an annual basis.
- The temperature of the Library is maintained at 21°C (70°F).
- For the purpose of water consumption, typical occupancy of the area is 4.
- The proposed heat recovery ventilator (HRV) is to be shared between the Library and Town Administration areas.
- The parking lot controllers are used for 8 hours a day, 60 days of the year.

Table 6 Energy Saving Opportunities for the Library

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace 4'T12s with 4'T8s (42x4) when burnt out.	168	$32	$12	$0	$6,201	$2,371	2,726	$164	37.9	14.5
Replace EXIT incandescent lamps with LED modules.	2	$50	$5	$80	$296	$194	473	$28	10.4	6.8
Install Parking Lot Controller	3	$100	$75	$150	$855	$770	1,440	$86	9.9	8.9
Lighting Subtotal					**$7,353**	**$3,334**	**4,639**	**$279**		
ENVELOPE										
Weather strip & caulk pedestrian door.	1	$15	$15	$50	$74	$74	1,773	$81	0.9	0.9
Envelope Subtotal					**$74**	**$74**	**1,773**	**$81**		
HVAC										
Install HRV (200cfm) unit – shared with office.	1	$475	$475	$500	$1,112	$1,112	1,051	$48	23.1	23.1
Install setback thermostat set to 15°C (59°F)	1	$300	$300	$300	$684	$684	3,581	$215	3.2	3.2
Replace furnace with high efficiency furnace	1	$3,200	$2,955	$1,000	$4,788	$4,509	8,968	$410	11.7	11.0
Replace existing air-conditioning unit with a high efficiency unit.	1	$2,500	$2,200	$1,000	$3,990	$3,648	5,025	$302	11.6	10.6
HVAC Subtotal					**$10,574**	**$9,952**	**18,624**	**$975**		
HOT WATER										
Replace HWT with instantaneous water heater.****	1	$300	$300	$400	$798	$798	973	$44	18.0	18.0
Water Subtotal					**$798**	**$798**	**973**	**$44**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	52,547	$3,162	5.7
Estimated Annual Savings	26,008	$1,379	2.7
Percent Savings	49%	44%	47%

* NI = Cost does not include incentives, WI = Cost includes incentives
* *The total cost column includes 14% taxes.
*** As of April 2005 the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and 0.0457$/kWh for natural gas.
**** Discounted to include the cost of replacement tank in 10 years.

Table 7 Water Saving Opportunities for the Library

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	4	$309	$150	$2,093	80%	1,864	$1
Install water efficient toilets.	3	$284	$150	$1,484	70%	7,713	$4
Install water efficient urinals	1	$344	$200	$620	45%	3,557	$2

* The total cost column includes 14% taxes

5.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the EXIT incandescent lights with LED modules would save nearly 500 kWh per year, reducing their current energy consumption by over 80%. Upgrading the existing T12 lamps to T8s when they are burnt out would save over 2,700 kWh of electric energy. Payback periods associated with these two ESOs are 6.8 and 14.5 years respectively. Installing parking lot controllers would save close to 1,500 kWh of energy a year. Energy saving opportunities were not feasible for the existing outdoor floodlights. Upgrading these lamps to high-pressure sodium lamps generated a payback period over 100 years, an unrealistic length of time. Therefore, this ESO was not included in Table 6.

Envelope

Adding new weather stripping and caulking to the existing pedestrian door would save over 1,700 kWh per year with a payback period of less than one year. The current wall and roof insulation are sufficient and any windows in the building are already triple pane fixtures. Therefore, no other ESOs were available for the Library's building envelope.

HVAC

Significant ESOs are available in the HVAC component of the Library. Installing a setback feature on the existing thermostat would save over 3,500 kWh per year, nearly 7% of the current

energy consumption. This feature would program the temperature of the building to be lowered to 15°C (59°F) during unoccupied times and to be maintained at 21°C (70°F) during occupancy.

Replacing the current furnace with a higher efficiency model is a significant ESO, saving nearly 9,000 kWh per year with a payback period of 11 years.

Other energy saving opportunities for the Library's HVAC include replacing the existing air conditioning unit with a high efficiency unit and to install an HRV. Total energy savings for this component of the building are 18,624 kWh per year, 35% of the annual energy consumption.

Water

Table 4.5A in Appendix B shows the results from the Library's water usage. Replacing the existing faucets, toilets and urinal with low flow fixtures would save over 68% of the current water consumption. Replacing the existing hot water tank with an instantaneous water heater would save over 970 kWh per year. The payback period associated with this ESO is 18 years.

5.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Clean the dirty furnace filter.
- Until setbacks are installed on the thermostats, the temperature should be manually reduced when the area is unoccupied.

Refer to section 16 for more information.

6.0 TOWN ADMINISTRATION BUILDING

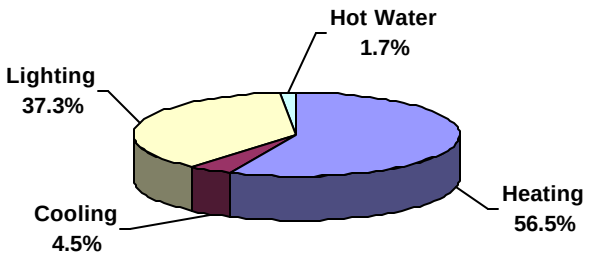
6.1 BACKGROUND

The Town Administration Building is 368 square metres in area and is housed in the same building as the Library. The office is occupied from Monday to Friday for 8 hours each day, all year long. As previously stated, the two areas have separate energy consumptions meters and billings.

Photo 5: Town Administration Building

For the previous year, the Town Administration Building consumed 29,940 kWh of electric energy and 41,802 kWh of natural gas. The following pie chart shows how the energy is utilized.

Energy Breakdown (% of Total kWh) for the Town Administration Building



The Town Administration Office Building has two toilets and two faucets, all high flow fixtures. To estimate water saving opportunities, assumptions were made on the frequency of use of these fixtures.

6.2 ENERGY SAVING OPPORTUNITIES

Tables 8 and 9 show summaries of the energy saving opportunities and water saving opportunities for the Town Administration Building. The following assumptions were made in the calculations:

- The office is occupied for 40 hours a week, 2080 hours per year.
- The temperature is maintained at 21°C (70°F).
- Both electric energy and natural gas are consumed.
- The current air conditioning unit is assumed to be at 8 SEER rating.
- For the purpose of water consumption, typical occupancy of the Town Administration Office is assumed to be 5.

Table 8 Energy Saving Opportunities for the Town Administration Building

Description	Qty	Installed Cost/Unit ($)			Total Cost ** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace 4'T12s with 4'T8s when burnt out (42x4).	252	$32	$12	$0	$9,302	$3,557	10,221	$614	15.2	5.8
Replace EXIT incandescent lamps with LED modules.	4	$50	$5	$80	$593	$388	946	$57	10.4	6.8
Lighting Subtotal					**$9,895**	**$3,944**	**11,167**	**$670**		
ENVELOPE										
Weather strip & caulk pedestrian door.	1	$15	$15	$50	$74	$74	1,773	$81	0.9	0.9
Envelope Subtotal					**$74**	**$74**	**1,773**	**$81**		
HVAC										
Install HRV (200cfm) unit – shared with library.	1	$475	$475	$500	$1,112	$1,112	1,051	$48	23.1	23.1
Install setback thermostat set to 15°C (59°F)	1	$300	$300	$300	$684	$684	4,640	$279	2.5	2.5
Replace furnace with high efficiency furnace	1	$3,200	$2,955	$1,000	$4,788	$4,509	13,792	$630	7.6	7.2
HVAC Subtotal					**$6,584**	**$6,304**	**19,483**	**$957**		
HOT WATER										
Replace HWT with instantaneous water heater. ****	1	$300	$300	$400	$798	$798	973	$44	18.0	18.0
Water Subtotal					**$798**	**$798**	**973**	**$44**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	71,742	$4,116	8.4
Estimated Annual Savings	33,395	$1,753	3.6
Percent Savings	47%	43%	43%

* NI = Cost does not include incentives, WI = Cost includes incentives
* *The total cost column includes 14% taxes.
*** As of April 2005 the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and 0.0457$/kWh for natural gas.
**** Discounted to include the cost of replacement tank in 10 years.

Table 9 Water Saving Opportunities for the Town Administration Building

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	2	$309	$150	$1,047	80%	5,658	$3
Install water efficient toilets.	2	$284	$150	$990	70%	26,512	$12

* The total cost column includes 14% taxes.

6.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the existing 4' T12s with T8s would generate over 10,200 kWh of savings per year, over 14% of the current energy consumption. By waiting to upgrade the lighting until the current units are burnt out, the payback period is kept under 6 years. The only other ESO for the office's lighting component would be to replace the incandescent EXIT lights with LED modules. This would reduce energy consumption to 10% of the current use. The lighting analysis summary for the Town Administration Office Building is found in Appendix B, Table B.4.3B.

Envelope

The only ESO available for the Office's envelope would be to install new weather stripping and caulking on the existing pedestrian door. Over 1,770 kWh would be saved in less than one year by this ESO. Table 4.4B in Appendix B show the details behind this ESO.

HVAC

Similar to the Library, the Office area has the greatest amount of ESOs in its HVAC component. Installing a setback feature on its thermostat would save over 4,600 kWh of energy per year, with a short payback period of 2.5 years. Replacing the existing furnace with a higher efficiency furnace generates nearly 14,000 kWh of savings per year, 19% of the current energy consumption, with an associated payback period of just over seven years. A longer payback period ESO is to install an HRV that would be shared with the Library area. In total, over 19,400

kWh of energy could be saved by these options. This translates into a 27% savings of energy consumption in just the HVAC component.

Water

Table 4.5B in Appendix B shows the current water usage in the Town Administration Office. Replacing the hot water tank with an instantaneous water heater would save 973 kWh of energy per year with a payback period of 18 years. Upgrading the existing fixtures with low flow fixtures would reduce water consumption by 80% for faucets to 70% for toilets.

7.0 RECYCLING DEPOT

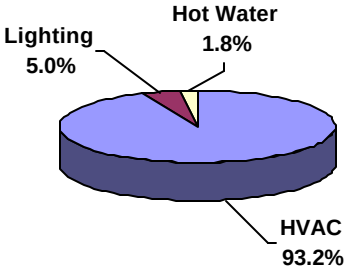
7.1 BACKGROUND

The Recycling Depot is a 5,032 square foot facility that contains the recycling office and food bank, a storage area and a town shop storage area. The latter area was added to the facility in 1980, approximately 20 years after the original structure was built. The recycling area is occupied for fours a day, from Monday to Friday, where as the Town Shop is used intermittently.

Photo 6: Recycling Depot

In the previous year, the Recycling Depot used 690 kWh of electric energy and 130,768 kWh of natural gas. The following pie chart shows how the facility consumes the energy.

Energy Breakdown (% of Total kWh) for the Recycling Depot



The facility has one toilet and one sink, which are low flow fixtures. Estimates were made on the frequency of use of these fixtures.

7.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 110 shows the energy saving opportunities for the Recycling Depot. The following assumptions were made in the analysis:

- The Recycling Depot is occupied for 20 hours per week all year.
- The Town Shop area is occupied intermittently
- For the purpose of water consumption, typical occupancy of the Recycling Depot is assumed to be 4.
- The existing toilet and sink fixtures are already low flow fixtures and do not require upgrades.

Table 10 Energy Saving Opportunities for the Recycling Depot

Description	Qty	Installed Cost/Unit ($)			Total Cost ** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Recycling Depot										
Replace 4' T12s to 4' T8s when burnt out (1x6).	6	$41	$21	$0	$282	$145	112	$7	41.8	21.5
Replace 8' T12s with 8' T8s when burnt out (2x19).	38	$47	$12	$0	$2,049	$533	2,262	$136	15.1	3.9
Town Shop										
Replace 8' T12s with 8' T8s when burnt out (2x18).	36	$47	$12	$0	$1,941	$505	1,071	$64	30.2	7.8
Lighting Subtotal					**$4,272**	**$1,183**	**3,445**	**$207**		
ENVELOPE										
Weather strip pedestrian doors	3	$15	$15	$50	$222	$222	7,090	$324	0.7	0.7
Replace and weather strip vehicle door	1	$530	$530	$100	$718	$718	8,470	$387	1.9	1.9
Replace 60"x60" double pane window with triple pane + caulk.	1	$820	$774	$100	$1,049	$996	1,550	$71	14.8	14.1
Upgrade 46"x56" double pane windows with triple pane + caulk.	7	$505	$472	$100	$4,828	$4,565	8,311	$380	12.7	12.0
Upgrade roof insulation.	1	$7,925	$7,347	$7,925	$18,070	$17,410	28,211	$1,289	14.0	13.5
Envelope Subtotal					**$24,887**	**$23,912**	**53,632**	**$2,451**		
HVAC										
Replace BDD with motorized damper.	1	$300	$300	$300	$684	$684	10,377	$474	1.4	1.4
Replace furnace and unit heaters with high efficiency furnaces.	4	$2,500	$2,255	$500	$13,680	$12,563	12,255	$560	24.4	22.4
Install setback thermostat (10°C) in the Town Shop Office.	1	$300	$300	$300	$684	$684	11,152	$510	1.3	1.3
Install setback thermostat (15°C) in Recycling Depot.	1	$300	$300	$300	$684	$684	7,104	$325	2.1	2.1
HVAC Subtotal					**$15,732**	**$14,615**	**40,889**	**$1,869**		
HOT WATER										
Install instantaneous water heater ****	1	$300	$300	$400	$798	$798	1,113	$67	11.9	11.9
Insulate 50ft of copper piping on HWT.	1	$125	$125	$125	$285	$285	1,219	$73	3.9	3.9
Water Subtotal					**$1,083**	**$1,083**	**2,332**	**$140**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	131,458	$5,678	23.50
Estimated Annual Savings	100,298	$4,666	10.19
Percent Savings	76%	82%	43%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005 the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).
**** Discounted to include the cost of replacement water tank in 10 years.

7.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the 8' T12s in both the recycling area and in the town shop with T8s would save over 3,200 kWh per year. By waiting to replace the existing lights until they are burnt out, the payback period are kept to a reasonable length. The other lighting ESO available for the facility is to upgrade the 4' T12s with T8s when it is time for replacement. The lighting analysis summary can be found in Table B.6.3 in Appendix B.

Envelope

Significant ESOs are available with the building's envelope, all under a 15-year payback period. Weather-stripping and caulking the existing pedestrian doors saves over 7,000 kWh a year. With a very short payback period of less than one year and minimal capital expense, this ESO is a feasible option that should not be overlooked. Another ESO with a short payback period is replacing the existing vehicle door, complete with new weather stripping. This option would save over 8,400 kWh per year, with a payback of under two years. Longer payback options include upgrading the existing eight double pane windows with triple pane windows, complete with new caulking and upgrading the existing roof insulation from R-24 to R-40 by adding 4" of batt insulation. These ESOs have payback periods ranging from 12 to 14.1 years. Total savings for the building's envelope are over 53,600 kWh per year, nearly 41% of the current energy consumption.

HVAC

The temperature in the Town Shop area is currently maintained at 20°C (68°F). By installing a setback thermostat in the area, the temperature could be set to 10°C (50°F) during the unoccupied times. This area is infrequently used; therefore lowering the temperature to 10°C would be practicable, saving over 11,100 kWh per year. Since there is regular occupancy of the recycling area, installing a setback thermostat that lowers the temperature to 15°C (59°F) during unoccupied times would save over 7,100 kWh per year. By lowering this area to 15°C rather then 10°C, it would be ensure that the area would be able to warm up to 21°C in a sufficient period of time during occupancy.

Other energy saving opportunities includes replacing the existing back draft damper with a motorized insulated damper and upgrading the existing furnaces and unit heaters with high efficiency furnaces. Together, these ESOs would save nearly 41,000 kWh a year.

Water

The existing water fixtures in the Recycling Depot are already low flow fixtures and do not require upgrading. Table 5.5 in Appendix B shows the current water usage in the Recycling Depot. The only ESOs for this section would be to install an instantaneous hot water heater and to insulate the piping for the tanks. Over 2,300 kWh of energy would be saved by these opportunities with paybacks of 11.9 and 3.9 years respectively.

7.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Until setbacks are installed on the thermostats, the temperature should be reduced when the area is unoccupied. Temperature should be lowered to 10°C (50°F) in the shop area and to 15°C (59°F) in the recycling area.
- Ceiling fans should be run continuously in the winter to reduce heat loss.

Refer to section 16 for more information.

8.0 FIRE HALL

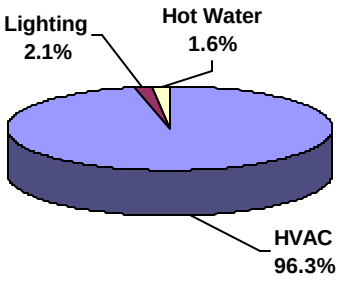
8.1 BACKGROUND

The Roblin Fire Hall is a 446 square metre building that consists of truck bays, an office and a meeting room. The building has a metal clad exterior and interior. The facility is occupied for approximately 8 hours a week, all year. There have been no renovations to the Fire Hall since its original construction in 1978.

Photo 7: Fire Hall

The Fire Hall uses both electric energy and natural gas. In the previous year 31,000 kWh of electric energy and 131,897 kWh of natural gas were consumed by the facility. Costs associated with these energies were $2,307 and $5,269 respectively. The following pie chart shows the percentage of energy consumption used for heating, lighting and hot water in the Fire Hall.

Energy Breakdown (% of Total kWh) for the Fire Hall



The Fire Hall has two toilets and one urinal, all low flow fixtures. In addition, there are two high flow sinks and one leaky faucet in the janitor's room. Hot water consumption by the fixtures was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. From this, total annual hot water consumption was established.

8.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 11 and 12 show the energy and water saving opportunities for the Fire Hall. The following assumptions were made in the analysis:

- The Fire Hall is occupied for approximately 8 hours per week year round.
- The exit sign is on for 24 hours a day, 365 day of the year.
- For the purpose of water consumption, typical occupancy is 12 in the office.
- The temperature of the building is maintained at 20°C (68°F).

Table 11 Energy Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamp with LED module.	1	$50	$5	$80	$148	$97	237	$14	10.4	6.8
Lighting Subtotal					**$148**	**$97**	**237**	**$14**		
ENVELOPE										
Replace weather stripping & caulking for vehicle doors (14'x12')	3	$30	$30	$100	$445	$445	13,826	$632	0.7	0.7
Replace 70"x36" double pane windows in meeting room to triple pane windows.	2	$900	$867	$100	$2,280	$2,205	1,144	$52	43.6	42.2
Replace 60"x60" double pane window to triple pane window.	1	$815	$769	$100	$1,043	$991	841	$38	27.1	25.8
Envelope Subtotal					**$3,768**	**$3,640**	**15,811**	**$723**		
HVAC										
Install heat pump (geothermal)[1]	1	$31,140	$22,914	$0	$35,500	$26,121	114,537	$6,877	5.2	3.8
Replace BDD with motorized damper.	1	$300	$300	$300	$684	$684	10,377	$474	1.4	1.4
Install programmable thermostat wired with an occupancy sensor. Setback temperature to 15°C (59°F)	2	$300	$300	$300	$1,368	$1,368	15,693	$942	1.5	1.5
Replace gas unit heaters with high efficiency furnaces.	3	$2,500	$2,500	$500	$10,260	$10,260	23,535	$1,076	9.5	9.5
HVAC Subtotal					**$10,602**	**$9,764**	**49,605**	**$2,492**		
HOT WATER										
Install instantaneous hot water heater. ****	1	$300	$300	$400	$798	$798	1,194	$72	11.1	11.1
Insulate 50ft of copper piping on HWT.	1	$125	$125	$125	$285	$285	1,219	$73	3.9	3.9
Water Subtotal					**$1,083**	**$1,083**	**2,413**	**$145**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	162,897	$7,575	24.61
Estimated Annual Savings	68,066	$3,373	9.48
Percent Savings	42%	45%	39%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and 0.0457$/kWh for natural gas.
**** Discounted to include the cost of replacement water tank in 10 years.
[1] Geothermal energy savings were not added in the totals. Either geothermal installation or replacement of the existing gas unit heaters with higher efficiency unit heaters could be implemented. Both ESOs are not possible.

Table 12 Water Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	2	$309	$150	$1,047	80%	3,195	$1

* The total cost column includes 14% taxes.

8.3 GENERAL RECOMMENDATIONS

Lighting

The only feasible ESO available with the Fire Hall's lighting is replacing the existing incandescent EXIT lamp with an LED module. This reduces the energy consumption to 10% of the current usage. Upgrading the 4' T12 fluorescents to T8 was examined. However, very long payback periods over 100 years would occur with this ESO, deeming it unrealistic. Therefore, it was not included in Table 11. Table 6.3 in Appendix B has the lighting analysis summary for the Fire Hall.

Envelope

There are three vehicle doors that are each 14' x 12' in size. A large amount of heat is currently being lost through the cracks around these doors. From Table 11 it can be seen that replacing the weather-stripping around the doors would result in large annual energy savings of 13,826 kWh with a payback period of less than one year. Replacing the three double pane windows

with triple pane windows would save nearly 2,000 kWh annually. However, long payback periods are associated with these ESOs due to the higher capital costs.

HVAC

Over 30% of the current energy consumption could be saved by energy saving opportunities applied to the Fire Hall's HVAC system alone. Replacing the existing thermostat with a programmable thermostat complete with an occupancy sensor and setting the temperature back to 15°C (59°F) when the Fire Hall is unoccupied would save nearly 16,000 kWh of heat in a typical year. Other ESOs include replacing the existing back draft damper with a motorized damper and replacing the gas unit heaters with high efficiency furnaces. Payback periods associated with these ESOs range from 1.4 to 9.5 years. Nearly 50,000 kWh of energy could be saved with these ESOs.

A geothermal heating system was also investigated for this facility. The existing unit heaters would be replaced with a water-to-air heat pump connected to a closed loop ground water system. A geothermal heat pump is one of the most energy efficient and environmentally friendly electric heating and cooling systems available. The cost of installing this system with would be approximately $26,000 with over $6,800 savings in annual heating costs, which translates into an energy consumption savings of 114,537. This would result in a payback period of less than 4 years.

Water

The Fire Hall already has low flow toilets and urinal. However, the existing sinks are high flow fixtures. As shown in Table 13, replacing these sinks with low flow fixtures would reduce water consumption by 80%. Installing an instantaneous water heater and adding insulation to the copper piping would produce over 2,400 kWh of energy savings per year. With payback periods of 11.1 and 3.9 years, these ESOs are feasible.

8.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Until setbacks are installed on the thermostats, the temperature should be reduced to 15°C (59°F) when the vehicle area is unoccupied.
- Leaky faucet in the janitor's room should be repaired.

Refer to section 16 for more information.

9.0 PUBLIC WORKS SHOP

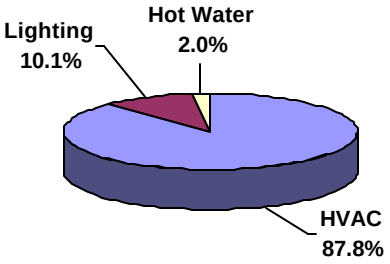
9.1 BACKGROUND

Built in 1962, the Public Works Shop is a 301 square metre metal clad building. The facility is occupied for approximately 50.5 hours per week, year round. The building has a heavy vehicle storage area and a workshop. No renovations have been made to the facility since its original construction. Insulation levels in the building are below current standards at R-12 and R-20 for the walls and roof respectively.

Photo 8: Public Works Shop

In the previous year, the Public Works Shop consumed 20,860 kWh of electricity and 117,645 kWh of natural gas. The respective energy costs were $1,617 and $4,893. The following pie chart shows the breakdown of energy consumption for this building.

Energy Breakdown (% of Total kWh) for the Public Works Shop



There is one faucet and one toilet in the building, both high flow fixtures. Assumptions were made on the occupancy of the building and the frequency at which these fixtures are used. From this, total annual hot water consumption was estimated.

9.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 13 and 14 show summaries of the energy and water efficiency improvement opportunities for the Public Works Shop. The following assumptions were made in the calculations:

- The Public Works Shop is occupied for approximately 8.5 hours per day, Monday to Friday and from 8am until noon on Saturdays and Sundays.
- For the purpose of water consumption, the typical occupancy of the Public Works Shop is 6 people.
- The building is maintained at 21°C (70°F).

Table 13 Energy Saving Opportunities for the Public Works Shop

Description	Qty	Installed Cost/Unit ($)			Total Cost ** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING & PARKING LOT CONTROLLERS										
Incandescants (100W) - convert to compact fluorescents	6	$15	$10	$13	$188	$154	1,134	$68	2.8	2.3
Convert indoor incandescent lamps (300W) to compact fluorescents	8	$20	$15	$13	$301	$255	5,147	$309	1.0	0.8
Maintenance Office - upgrade 8' T12s to 8' T8s when burnt out (6x2).	12	$47	$12	$0	$647	$168	945	$57	11.4	3.0
Install parking lot controller.	4	$100	$75	$150	$1,140	$1,026	1,920	$115	9.9	8.9
Lighting Subtotal					**$2,276**	**$1,604**	**9,147**	**$549**		
ENVELOPE										
Replace weather stripping & caulking for vehicle doors.	6	$30	$30	$100	$889	$889	25,526	$1,167	0.8	0.8
Replace weather-stripping & caulking on pedestrian doors.	2	$15	$15	$50	$148	$148	3,545	$162	0.9	0.9
Replace single pane window c/w weather stripping & caulking.	1	$390	$296	$100	$559	$451	1,531	$70	8.0	6.5
Replace double pane window c/w weather stripping & caulking.	1	$350	$333	$100	$513	$494	719	$33	15.6	15.0
Upgrade roof insulation	1	$9,720	$8,975	$2,500	$13,931	$13,081	7,785	$356	39.2	36.8
Envelope Subtotal					**$16,040**	**$15,064**	**39,105**	**$1,787**		
HVAC										
Replace BDD with motorized damper	1	$300	$300	$300	$684	$684	10,377	$474	1.4	1.4
Replace unit heater/furnace with high efficiency furnace.	2	$2,500	$2,255	$500	$6,840	$6,281	18,646	$852	8.0	7.4
Install setback thermostat set to 15°C (59°F)	2	$300	$300	$300	$1,368	$1,368	9,140	$549	2.5	2.5
HVAC Subtotal					**$8,892**	**$8,892**	**38,163**	**$1,875**		
HOT WATER										
Install water efficient metering faucet.	1	$309	$309	$150	$523	$523	378	$27	19.1	19.1
Replace HWT with an instantaneous water heater. ****	1	$300	$300	$400	$798	$798	1,113	$67	11.9	11.9
Insulate piping for HWT.	1	$125	$125	$125	$285	$285	1,219	$73	3.9	3.9
Hot Water Subtotal					**$1,606**	**$1,606**	**2,710**	**$167**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	138,505	$6,510	106.7
Estimated Annual Savings	88,523	$4,348	12.8
Percent Savings	64%	67%	12%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and 0.0457 $/kWh for natural gas.
**** Discounted to include the cost of replacement water tank in 10 years.

Table 14 Water Saving Opportunities for the Public Works Shop

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	1	$309	$150	$523	80%	10,084	$5
Install water efficient toilets.	1	$284	$150	$495	70%	18,257	$8

* The total cost column includes 14% taxes

9.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis summary table for the Public Works Shop is found in Appendix B as Table 7.3. The largest ESO in terms of lighting is converting the existing indoor incandescent lights to compact fluorescents. Over 6,000 kWh of energy would be saved by these upgrades, with paybacks of less then 2.5 years. Other energy saving opportunities includes replacing the existing 8' T12s in the maintenance office with T8s when burnt out and installing parking lot controllers.

Envelope

Energy saving opportunities within the building envelope produces the largest savings for this building. The single largest ESO is replacing the existing damaged weather stripping and caulking on the vehicle doors. Over 25,500 kWh of energy would be saved by this inexpensive option, with a payback period of less than one year. Installing new weather stripping and caulking on the pedestrian doors is another ESO with a payback period of less than one year.

This option would save over 3,500 kWh per year. Other energy saving opportunities for the Public Works Shop envelope are replacing the existing single and double pane windows with triple pane windows, complete with new weather stripping and caulking. Upgrades to the windows have moderate payback periods ranging from 6.5 to 15 years due to the higher capital cost associated with windows. The existing roof insulation is of R-20 value. Upgrading it to R-40 would save nearly 8,000 kWh of energy a year. However, this particular ESO has a significantly longer payback period of nearly 37 years and should be considered a long term saving opportunity.

HVAC

The Public Works Shop is presently maintained at 21°C (70°F). By installing a setback feature on the thermostats, the temperature would be lowered to 15°C (59°F) when it is unoccupied, saving over 9,100 kWh of energy a year. Replacing the existing leaky back draft damper with a motorized damper would save over 10,300 kWh of energy, with a payback period of less than 1.5 years. An ESO with a moderate payback period of 8 years is to upgrade the existing unit heater and furnace with high efficiency furnaces. Nearly 19,000 kWh of energy would be saved by this option, approximately 13% of the current energy consumption. The longer payback period is a result of the higher capital cost associated with this upgrade.

Water

The water analysis summary for this building is shown in Table B.7.5 in Appendix B. Replacing the existing high flow sink with a low flow fixture would save over 370 kWh of energy save over 80% of the annual water consumption for the current fixture. Other energy saving opportunities related to the Public Works Shop water component include installing an instantaneous hot water tank and insulating the existing copper piping to reduce heat loss. Over 2,700 kWh of energy could be saved in this sector of the facility.

9.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Clean or replace the dirty furnace filter. Filters should be cleaned on a regular basis.
- Lower temperature to 15°C (59°F) when the building is unoccupied until setback is installed.

Refer to section 16 for more information.

10.0 WATER TREATMENT PLANT

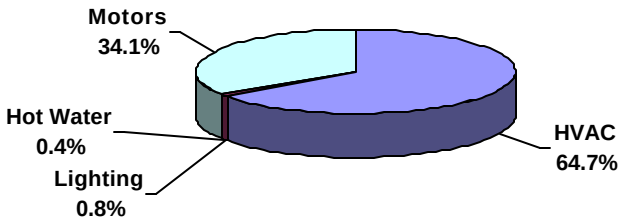
10.1 BACKGROUND

Built in 1959, the Water Treatment Plant is a 32'x37' building with a square open floor plan. The facility has an upper and lower level. A new roof was installed in 2005 and VFDs were installed on the distribution pumps, controlled by the Aquavar pump control system, in the recent past. The building is of concrete block construction with portions of architectural brick. The built up roof is composed of steel decking, tar and gravel. The plant is occupied for approximately 2 to 4 hours on a daily basis.

Photo 9: Water Treatment Plant

The total electricity consumption over the past year was 67,310 kWh at a cost of $5,065 and 200,774 kWh of natural gas at a cost of $8,172. The following pie chart displays the percentage of energy consumption used for heating, lighting and hot water and motors in the Water Treatment Plant.

Energy Breakdown (% of Total kWh) for the Water Treatment Plant



Except for one hot/cold water hose bib, the Water Treatment Plant has no plumbing fixtures.

10.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 15 shows a summary of the energy saving opportunities for the Water Treatment Plant. The following assumptions were made in the analysis:

- The Water Treatment Plant is occupied for 21 hours per week year round.
- The sodium and metal halide lighting are already energy efficient and do not require upgrading.
- The temperature is maintained at 25°C (77°F).
- There is no on site plumbing.

Table 15 Energy Saving Opportunities for the Water Treatment Plant

Description	Qty	Installed Cost/Unit ($)			Total Cost ** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace 4'T12s with 4'T8s (8x2) when burnt out.	16	$41	$21	$0	$751	$387	341	$20	36.7	18.9
Lighting Subtotal					**$751**	**$387**	**341**	**$20**		
ENVELOPE										
Weather-strip & caulk exterior pedestrian doors.	2	$15	$15	$50	$148	$148	3,545	$162	0.9	0.9
Seal and caulk windows.	2	$5	$5	$25	$68	$68	1,182	$54	1.3	1.3
Replace existing single pane window in upper level entrance with triple pane window.	1	$225	$197	$100	$371	$339	309	$14	26.2	23.9
Replace existing single pane window in lower level entrance with triple pane window.	1	$1,700	$1,472	$100	$2,052	$1,792	2,476	$113	18.1	15.8
Upgrade ceiling insulation.	1	$995	$995	$995	$2,268	$2,268	12,327	$563	4.0	4.0
Envelope Subtotal					**$4,907**	**$4,615**	**19,840**	**$907**		
HVAC										
Install setback thermostat set to 15°C (59°F)	1	$300	$300	$300	$684	$684	17,206	$1,033	0.7	0.7
Upgrade furnace to high efficiency furnace when time for replacement.	1	$6,040	$5,795	$0	$6,886	$6,606	14,975	$684	10.1	9.7
HVAC Subtotal					**$7,570**	**$7,290**	**32,181**	**$1,717**		
HOT WATER										
Replace HWT with instantaneous water heater.****	1	$300	$300	$400	$798	$798	977	$59	13.6	13.6
Water Subtotal					**$798**	**$798**	**977**	**$59**		
MOTORS										
When replacing 15 HP distribution pump motors, replace with high efficiency motors.	2	$377	$377	$0	$860	$860	2,352	$141	6.1	6.1
When replacing 5HP air scour blower motor, replace with a high efficiency motor.	1	$236	$236	$0	$269	$269	261	$16	17.1	17.1
Motors Subtotal					**$1,129**	**$1,129**	**2,613**	**$157**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	268,084	$13,237	38.05
Estimated Annual Savings	55,951	$2,860	6.88
Percent Savings	21%	22%	18%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website) and 0.0457 $/kWh for natural gas.
**** Discounted to include the cost of replacement water tank in 10 years.

10.3 GENERAL RECOMMENDATIONS

Lighting

As shown in the lighting analysis summary in Table 8.3 in Appendix B, the sodium and metal halide lamps are energy efficient lights and do not require any upgrades. The only energy saving opportunity for the lighting component of this building is to replace the existing 4' T12s lamps with 4' T8s when they are burnt out. By waiting to replace these components, payback periods are kept to a reasonable duration.

Envelope

Adding new weather stripping and caulking to the exterior pedestrian doors and windows would save over 4,700 kWh of energy a year with payback periods of under 1.5 years. The single largest ESO for the building envelope is to upgrade the roof insulation from its existing value of R-7.5 to R-40. Over 12,300 kWh would be saved with a short payback period of 4 years. Other ESOs include replacing the single pane windows in both the upper and lower level entrances with triple pane windows. Nearly 2,800 kWh could be saved by these incentives. Table 8.4 in Appendix B illustrates the details behind these ESOs.

HVAC

Currently the facility is maintained at approximately 25°C (77°F), which is above the recommended comfort temperature of 21°C resulting in excessive energy consumption. Installing a setback feature on the thermostat would allow the temperature to be lowered to 15°C (59°F) when it is unoccupied and 21°C when occupied. This ESO would save over 17,000

kWh of energy a year, with a payback period of less than one year. Another ESO would be to replace the existing furnace with a high efficiency furnace when time for replacement. This would save close to 14,000 kWh a year. Together, over 11% of the current energy consumption could be saved from ESOs applied to the building's HVAC component.

Water

Other then one water bib hose, there are no plumbing fixtures located in the Water Treatment Plant. Therefore, energy saving opportunities for this sector is limited to replacing the existing hot water tank with an instantaneous water heater. Nearly 1,000 kWh would be saved on an annual basis from this ESO.

Motors

When the existing distribution pump motors and air scour blower motors need replacement, they should be upgraded to high efficiency models. Over 2,600 kWh would be saved with these incentives.

11.0 LIFT STATION #1

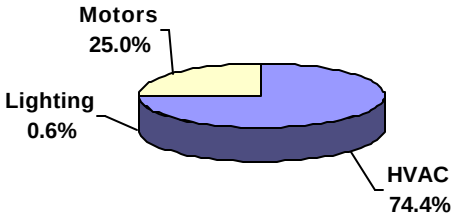
11.1 BACKGROUND

Built in 1959, the Lift Station #1 is a 23 square metre structure with a square open floor plan. No significant renovations have been made to the facility in recent years. The station is occupied for approximately 1.5 hours a week, for a total of 78 hours a year.

Photo 10: Lift Station #1

The lift station solely uses electric energy. In the previous year 76,691 kWh of electricity was consumed. The following pie chart shows how the energy is consumed in a typical year.

Energy Breakdown (% of Total kWh) for the Lift Station #1



There are no plumbing fixtures in the building. Therefore, no water saving opportunities were identified for Lift Station #1.

11.2 ENERGY SAVING OPPORTUNITIES

Table 16 shows a summary of the energy saving opportunities for the Lift Station #1. The following assumptions were made in the analysis:

- The Station is occupied for 1.5 hours per week, approximately 78 hours a year.
- There are no plumbing fixtures or domestic hot water capabilities on site.
- Temperature in the building is maintained at 21°C (70°F).

Table 16 Energy Saving Opportunities for the Lift Station #1

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace outdoors incandescent with high-pressure sodium lamp when burnt out.	1	$125	$100	$0	$143	$114	219	$13	10.8	8.7
Lighting Subtotal					**$143**	**$114**	**219**	**$13**		
ENVELOPE										
Replace weather-stripping & caulking on pedestrian doors.	1	$15	$15	$50	$74	$74	1,436	$86	0.9	0.9
Replace double pane window c/w weather stripping & caulking with triple pane window.	1	$1,800	$1,750	$100	$2,166	$2,109	1,692	$102	21.3	20.8
Replace single pane window c/w weather stripping & caulking with triple pane window.	1	$690	$525	$100	$901	$713	2,074	$125	7.2	5.7
Upgrade roof insulation.	1	$740	$740	$600	$1,528	$1,528	9,985	$600	2.5	2.5
Upgrade wall insulation	1	$2,240	$2,240	$1,000	$3,694	$3,694	17,438	$1,047	3.5	3.5
Envelope Subtotal					**$8,362**	**$8,117**	**32,625**	**$1,959**		
HVAC										
Install setback thermostat set to 10°C (50°F)	1	$300	$300	$300	$684	$684	14,336	$861	0.8	0.8
HVAC Subtotal					**$684**	**$684**	**14,336**	**$861**		
MOTORS										
When replacing trash pump motors, replace with high efficiency units.	2	$433	$433	$0	$987	$987	563	$34	29.2	29.2
Motors Subtotal					**$987**	**$987**	**563**	**$34**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	76,691	$5,480	2.29
Estimated Annual Savings	47,743	$2,867	1.42
Percent Savings	62%	52%	62%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
***As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).

11.3 GENERAL RECOMMENDATIONS

Lighting

The building is occupied for 78 hours a year, or less than one percent of the time. Therefore, a number of energy saving opportunities have not been included in the above table since their associated payback periods would be unreasonably lengthy.

Converting the 4' T12 lamps to 4' T8s when the existing lamps are burnt out would generate a payback period well over 100 years, an unrealistic length of time and was not included in the summary table for the building. The only feasible lighting ESO for the Lift Station #1 is upgrading the outdoor incandescent light to a high-pressure sodium lamp when replacement is needed. Nearly 220 kWh of energy could be saved by this opportunity with a payback period less than 9 years.

Envelope

The largest energy saving opportunities for the Lift Station are found within the building envelope. ESOs with payback periods under 4 years include installing new weather stripping and caulking to the existing pedestrian door and upgrading the roof and wall insulations. Together, these opportunities could save nearly 29,000 kWh of energy, approximately 37% of the current consumption. Energy saving opportunities with longer payback periods are replacing the double pane and single pane windows with triple pane windows, complete with new weather stripping and caulking. Table 9.4 in Appendix B show the details behind these ESOs.

HVAC

With the building so infrequently occupied, installing a setback feature on the thermostat would allow the temperature to be lowered to 10°C (50°F) when it is unoccupied. This would save over 14,330 kWh per year, with a short payback period of less than one year.

Motors

There are two 18 HP trash pump motors in the facility. When it is time for replacement, upgrading the existing models with high efficiency motors would save 563 kWh per year without additional labour expense.

12.0 LIFT STATION #2

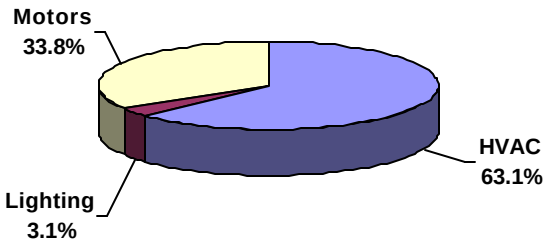
12.1 BACKGROUND

Built in 2000, the Lift Station #2 is a 21 square metre building with a square open floor plan and a separate electrical and control room. This new building was constructed with R12 insulation for the walls and R40 for the roof. The facility is occupied for approximately 1.5 hours per week, year round.

Photo 11: Lift Station #2

In the previous year the Lift Station #2 consumed 8,100 kWh of electric energy. The following pie chart displays how this energy was used in the facility.

Energy Breakdown (% of Total kWh) for the Lift Station #2



Similar to Lift Station #1, there are no plumbing fixtures in the building. Therefore, water saving opportunities were not performed nor included for the Lift Station #2.

12.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 17 show a summary of the energy saving opportunities for the Lift Station #2. The following assumptions were made in the analysis:

- Lift Station #2 is occupied for 1.5 hours per week, approximately 78 hours a year.
- There are no plumbing fixtures or domestic hot water capabilities on site.
- Temperature in the building is maintained at 21°C (70°F).

Table 17 Energy Saving Opportunities for the Lift Station #2

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace indoor incandescents with compact fluorescents when burnt out.	3	$15	$10	$0	$51	$34	28	$2	30.9	20.6
Lighting Subtotal					**$51**	**$34**	**28**	**$2**		
ENVELOPE										
Replace weather-stripping & caulking on pedestrian doors.	1	$15	$15	$50	$74	$74	1,436	$86	0.9	0.9
Envelope Subtotal					**$74**	**$74**	**1,436**	**$86**		
HVAC										
Install setback thermostat set to 10°C (50°F)	1	$100	$100	$50	$171	$171	1,283	$77	2.2	2.2
HVAC Subtotal					**$171**	**$171**	**1,283**	**$77**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	8,100	$847	0.24
Estimated Annual Savings	2,746	$165	0.09
Percent Savings	34%	23%	38%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
***As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).

12.3 GENERAL RECOMMENDATIONS

Lighting

The only lighting ESO available is to replace the existing indoor incandescent lights with compact fluorescents when time for replacement. The outdoor light is already of energy efficient type and does not require any upgrades. Table 10.3 in Appendix B displays the lighting analysis summary for the Lift Station #2.

Envelope

Installing new weather stripping and caulking on the pedestrian door would generate over 1,400 kWh of energy savings a year. With a payback period under one year, this is a very worthwhile ESO to implement.

HVAC

By installing setback on the facility's thermostat and maintaining the temperature at 10ºC (50ºF) as opposed to 21ºC (70ºF) when the building is unoccupied, 1,283 kWh of energy would be saved each year.

Motors

There are two 5HP trash pump motors in Lift Station #2. However, upgrading the existing motors to high efficiency motors generates an unrealistically long payback period, well over 100 years. Therefore, this ESO was not included in the overall summary for this building.

13.0 PUMPHOUSE #1

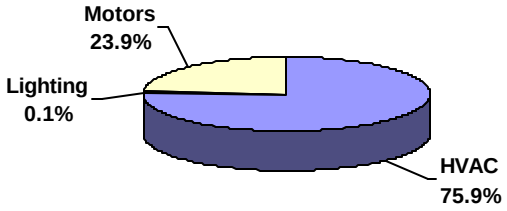
13.1 BACKGROUND

Constructed in 1985, Pumphouse #1 is a 20 square metre building with a square open floor plan. The facility is occupied for approximately 30 minutes each day, year round.

Photo 12: Pumphouse #1

In the previous year, Pumphouse #1 used 96,580 kWh of electric energy. The building does not use any natural gas. The following pie chart displays how this energy was consumed in the facility.

Energy Breakdown (% of Total kWh) for the Pumphouse #1



The building's water supply is a cold-water hose bib from the Water Treatment Plant. No other plumbing fixtures are located within Pumphouse #1.

13.2 ENERGY AND WATER SAVING OPPORTUNITIES

Table 18 shows a summary of the energy saving opportunities for Pumphouse #1. The following assumptions were made in the analysis:

- Pumphouse #1 is occupied daily for 30 minutes.
- The temperature of Pumphouse #1 is maintained at 21ºC (70 ºF).
- Except for one cold-water hose bib, there are no other plumbing fixtures at the facility.

Table 18 Energy Saving Opportunities for the Pumphouse #1

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace indoor incandescent lamps with compact fluorescents when burnt out.	4	$15	$10	$0	$68	$46	44	$3	25.7	17.1
Lighting Subtotal					**$68**	**$46**	**44**	**$3**		
ENVELOPE										
Replace existing single pane sliding window with a triple pane window c/w new caulking.	1	$345	$304	$100	$507	$461	637	$38	13.3	12.0
Replace existing double pane window with a triple pane window c/w new caulking.	1	$672	$649	$100	$880	$854	762	$46	19.2	18.7
Upgrade roof insulation.	1	$171	$171	$171	$389	$389	420	$25	15.4	15.4
Envelope Subtotal					**$1,776**	**$1,703**	**1,819**	**$109**		
HVAC										
Install setback thermostat set to 10°C (50°F)	1	$300	$300	$300	$684	$684	18,193	$1,092	0.6	0.6
HVAC Subtotal					**$684**	**$684**	**18,193**	**$1,092**		
MOTORS										
When replacing 40 HP submersible pump motor, replace with a high efficiency motor.	1	$805	$805	$0	$918	$918	680	$41	22.5	22.5
Motors Subtotal					**$918**	**$918**	**680**	**$41**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	96,580	$6,134	2.88
Estimated Annual Savings	20,737	$1,245	0.62
Percent Savings	21%	20%	22%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
***As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).

13.3 GENERAL RECOMMENDATIONS

Lighting

There is one exterior metal halide light fixture at Pumphouse #1. This lamp is already an energy efficient fixture and does not require any upgrading. The only ESO feasible for this building is to replace the existing indoor incandescent lamps with compact fluorescents when needed. Table 11.3 in Appendix B is the lighting analysis summary for Pumphouse #1. Installing a parking lot controller for the facility produces a payback period well over 100 years. Therefore, it was not included in the above summary table.

Envelope

The walls are of sufficient insulation at R-20 value and do require any upgrading. However, increasing the insulation in the roof from its existing R-20 value to R-40 value is a viable energy saving opportunity. This would save 420 kWh a year, with a payback period just over 15 years.

The only other ESOs are replacing the existing single pane sliding window and double pane window with triple pane windows, complete with new caulking. Nearly 1,400 kWh would be saved by these opportunities.

HVAC

By installing setback on the facility's thermostat and maintaining the temperature at 10ºC (50ºF) as opposed to 21ºC (70ºF) when the building is unoccupied, 18,193 kWh of energy would be saved annually, approximately 19% of the current energy consumption. The associated payback period for the ESO is very short at 0.6 years.

Motors

When replacing the 40HP submersible pump motor, upgrading it to a high efficiency motor would save 680 kWh a year.

14.0 PUMPHOUSE #2

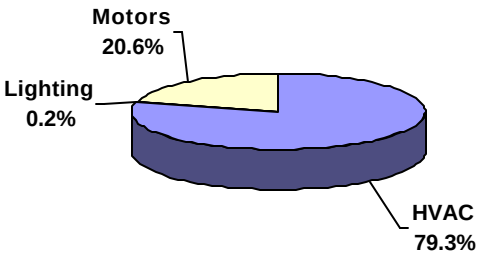
14.1 BACKGROUND

Similar to Pumphouse #1, Pumphouse #2 was constructed in 1985 and is a 20 square metre building. It is occupied for 30 minutes a day, year round.

Photo 13: Pumphouse #2

In the previous year, Pumphouse #2 consumed 76,900 kWh of electricity. The following pie chart displays the energy breakdown for the building.

Energy Breakdown (% of Total kWh) for the Pumphouse #2



14.2 ENERGY AND WATER SAVING OPPORTUNITIES

Table 19 shows a summary of the energy saving opportunities for Pumphouse #2. The following assumptions were made in the analysis:

- Pumphouse #2 is occupied daily for 30 minutes.
- The temperature of Pumphouse #2 is maintained at 21ºC (70 ºF).
- The building is identical in age and size to Pumphouse #1.
- Except for one cold-water hose bib, there are no other plumbing fixtures at the facility.

Table 19 Energy Saving Opportunities for the Pumphouse #2

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace indoor incandescent lamps with compact fluorescents when burnt out.	4	$15	$10	$0	$68	$46	44	$3	25.7	17.1
Lighting Subtotal					**$68**	**$46**	**44**	**$3**		
ENVELOPE										
Replace existing single pane sliding window with a triple pane window c/w new caulking.	1	$345	$304	$100	$507	$461	1,039	$62	8.1	7.4
Replace existing double pane window with a triple pane window c/w new caulking.	1	$672	$649	$100	$880	$854	691	$41	21.2	20.6
Upgrade roof insulation.	1	$171	$171	$171	$389	$389	420	$25	15.4	15.4
Envelope Subtotal					**$1,776**	**$1,703**	**2,150**	**$129**		
HVAC										
Install setback thermostat set to 10°C (50°F)	1	$300	$300	$300	$684	$684	18,193	$1,092	0.6	0.6
HVAC Subtotal					**$684**	**$684**	**18,193**	**$1,092**		
MOTORS										
When replacing 40 HP submersible pump motor, replace with a high efficiency motor.	1	$805	$805	$0	$918	$918	680	$41	22.5	22.5
Motors Subtotal					**$918**	**$918**	**680**	**$41**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	76,900	$5,442	2.29
Estimated Annual Savings	21,068	$1,265	0.63
Percent Savings	27%	23%	28%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
***As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).

14.3 GENERAL RECOMMENDATIONS

Lighting

Similar to lighting in Pumphouse #1, there is one exterior metal halide fixture at Pumphouse #2. This lamp is already energy efficient and does not require any upgrading. The only viable ESO for this building is to replace the existing indoor incandescent lamp with a compact fluorescent when needed. Table 12.3 in Appendix B contains the lighting analysis summary for Pumphouse #2.

Envelope

Identical to the building envelope of Pumphouse #1, the walls of this facility do not require upgrading. However, increasing the insulation in the roof is an ESO that would save 420 kWh a year. Other opportunities are replacing the existing single pane and double pane windows with triple pane windows, complete with new caulking. Total energy saving opportunities for the envelope total 2,150 kWh a year, or a cost savings of $129.

HVAC

The building is currently kept at 21°C (70°F) on a constant basis. By installing a setback feature on the thermostat lowering the temperature to 10°C (50°F) during non-occupancy, 18,193 kWh of energy would be saved annually. This translates into 23.6% of the current energy consumption, a significant ESO. The associated payback period for this option is very short at 0.6 years.

Motors

When time for replacement, upgrading the 40 HP submersible pump motor to a high efficiency motor would save 680 kWh a year.

15.0 CAMPGROUND OFFICE

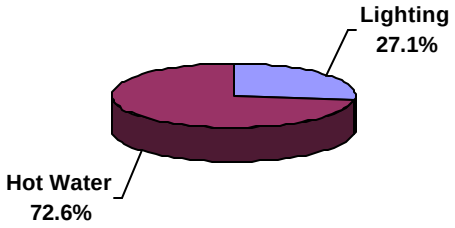
15.1 BACKGROUND

The Campground Office is a 744 square foot facility that consists of an office, shower and changeroom area and an ice cream stand. Built in the 1980s, the facility is open during the summer months from May until September and is unheated. The office is occupied for 40 hours a week, where as the ice cream stand is open for 7 hours a day, 7 days a week. No renovations have been made to the building since its original construction.

Photo 14: Campground Office

In the previous year, the Campground Office consumed 8,200 kWh of electric energy. The building does not use natural gas. The following pie chart displays the energy breakdown for the building.

Energy Breakdown (% of Total kWh) for the Campground Office



The Campground Office has the following plumbing fixtures: three toilets, four sinks, four showers and one urinal. They are all high flow water fixtures. Assumptions were made on the occupancy of the building and the frequency at which these fixtures are used. From this, total hot water consumption was estimated.

15.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 20 and 21 show summaries of the energy and water saving opportunities for the Campground Office. The following assumptions were made in the analysis:

- The Campground Office is open during the summer season from May until September long weekend.
- The office portion is occupied for 40 hours a week from Monday to Friday.
- The ice cream stand is open for seven a day, seven days a week.
- The facility is unheated
- For the purpose of water consumption, the typical occupancy of the Campground Office is 2 people.

Table 20 Energy Saving Opportunities for the Campground Office

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Material (NI*)	Material (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace indoor incandescent lamps with compact fluorescents	9	$15	$10	$13	$282	$231	518	$31	9.1	7.4
Replace outdoor incandescent lights with high pressure sodium lamps	2	$125	$100	$125	$570	$513	438	$26	21.7	19.5
Lighting Subtotal					**$852**	**$744**	**956**	**$57**		
HOT WATER										
Replace HWT with instantaneous water heater.****	3	$300	$300	$400	$2,394	$2,394	3,491	$210	11.4	11.4
Insulate piping for HWT.	1	$50	$50	$50	$114	$114	488	$29	3.9	3.9
Install water efficient showers.	4	$21	$21	$50	$324	$324	852	$65	5.0	5.0
Hot Water Subtotal					**$2,832**	**$2,832**	**4,831**	**$304**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Emissions	8,200	$775	0.24
Estimated Annual Savings	5,787	$361	0.13
Percent Savings	71%	47%	54%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
***As of April 2005, the cost assigned to electricity is 0.06004 $/kWh (rate taken from Manitoba Hydro's website).
**** Discounted to include the cost of replacement tank in 10 years.

Table 21 Water Saving Opportunities for the Campground Office

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Annual Water Savings (L)	Annual Cost Savings ($)
		Material	Labour				
Install water efficient metering faucets.	4	$309	$150	$2,093	80%	2,688	$1.65
Install water efficient toilets.	3	$284	$150	$1,484	70%	7,416	$4.55
Install water efficient showers	4	$21	$50	$324	29%	22,734	$13.94
Install water efficient urinals	1	$344	$200	$620	45%	1,140	$0.70

* The total cost column includes 14% taxes

15.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis summary for the Campground Office is found in Appendix B, Table 13.3. Lighting ESOs for this building include replacing the indoor and outdoor incandescent lights with compact fluorescents and high-pressure sodium lamps respectively. Upgrading the current 4' T12 lamps with T8s is not a viable ESO for this building. A payback period well over 100 years would incur, an unrealistic length of time. Therefore, it was not included in the energy saving opportunities for the Campground Office.

Hot Water

Replacing the existing hot water tanks with instantaneous water tanks saves nearly 3,500 kWh of energy a year with a payback period just over 11 years. Insulating the copper piping for the tanks would save 488 kWh of energy that is currently dispersed as heat loss. This ESO has payback period less than four years. Installing water efficient shower fixtures would save approximately 850 kWh in a 5-year payback period.

16.0 GENERAL UPGRADES AND MAINTENANCE RECOMMENDATIONS FOR REDUCING ENERGY AND WATER CONSUMPTION

The following energy and water saving opportunities exist in many buildings including those toured in this study. The saving opportunities are generic in nature and include both capital upgrades (Sections 16.1 to 16.4) and maintenance activities (Section 16.5) that will result in energy / water savings for all the buildings.

16.1 LIGHTING AND ELECTRICAL

Light Switches – Place signs or stickers adjacent to switches to remind occupants to shut off switches when leaving rooms unoccupied. Occupancy sensors can be provided to shut off lights automatically when not in use. Timers can also be used in a similar fashion.

Fluorescent Lighting Systems – T12 lights should be upgraded to premium T8 or T5 electronic ballasts and lamps. This may be done when current T12 ballasts need replacement or in a planned retrofit program. T12 light fixtures will become obsolete by 2010. Use cold-weather rated ballasts for retrofits in areas where the temperature is below 15°C (59°F). When selecting T8 electronic ballasts, please refer to Manitoba Hydro's Power Smart Lighting program for current listings of eligible ballasts. Contact Manitoba Hydro for details.

EXIT Signs – Replace all incandescent exit signs with 3W LED signs.

Incandescent Bulbs – All incandescent bulbs should be converted to compact fluorescents. Compact fluorescent bulbs last approximately 10 times longer than incandescent bulbs and save up to 75% of the energy costs.

Exterior Lights – Compact fluorescent bulbs do not function at low temperatures, therefore, the exterior lights should be replaced with high-pressure sodium lighting. High-pressure sodium lights are the most energy efficient type of lighting available today. Savings of approximately 50% would result from replacing exterior incandescent fixtures with these high-pressure sodium lights. Photos cells should be considered for automatically shutting off outdoor lights during day light conditions.

Parking Lot Controllers – Parking lot controllers save energy by automatically adjusting the power at the car plugs depending on the outside temperature.

Motors – When installing new motors, consider using premium efficiency as opposed to standard efficiency motors.

Other Recommendations - Dispose of all fluorescent lamps and ballasts through a recycling company to reduce toxins entering the landfills.

Refer to Appendix D for a list of Manitoba Hydro's Power Smart incentives and listings of other incentive programs.

16.2 BUILDING ENVELOPE

Window/Door Infiltration – Seal drafts on windows and doors. This can be done by installing or upgrading weather-stripping, or with removable silicone caulking such as "Draft Stop" or "Peel and Seal". Doors with high usage should be inspected twice per year for damaged weather stripping.

Window/Door Replacement – Windows and doors with low R-values should be considered for replacement. Manitoba Hydro offers incentives for new windows.

Wall / Roof Insulation – The wall insulation in older buildings typically has a resistance of R-12 or less. Large energy savings would result from upgrading this insulation to R-20. Similarly, roof insulation should be upgraded to R40. In addition to the energy savings, upgrading insulation also extends the life of a building by avoiding the rotting of wood framing from the development of mould and mildew in the walls. Vapour barriers in walls can also be upgraded at the same time to reduce infiltration. Upgrading insulation is typically quite costly. When this is done, more insulation will pay dividends in the future.

Electrical Outlets – Install draft-reducing foam pads in all electrical receptacles.

16.3 HEATING, VENTILATION, AND AIR CONDITIONING

Temperature Control – Use programmable electronic thermostats where appropriate. Use the recommended "set-back" and "set forward" temperatures during unoccupied periods. A 6C "set-back" over a 12-hour period can reduce heating costs by 8%. Reduce room temperature at night in the winter to as low as comfort conditions permit (typically 15°C in occupied buildings and 10°C in unoccupied buildings). Terminate ventilation during un-occupied periods.

Furnaces – Replace standard efficiency furnaces with premium efficiency furnaces. Old standard efficiency furnaces can be as low as 60% efficient. Replacing these with 95% efficient furnaces would save 35% of the annual energy consumed for heating.

Air Conditioning – Reduce the cooling load on the air conditioner by keeping the facility a few degrees warmer and using fans at workstations to augment cooling of personnel. Provide an economizer to supply "free cooling" when it is cool outside and air conditioning is required.

Remove or insulate wall or window-mounted air conditioners for the winter season.

When replacing condensing units or rooftop units, install high efficiency units.

CO_2 Sensors – Install CO_2 sensors to control ventilation. CO_2 sensors monitor the level of carbon dioxide in the air. Once the level exceeds an accepted limit, the ventilation system will

turn on. This will ensure that the room is ventilated only when required and will thus save in energy required for heating and/or cooling.

Vehicle Emission Sensors - For garages and fire halls, a vehicle emission sensor will monitor the level of vehicle emissions in the air and could be set up to control the ventilation such that the room is ventilated only when required. This is an energy saving feature and provides increased safety for occupants.

Motorized Dampers – Backdraft dampers on intake and exhaust ducts are often leaky and let cold air into the building on windy days. Insulated motorized dampers provide a better seal when they are closed and drastically reduce the cold air infiltration into the building throughout the winter.

Heating Recovery Ventilators (HRVs) - An HRV moves stale contaminated air from inside the building to outside while at the same time it draws fresh air from outside and distributes it throughout the building. When intake and exhaust air pass through the HRV they do not mix. In the wintertime, the air passes on either side of an aluminium heat exchange core, which transfers heat from the outgoing air to the incoming air. In the summertime, the HRV works in reverse and transfers heat from the incoming air to the exhaust air.

Solar Wall – Another option for pre-heating ventilation air is to install a solar wall. A solar wall is installed on the south wall of the building and uses free heating from the sun to heat the make up air. In addition, a solar wall reduces building heat losses during the winter. Heat lost to the cavity between the building and the exterior metal panels of the solar wall is captured by the incoming air and returned to the building. In summer, the solar wall is ventilated naturally thereby reducing the wall temperature, which saves air conditioning energy costs.

Geothermal Heating – A geothermal heat pump is one of the most energy efficient heating and cooling systems available. Compared to electrical heat, a heat pump decreases energy consumption by 50-70%. In the wintertime, the heat pump moves heat from the earth into your building and in the summertime the heat is moved from inside the building back into the earth. Geothermal systems are most effective in arenas where they are used to make ice. The waste heat obtained from ice making can be used to heat a nearby building using little energy.

HVAC Ductwork – Seal duct joints with duct tape to reduce losses of heated or cooled air where the ducts traverse cold or hot areas respectively. Insulate ductwork passing through unconditioned spaces.

Thermostat Equipped Electric Baseboard Heaters – Mark the thermostat “normal” setting to provide a visual cue as to when they are on or set too high.

16.4 WATER CONSUMPTION

Excessive water usage wastes energy, increases water / sewage treatment costs and further risks damage to the environment.

Toilet Tanks – Install flush volume reduction devices in existing toilet tanks to reduce the quantity of water used per flush by about 25%. "Early closing flapper valves" are inexpensive and are easily installed**.**

Toilets – When replacing older toilets or installing new ones, use high efficiency, low-flush volume models that require only 6 L (1.3 Imp. gal.) or 3 L (0.8 Imp. gal.) per flush. These toilets reduced water usage by over 70% compared with traditional 13 L, and by 40% over a "low flush" 6 L toilet. Refer to the toilet and drain line reports on the Canadian Water and Wastewater Association (CWWA) website for advice in selecting a toilet that will perform well.

Urinals - Waterless urinals function on gravity flow and use absolutely no water. These urinals resemble conventional wall-hung urinals but do not require a water supply or a flush valve.

Hot Water – In facilities where large volumes of hot water are not required, set the hot water tank thermostat to 55°C (131°F). A reduction from 60°C to the recommended value of 55°C saves approximately 3% of the energy related to hot water generation. Insulate the first 2 meters (6 ft) of the cold water line and as much of the hot water distribution lines as practical, particularly where hot water lines traverse cold spaces.

Shower Controls – In facilities where large amounts of water are used, consider retrofitting single actuator, short cycle (adjustable), self-closing control valves, with pressure-balancing temperature controls to reduce water consumption. These controls limit flow and allow for a preset water temperature (recommended 40°C) for the showers in order to reduce water heating costs and wastage of water.

Auto-Shut Off Fixtures - Consider using spring-loaded fixtures that automatically shut off water flow in public areas.

Tankless Water Heaters – Consider replacing the hot water storage tanks with instantaneous water heaters to avoid storage tank losses and save energy.

16.5 ICE RINKS

Ventilate Rink – Natural ventilation of the rink in the winter saves energy by reducing the run time on the compressors/heat pumps.

Quality of Ice – Ensure that the water used for flooding is pure – salts lower the freezing point of water and air in water acts like an insulation, making it harder for glycol in the slab to freeze the top layer of the ice.

Ice Thickness – Keep the ice thin (1 inch thick) because excessive ice thickness increases the load on the compressor. Shaving ice helps to reduce the ice thickness and removes concentrations of impurities.

Melt Ice Outdoors – When shaving ice, take the ice shavings outside to be melted as opposed to melting the shavings in a heating area of the building. This will eliminate the energy consumed to melt this ice.

High Efficiency Boilers – Use high efficiency boilers for zamboni water heating. Annual energy savings for zamboni water heating of up to 30% can be achieved by upgrading to high efficiency boiler systems.

Specific Gravity of Brine – Maintain the brine at a specific gravity of 1.2 to 1.22 for optimum energy use and maintain the brine temperature as high as possible.

Heat Recovery – Significant amounts of energy can be saved by recovering heat from the refrigeration equipment and using it for flood water heating, space heating, domestic water heating, or ice melting.

16.6 MAINTENANCE

Maintenance activities are important to ensure that the equipment in a building is operating efficiently and to reduce the potential for future equipment breakdown. One option is to hire a maintenance contractor to perform inspections four times annually to clean, lubricate, test, and adjust the building's HVAC.

The following is a list of HVAC maintenance procedures that should be performed two to four times annually:

Heating/Ventilation Systems

- Change filters
- Inspect belts
- Inspect and clean heating coils
- Inspect operation of blower
- Inspect and lubricate motor and fan bearings
- Inspect and lubricate fresh air, exhaust air, and return air dampers

Air Conditioning/Ice Plant Systems

- Clean outdoor condensers
- Clean filters
- Check refrigerant and oil levels
- Inspect ice plant and refrigerant piping for leaks
- Inspect and lubricate brine pumps
- Inspect and lubricate motorized and back draft dampers
- Inspect A/C operation and adjust as required

17.0 IMPLEMENTATION OF ENERGY AND WATER SAVING OPPORTUNITIES

17.1 IMPLEMENTATION

The energy and water savings opportunities suggested in this report range from simply changing a light bulb to installing a wall panel. Many of the simpler recommended upgrades could be completed in-house while others would require hiring a contractor to complete the work. Major renovation projects will require a consulting engineer to design and help implement the upgrade. The various energy/water saving opportunities discussed throughout this report are separated into three levels of implementation: (1) in-house implementations, (2) contractor implementations, and (3) consulting engineer implementations. The following sections discuss which upgrades fall into each of these three categories.

In-House Implementations

Some of the energy saving opportunities can be completed in-house. Replacing the incandescent light bulbs with compact fluorescent bulbs involves simply replacing the bulb and could easily be done by one of the building's maintenance personnel. Installing weather-stripping around the doors and sealing the windows could also be done in-house. For the saving opportunities that involve replacing the doors, some could be done in-house while for others, such as vehicle doors, it is best to hire a contractor.

Contractor Implementations

The majority of the energy saving opportunities will require a contractor. In terms of lighting, replacing the T12s with T8s requires replacing the ballast as well as the bulbs. An electrician should be hired to complete this function. Replacing the exterior incandescent lights with high-pressure sodium lights and replacing the exit incandescent lamps with LED modules involve replacing the fixture and will therefore require an electrician.

Upgrades on a building's envelope not mentioned in the "In-House Implementations" section should be done by a contractor. This includes replacing windows and upgrading the wall and/or roof insulation.

In terms of HVAC, a contractor should be hired to install programmable thermostats and high efficiency air conditioner units.

Electricians should be hired to replace motors with high-efficiency motors.

For the water saving opportunities involving installing low-flow water fixtures, a contractor will likely be required. Insulating the hot water tank and installing an instantaneous water heater will also require a contractor.

Consulting Engineer Implementations

A consulting engineer should be consulted regarding any major renovations to the building envelope as well as the building HVAC systems to ensure the work is done properly and in accordance with building code requirements.

17.2 FINANCING

There are several incentive programs listed in Appendix D of this report that will help finance the implementation of the energy and water saving opportunities. In the "Energy Saving Opportunity" tables throughout this report, the capital costs are listed both with and without incentives. The incentives in these tables are from Manitoba Hydro's Power Smart Incentives and apply to energy efficient lighting, windows and wall insulation upgrade. For more information on these incentives, contact your local Manitoba Hydro Energy Services Coordinator or the contact listed in Table D.1.

Table D.2 lists other incentive programs that are available for energy saving upgrades. These programs are:

- Energy Innovators Initiative: Energy Retrofit Assistance (ERA)
- Municipal Rural Infrastructure Fund (MRIF)

- Renewable Energy Development Initiative (REDI)
- Community Places Program
- Sustainable Development Innovations Fund (SDIF)

For further information on these programs refer to the website listed in the table.

Members of the Association of Manitoba Municipalities also have the option of purchasing products and services in bulk at reduced prices through the Municipalities Trading Company of Manitoba Ltd. (MTCML). Details on this can be found in Appendix G of this report.

17.3 POLITICAL FRAMEWORK

General Municipal Environment in Manitoba

In Manitoba, municipal elections are set every 4 years. The next municipal election will be in October 2006, which may mean that some councils will see a change in members. However, we do not expect this to have a major impact on the plans to implement the recommendations of this report.

There are currently no Provincial or Federal targets or goals set that municipalities must achieve. 'Green Projects' have become common in Manitoba and often programs like the Municipal Rural Infrastructure Fund (MRIF) targets such projects. Details of this project are included in this report. Manitoba has been a leader in energy efficiency and many municipalities have partnered with other levels of government and companies like Manitoba Hydro on innovative projects. We believe the MMEP project is an excellent example of an innovative project and believe all of the participating communities are receptive to innovative ideas because they have agreed to participate.

A recent trend in municipal government has been toward longer-term planning. This is seen with the recent changes to the provincial Planning Act and the requirements for community sustainability plans in the New Deal agreement. The recommendations in this report certainly complement this direction.

Political Environment in Roblin

Knowledge gained from this efficiency study will be useful in future development projects. A potential barrier that could affect the implementation of the opportunities discussed throughout this report is a change in council members. It is important that the information gained here be passed on as new members enter and current members leave the council.

18.0 PERFORMANCE VERIFICATION

Following the implementation of the recommended energy and water saving opportunities, it is important to continuously monitor the annual energy consumption to keep a record of the resulting energy savings.

Appendix F contains a spreadsheet and graph for each of the buildings audited. These spreadsheets should be used as a tool to monitor the energy consumption on a monthly basis. The first three columns in each spreadsheet are for year 2004-2005 and have already been completed.

Following the implementation of the measures discussed in this report, the energy consumption should be recorded. The year headings may need to be re-entered, depending on when the implementations are completed. The monthly energy consumption in kWh taken from the building's hydro bill should be recorded in the "Billed Energy Consumption" column. The monthly gas consumption in m^3 should be recorded in the "Billed Natural Gas" column. The monthly energy consumption for heating depends on the outdoor temperatures for that month. The "Billed Energy Consumption" is therefore normalized to the year 2004-2005 such that a fair comparison can be made.

The normalized energy consumption is determined as follows:

$$NEC = BEC \times (\%\ Energy\ Used\ \ for\ Heating) \times \left(\frac{HDD(present)}{HDD(2004-2005)} \right) + BEC \times (1 - \%\ Energy\ Used\ \ for\ Heating)$$

Where *NEC* is the Energy Normalized to year 2004-2005, *BEC* is the billed energy consumption and *HDD* is the heating degree-days.

The heating degree-days (HDD) for a given day are the number of Celsius degrees that the mean temperature is below 18°C. For the Town of Roblin, this data can be found on the following website:

http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=27119&Year=2004&Month=10&Day=4

Once the “Billed Elec. Energy”, the ‘Billed Propane Energy” and “HDD” columns are filled in, the “Energy Normalized to 2004-2005” column is automatically calculated and the graph is updated. From this graph, the energy consumption can be monitored on a monthly basis to ensure that the upgrades are resulting in a reduction in energy consumption.

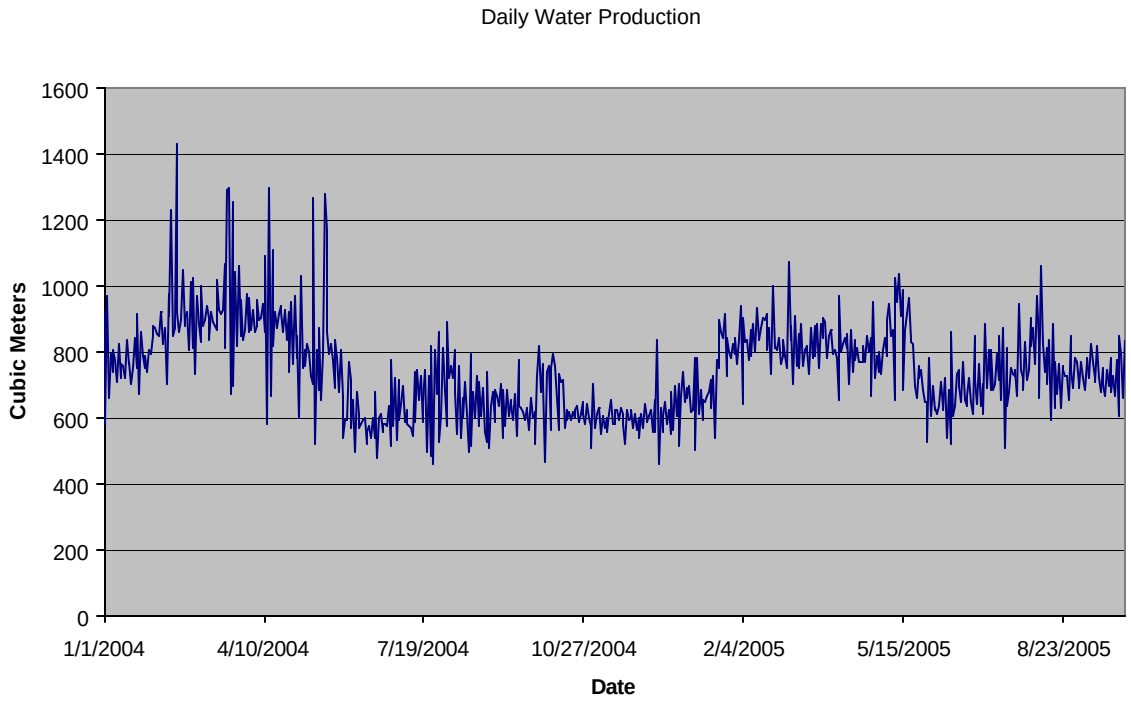
19.0 WATER AND SEWER AUDIT

19.1 WATER SYSTEM OVERVIEW

The Town of Roblin constructed a water treatment and distribution system in 1959. Two raw water pump houses draw water out of an aquifer located below the Town, each using a 40-horsepower pump. Potassium permanganate is added to the raw water, and then it is pumped to the water treatment plant. At the water treatment plant, the water is treated by greensand filtration, final chlorination, and fluoridation. After treatment, the water is stored in two underground storage reservoirs. The larger of the two reservoirs, which has a storage capacity approximately 855 m^3 (188,000 imperial gallons), is located next to the water treatment plant. The smaller reservoir, which has a storage capacity of approximately 455 m^3 (100,000 imperial gallons), is located directly under the water treatment plant. When demand calls for it, water is pumped from the storage reservoir into the distribution system by one of two 15-horsepower submersible distribution pumps. According to operation staff, a pressure tank maintains the system pressure at approximately 57 psi in the distribution system.

Based on data provided, the average amount of water produced from January 2004 through September 2005 was approximately 745.5 m^3 per day with a maximum day flow of approximately 1431.5 m^3 per day. From this data, the average water produced per capita is approximately 410.1 lpcd. Chart 1 shows the amount of treated water entering the distribution system on a daily basis for the period from January 2004 through September 2005.

Chart 1 Daily Water Production



The current length of the distribution system, according to data provided, is 19,950 m. PVC piping makes up approximately 9,100 m of the distribution, while the remaining 10,850 m is cast iron piping. The Town is actively replacing approximately 1,000 m of the old cast iron piping with PVC C900 piping each year.

The annual operating and maintenance cost for the water treatment and distribution system was approximately $220,000 in 2005. Of this $220,000, approximately $19,000 is used to purchase chemicals used to treat the water. Table 22 lists the estimated annual use of each chemical used at the water treatment plant.

Table 22 Estimated Annual Chemical Use

Chemical	Annual Consumption
Potassium Permanganate	1,300 kg
Sodium Hypochlorite	16,320 L
Shannon SL1-5230	2,556 kg
Hydrofluosilic Acid	1,120 kg

Table 23 lists the amount of water produced at the water treatment plant and the amount of water consumed by clients per quarter, based on information provided.

Table 23 Water Production and Consumption By Quarter

Quarter	Consumption (m^3)	Production (m^3)
January, 2004	42,188	79,830
April, 2004	46,762	69,700
July, 2004	43,042	59,643
October, 2004	51,920	57,233
January, 2005	39,997	71,975
April, 2005	48,097	69,202
July, 2005	45,565	68,804
Total	317,571	476,386

The cost associated with the Town of Roblin's unaccounted-for water loss is given in Table 24.

Table 24 Cost of Unaccounted-For Water Loss

Unaccounted-For Water Loss (m^3)	
	January 2004 - September 2005
Total Water Produced (m^3)	476,386
Total Water Sold (m^3)	317,571
Authorized Unmetered Water Use[1]	5,883
Meter Inaccuracies[2]	3,273
Total Unaccounted-For Water Loss	149,659
Percent Unaccounted-For Water Loss	31.4%
Unit Cost per Cubic Meter[3]	$0.462
Cost of Unaccounted-For Water Loss	$69,142.58

[1] Based on information obtained from operation staff that indicated approximately 641,758 imperial gallons of water are used annually for authorized non-metered purposes, such as main flushing, and operation staff estimates of the amount of water used by water bleeders to prevent line freezing.
[2] Based on the probable amount of water loss estimated using typical accuracy figures published by the American Water and Wastewater Association (AWWA) journal for meters with plastic components that are three years old.
[3] Based on the operation and maintenance costs from 2005.

Based on information provided, the Town lost approximately $69,000 due to unaccounted-for water loss over the period from January 2004 through September 2005. This cost may not be completely accurate, since the error on the distribution meter was unknown, and the overall error on the client water meters was estimated. If it was found that the client water meters were less accurate than the typical 3-year-old water meter with plastic components, the value for the

amount of water sold would increase, thus decreasing the amount of unaccounted-for water loss and the associated cost of this loss.

Water Meters

There is a 200 mm water meter that measures the amount of water entering the distribution system at the water treatment plant. In addition to the main water meter, there are three 3-inch Neptune turbine flow meters, one per filter, that are used to measure the amount of water that flows through each of the filters. There is also a 3-inch Neptune Trident water meter that measures the amount of water used to backwash the filters; however, this meter does not work.

Data provided shows that there are currently 814 water meters along the distribution system that measure water consumption on a per client basis, and that approximately half of these water meters have been replaced in the past 3 years. Table 25 shows the breakdown of client water meters by meter size.

Table 25 Client Water Meter Sizes

Meter Size	5/8"	3/4"	1"	1.5"	2"	3"	Total
Number	814	5	11	3	5	1	839

Data provided indicates that there is currently no program in place to evaluate the accuracy of client water meters, but if a client complains, the Town's general practice is to replace the old meter with a new one.

Pumps

Each raw water pump house has a pump that supplies water to the water treatment plant. The fire pump and both of the water distribution pumps are located within the water treatment plant. Table 26 lists the relevant available pump data for the water treatment and distribution system.

Table 26 Water Treatment and Distribution Pumps

Function	Motor Size (HP)	Pump/Motor Manufacturer
Raw Water Pumphouse #1 Pump	40	Franklin Electric
Raw Water Pumphouse #2 Pump	40	Franklin Electric
Submersible Distribution Pump #1	15	Grundfos
Submersible Distribution Pump #2	15	Grundfos
Fire Pump	50	Ford Industrial

Water Rates

Meters are read and clients are charged quarterly. For the first 115 cubic meters of water used per quarter, clients are billed at a rate of $1.43 per cubic meter for water service, and $0.68 per cubic meter for sewer service. Once a client passes 115 cubic meters per quarter, they are billed at a rate of $1.06 per cubic meter for water service, and $0.68 per cubic meter for sewer service for the next 1,000 cubic meters of water consumed. If a client consumes more than 1,115 cubic meters of water in a quarter, the client is charged at a rate of $0.78 per cubic meter for water service, and $0.68 per cubic meter for sewer service. Table 27 lists the minimum quarterly fees based on the size of water meter.

Table 27 Minimum Quarterly Water Rates

Charges per Quarter	Meter Size					
	5/8"	3/4"	1"	1.5"	2"	3"
Service Charge	$11.70	$11.70	$11.70	$11.70	$11.70	$11.70
Water	$21.45	$42.90	$85.80	$201.55	$440.05	$758.05
Sewer	$10.20	$20.40	$40.80	$102.00	$255.00	$459.00
Total Quarterly Minimum	$43.35	$75.00	$138.30	$315.25	$706.75	$1,228.75
Water Included in Rate (m^3)	15	30	60	150	375	675

Water can also be purchased from a bulk fill line. Bulk sales of water are charged at a rate of $1.90 per cubic meter.

Maintenance Programs

There is currently no scheduled maintenance program in place at the water treatment plant; however, the facility and equipment are inspected daily when the daily water meter reading is taken. Any problems that arise are dealt with as soon as possible.

Water mains are flushed in the spring and fall, while the Town inspects fire hydrants and exercises fittings annually. Also, the Town has a program of replacing 1,000 m of distribution pipe per year with PVC C900 pipe.

Water main breaks are repaired as they are detected. Table 28 lists the number of breaks that have been detected in the system by year for the past 5 years.

Table 28 Water Main Breaks

Year	Number of Main Breaks
2005	3
2004	5
2003	7
2002	5
2001	3

19.2 WATER SYSTEM AUDIT RESULTS

In general, community water rates should be set at a level that covers the cost of supplying water to clients, including treating the water, distributing the water, maintaining the treatment and distribution systems, and replacing key pumping and process equipment. Reducing the amount of water lost can have an impact on the overall cost of water treatment.

By reducing water loss, the Town will realize savings through reduced chemical costs related to treating the water, and reduced electrical costs associated with a reduction in the amount of pumping required to supply the water. Over a long-term prospect, the overall life of the facility and major process components can be extended, reducing the replacement frequency and equipment maintenance requirements.

A program for checking meter accuracy can also increase revenues for the Town by ensuring that customers are being billed for the actual amount of water they use. This program will not actually change the amount of water a client uses, it simply allows the Town to bill for the correct amount and recover production costs that would otherwise be attributed to unaccounted losses.

19.2.1 Unaccounted-For Water Loss

As calculated from the data supplied by the Town of Roblin, the Town has an unaccounted-for water loss of approximately 31.4% over the period from January 2004 through September 2005.

There are several factors that could account for this water loss:

Leakage

Every distribution system experiences some amount of leakage. According to Environment Canada, municipalities that have an unaccounted-for water loss exceeding 10 to 15 percent find that a leak detection program is cost-effective. Environment Canada goes on to report that some studies have shown that for every $1.00 spent in communities with leak detection programs, up to $3.00 can be saved. Since Roblin's unaccounted-for water loss is above the 10 to 15 percent range, it is recommended that the Town develop a leak detection program.

Meter Accuracy

As mentioned before, it is important to check not only client water meters, but the water meter at the treatment plant as well. If the production water meter is inaccurate, the Town will not have reliable data on the amount of water it is treating. This can lead to problems when trying to assess the amount of unaccounted-for water leaving the system, as more water will be leaving the system than is actually recorded. Upon inspection, the distribution water meter appeared to be fairly old and corroded. Both age and corrosion will affect the accuracy of a water meter. Photo 15 shows the Town of Roblin's distribution water meter.

Photo 15: Distribution Water Meter

As for the client water meters, ensuring they are accurate will increase revenues for the Town since clients will be paying for the actual amount of water used. Accurate client meters will also allow the Town to better assess the amount of unaccounted-for water leaving the system, since water that would be unaccounted-for if the meters were inaccurate would actually be included in water consumption data. Since, according to data received, approximately half of the client water meters have been replaced in the last 3 years, it is expected that these meters are measuring accurately. According to an article published in the American Water and Wastewater Association (AWWA) journal, water meters with plastic components that are 3 years old have an accuracy of approximately 98.98%.

Since the Town is not fully aware of the amount of water lost from the system, it is much more difficult to develop a leakage prevention program.

Other

Other sources of unaccounted-for water loss include water main breaks and water main flushing. It is recommended that the Town estimate the amount of water lost or used during main breaks or line flushing. This will increase the accuracy of any water audit performed in the future.

19.2.2 Maintenance Program

It is recommended that the Town develop a program for testing the accuracy of client water meters. Even though the Town is actively replacing a portion of the client water meters on an ongoing basis, those meters that have not been replaced will likely have a significant error. One cost effective method would be to hire a summer student that would test the accuracy of the meters.

The Town should inspect the distribution meter at the water treatment plant and complete meter calibration on a routine basis. This will allow the Town to have accurate records pertaining to total water production and will give some indication as to whether leaks or breaks have occurred in the distribution system, which would be evidenced through an increase in overall water production without a corresponding increase in water consumption.

19.2.3 Possible Cost Savings

The Town of Roblin's water treatment and distribution system is experiencing significant unaccounted-for water loss. For the period under review, taking into account estimates of the water used by bleeders and other authorized unmetered use, the treatment and distribution system experienced a loss of 31.4% of the total amount of water that had been treated. This loss may be exaggerated by underestimating the amount of unmetered water that is used for authorized purposes. The Town should install meters at all connections that are not currently metered to ensure that water-loss estimates are as accurate as possible.

It is recommended that the Town conduct a feasibility study into ways of reducing the unaccounted-for water loss through methods such as leak detection and prevention programs, metering all water use, and replacing sections of pipe prone to freezing with insulated pipes so that water bleeders are no longer needed. The Town should be able to reduce the unaccounted-for water loss to within 10-15% of the total treated water produced. Though it would be possible to reduce the unaccounted-for water loss even more, Environment Canada states that it is not usually economically feasible to do so. If the Town were able to reduce their unaccounted-for water loss, chemical costs associated with treating the water and electrical costs associated with pumping the treated water would be reduced. For example, if the Town

were to reduce unaccounted-for water loss to 15% from the current 31.4%, there would be a reduction in the amount of chemicals needed for treating the water of approximately 16%. This 16% reduction in chemical cost would, according to information provided, correspond to an annual savings of approximately $3,000.

Since the volume of water used for backwashing the filters is currently unmetered, due to the backwash meter being broken, it is difficult to determine if the backwash procedure could be optimized. Operation staff estimate that approximately 40.9 m^3 (9,000 imperial gallons) of water is used daily to backwash the filters. Over the period under review, this corresponds to a volume of 26,135 m^3. Comparing this value to the amount of water produced at the water treatment plant shows that approximately 5.5% of the treated water produced at the plant is used for backwashing. This value falls within the normally accepted range of 1-6%. It is recommended that the Town either repair or replace the backwash meter so that a more accurate measurement of the amount of water used to backwash the filters can be made.

19.3 SEWER SYSTEM OVERVIEW

The Town of Roblin constructed a sewage collection and treatment system in 1959. According to information received, the majority of the piping in the collection system is asbestos concrete piping, and the total length of the collection system is approximately 19,950 m. According to data provided, there are 171 manholes located throughout the collection system, which allow access for any maintenance that is required. The sewage collection system is a combined system collecting both sewer flow and storm water. Both infiltration and runoff are collected and treated along with the wastewater.

There are two lift stations that collect and pump the wastewater. The smaller of the two lift stations, Lift Station #2, is located on Goose Lake Drive; while the larger of the two lift stations, Lift Station #1, is located on Bud Avenue. Both of the lift stations were upgraded in 2001. Lift Station #2 is used to collect nearby wastewater and pump it over a hill where the wastewater joins a gravity sewer that conveys the wastewater to Lift Station #1. All of the Town's wastewater flows through Lift Station #1, which then pumps the sewage to the lagoon.

The sewage lagoon has four cells, two primary and two secondary, which have a combined storage capacity of 145,500 m^3. The sewage lagoon discharges to a four-cell engineered wetland system and to a spray irrigation system. Finally, the treated wastewater is discharged from the fourth cell of the wetland into the Shell River.

The annual operation and maintenance costs of the sewage collection system are approximately $120,000, based on information provided.

Pumps

All of the pumps for the sewage collection system are located at their respective lift stations. Table 29 lists the relevant available pump data.

Table 29 Lift Station Pump Data

Function	Motor Size (HP)	Pump Manufacturer
Lift Station #1 Pumps (2)	18	Flygt
Lift Station #2 Pumps (2)	5	Flygt

Sewer Rates

Sewage rates are included in the quarterly water bills. The rate structure is given in Table 27 in the Water System Overview.

Maintenance Programs

There is currently no scheduled maintenance program in place for the wastewater collection system; however, the facilities and equipment are inspected daily when the daily wastewater meter readings are taken. Any problems that arise are dealt with as soon as possible.

There is currently no program in place for replacing old sewer lines on a regular basis. Instead, damaged piping is replaced with PVC piping when leaks or breaks are detected. The Town televises the collection system to determine which areas are in the most need of replacement.

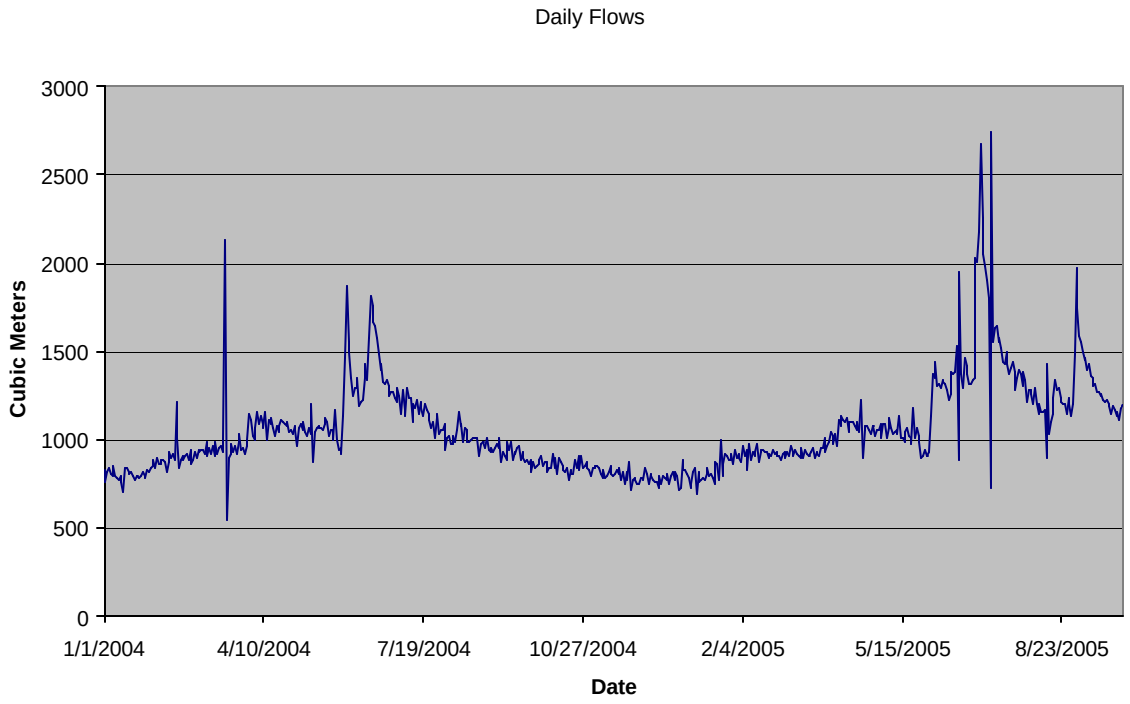
19.4 SEWER SYSTEM AUDIT RESULTS

Since Roblin operates a combined sewer system that collects storm water and runoff, it is expected that there will be a large discrepancy in the volume of water pumped to the lagoon over the course of a year. These infiltration and inflow variations will be caused by such factors as precipitation entering the system through manholes, weeping tiles, sump pumps, or rain leaders; as well as groundwater entering the system through leaks in the piping.

The volume of wastewater flowing through the system was measured at Lift Station #1, since all of the wastewater flowing through the sewage collection system must flow through Lift Station #1. Lift Station #1 has a relatively new flow meter installed, which is assumed to be quite accurate.

Chart 2 shows the daily flow of wastewater through Lift Station #1 for the period from January 2004 through September 2005.

Chart 2 Daily Wastewater Flow at Lift Station #1



As can be seen in Chart 2, the system experiences an increase in flow around July in both 2004 and 2005; however, the amount of wastewater pumped through the system for the remainder of the year is fairly constant. The total infiltration and inflow for the Town of Roblin, as calculated from the data provided and assuming an equivalent pipe diameter of 20 cm (8 inches) is approximately 667-l/cm•km•day (litres per centimetre of equivalent pipe diameter per kilometre of pipe in the collection system per day). Published data states that there is a normal permissible limit of 1,394-l/cm•km•day of infiltration and inflow that can normally be expected from typical groundwater infiltration sources. If a system is below this value of 1,394, then normal infiltration and inflow reduction methods tend to cost more to implement than they save in pumping and treatment costs. Since Roblin's inflow and infiltration rate is less than the 1,394 value, infiltration and inflow reduction methods may not be cost effective. Through measures such as sealing manholes and lining pipes, the Town could potentially decrease infiltration and inflows to the sewer system. Further study should be conducted to determine the feasibility of these infiltration reduction options, since they may not be cost effective in the Town of Roblin's specific case. Reducing infiltration will reduce pumping costs and extend the effective life of the lagoons.

The Town should conduct a study in order to determine feasible options to deal with the extraneous water sources. This study would likely include a detailed review of manholes within the system.

Maintenance Program

The Town may wish to start a scheduled maintenance program, such as actively replacing old pipe, to help minimize potential problems with the sewer system and to spread out the cost of repairing and replacing old piping.

By-Laws

In order to limit the amount of storm water entering the sewer system, the Village should consider instituting a by-law that prohibits any future hook-ups of sump pumps or weeping tiles to the sewer system. This may require the construction of a storm sewer system, but it will

greatly decrease the amount of water entering the lagoon, and will decrease pumping costs since less water will be flowing through the sanitary sewer system.

19.5 PUBLIC EDUCATION

Providing public education will create a better understanding of the water and wastewater treatment systems. If residents are aware of the processes and costs involved with treating and distributing drinking water and collecting and treating sewage, they will be more accepting of cost reduction efforts. A program that highlights the environmental and monetary benefits of water use reduction can help the community gain support for initiatives such as the following:

- Installing water meters, low flush toilets, or water saving showerheads.
- Fixing leaky taps and toilets.
- Only watering lawns once per week.
- Using drip irrigation for trees and shrubs.

19.6 RECOMMENDATIONS

It is recommended that the Town:

1. Either calibrate and repair the existing meters at the water treatment plant, or replace them altogether.

2. Develop a program for assessing the accuracy of water meters.

3. Develop a program for scheduled leak detection of the water distribution system.

4. Meter all authorized municipal water use in order to accurately estimate the amount of water loss within the distribution system.

5. Conduct a study on the feasibility of options to reduce unaccounted-for water loss from the water treatment and distribution system.

6. Conduct a study on the feasibility of options for reducing infiltration inflow to the sewage collection system.

7. Establish a by-law that prevents the connection of sump pumps or diversion of water from weeping tiles into the sewer system.

8. Provide public education on the water and wastewater treatment systems as discussed in Section 19.5.

APPENDIX A

INVENTORY SHEETS

TABLE OF CONTENTS – APPENDIX A

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 22, 2006
Toured By: Ray Bodnar & Clayton Paul	**Construction Date:** 1970
Building: Large Arena	**Renovations:**
Address: 315 Hospital Street	None
L x W x H: / **Area:** 41,280 SF	
Building Capacity: 200	
Building Floor Plan: Ice Rink & Kids Rink Waiting Area & Concession Kids Rink used as storage.	**Occupied Times:** Varies. - 45 hrs/wk for 6 months/yr. - Used 2 months/yr in summer.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: 10" Blockwall on large arena. 8" block on small arena.
Roof Type/R-value: R-10 fibreglass over heated area.
Door Type/weather stripping: 12'x12' vehicle door to large rink; 10'x10' to small rink. 2- pedestrian doors to heated area – no caulking & poor stripping. 12 – pedestrian doors to large rink/outside – poor caulking & stripping. 8 – wooden pedestrian doors to rink from reception – no stripping & no insulation (from heated to cold) 1 – to cold storage area
Window type/caulking: 4 – 40x46 double pane – 1975 year – no caulking. 7 – 96"x48" – single pane to view arena (inside)
Other:
MECHANICAL
Heating System: 6 – electric unit heaters in reception; 2 –infrared gas in reception; 16 – radiant heaters in arena 4 – electric unit heaters in change rooms; 6 – infrared in arena; 2 – electric baseboards in seniors booth.
Cooling System: None.
Ventilation System: No vent in rink area. Grease exhaust fan in canteen.
HVAC Controls: Standard stats – each heater has one stat.
HVAC Maintenance/Training: Infrared air intakes plugged with dirt.
Water Supply System:
Domestic Hot Water System: Main floor – 6000 W - 60 gal –electric tank with no pipe insulation 120 gal – 24kW – electric tank **Water Fixtures:** 7 toilets, 5 urinals, 6 sinks and 4 showers – all high flow fixtures.

ELECTRICAL	
31 – 400 W metal halide in rink area – new last year	32 – 8'x2 - T12 in reception area
2 – 160 W – in zamboni room	20 – 8'x2 – T12 in basement
8 – 150 W – incandescent in cold storage area.	9 – 4'x2 – T12 – in basement
2 – 100 W – incandescent – reception	2 – 100 W – incandescent -basement
Outdoor Lighting:	
Exit Signs: All in good condition.	
Motors:	
Parking Lot Plugs:	

OTHER BUILDING SYSTEMS		
Ice Plant Room:	**-** ice plant office is outside	- fill pit once per game
18"x18" exhaust fan with open BDD	- 100 HP ice plant motor – old	
Electric unit heater	- 20 HP brine pump	
Condenser fans? (36 amp)??	- stat in ice cycles plant to maintain temperature	

PROCESS SYSTEMS

Zamboni Room:

- electric pit heater
- 360 MBH gas water tank with 70 gal piped to 120 gal storage tank for zamboni heating
- ice pit for melting snow.

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

Pit is 7'x6'x3' deep.

NOTES

- Large rink area is cold.
- Small rink has no heat and is for storage only.
- New Zamboni room is being built.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin		**Date:** February 22, 2006
Toured By: Ray Bodnar & Clayton Paul		**Construction Date:** 1999
Building: Swimming Pool, Office/Changeroom		**Renovations:**
Address: 315 Hospital St.		None
L x W x H: 74 x 30	**Area:** 2220 SF + 450 SF plant room	
Building Capacity: 10		
Building Floor Plan: Reception + changerooms for pool. Open in summer only.		**Occupied Times:** June 1 – September 5: Noon – 10pm for 7days/wk

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Not heated. Summer use only.
Roof Type/R-value:
Door Type/weather stripping:
Window type/caulking:
Other:
MECHANICAL
Heating System: None.
Cooling System:
Ventilation System:
HVAC Controls:
HVAC Maintenance/Training:
Water Supply System:
Domestic Hot Water System: 26 gal gas water tank
Water Fixtures: 6 toilets, 6 sinks, 2 urinals & 6 showers – all high flow fixtures.

ELECTRICAL
Indoor Lighting: 39 – 34W – 4'x2 T12 3 – 150 W - incandescent
Outdoor Lighting: 9 – 100 W – flood lights
Exit Signs: Okay
Motors:
Parking Lot Plugs:
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
1225/1002 MBH Pool boiler – gas - newer – main pool. 136/95 MBH Pool boiler being replaced – kid's pool. 20 HP skimmer pump & 1.5 HP pump – pumps run 24/7 all summer.
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 23, 2006.
Toured By: Ray Bodnar & Len Addis	**Construction Date:** 1995
Building: Community Centre	**Renovations:** None.
Address: 55 6th Ave. N.E.	
L x W x H: 142' x 102' x 16' **Area:** 14,484 SF	
Building Capacity: 684 - 604 for hall & 80 for meeting room.	
Building Floor Plan: Hall - 7248SF, Meeting Room – 960SF, Kitchen, office & washrooms.	**Occupied Times:** Meeting Rooms: 96 x 4 hours Hall: 4/month x 10 hrs

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Metal clad exterior with some brick and drywall. Interior R-20.
Roof Type/R-value: Metal sloped roofs with T-bar ceiling. R-40.
Door Type/weather stripping: 9-pedestrian doors.
Window type/caulking: No windows.
Other:
MECHANICAL
Heating System: Lennox GCS models: PGA60 (1), PGA47 (1), PGA120 (4) Heat/cool roof tops with full economizer (60 = 60,000 BTUH cooling). Gas heat.
Cooling System:
Ventilation System: Washroom exhaust fans – 2 – Braun – 460 cfm each. MUA + kitchen exhaust (no damper in exhaust).
HVAC Controls: Programmable stats shut off ventilation during unoccupied times. Trouble with occupied/unoccupied sensor.
HVAC Maintenance/Training: Maintenance contract - 4/yr.
Water Supply System:
Domestic Hot Water System: 1 – 175 L electric tank for washrooms. No pipe insulation. 1 – 36 kW – 120 gal electric with 2 – 284 L 4500 W electric
Water Fixtures: All low flow fixtures.

ELECTRICAL
Indoor Lighting: T8s provided. HPs outside. Occupancy sensors for washroom lights.
Outdoor Lighting: On photo-cell.
Exit Signs: Good
Motors:
Parking Lot Plugs:
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Gas on site.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 21, 2006
Toured By: Ray Bodnar & Marna Bulbuck	**Construction Date:** 1984
Building: Town Administration Bldg & Library	**Renovations:**
Address: 125 1st Ave. N.W.	None
L x W x H: 90'x72'x16' **Area:** 6480SF	
Building Capacity: Office = 5; Library = 4	
Building Floor Plan: Library = 90 x 28 = 2520 SF Administration Office = 90 x 44 = 3960 SF	**Occupied Times:** Office: 8:30 – 4:30 from M-F Library: 16 hrs/wk – varies with days.

ARCHITECHTURAL/STRUCTURAL
Roof Type/R-value: Masonry exterior with drywall interior with 8" Batt = R-28. Metal clad on sides + back.
Door Type/weather stripping: 1 – door – poor w/s & good caulking Front door – good in office, same in library.
Window type/caulking: 3 pane bronze tint, good caulking.
Other:
MECHANICAL
Heating System: Office: Standard efficiency furnace – gas – 200,000 BTU @ 60% efficiency. Library: 100,000 BTU
Cooling System: Office: 4 ton A/C Library: 2.5 ton A/C Original keep rite condensers.
Ventilation System: Washroom exhaust fans.
HVAC Controls: Programmable stat in office & library. Out of setting.
HVAC Maintenance/Training: Clean filter in furnace (office). Dirty in library.
Water Supply System: Water meter off town system.
Domestic Hot Water System: 30 gal – 32MBH gas water heater in office. Same in library.
Water Fixtures: Office: 2 toilets & 2 sinks – all high flow. Library: 4 sinks, 1 urinal, 3 toilets – all high flow.

ELECTRICAL
Indoor Lighting: 63 – 40W – 4'x4 T12 in office. 42 – 40 W – 4'x4 T12 in library. 1- 150 W incandescent.
Outdoor Lighting: 8 – 150 W – flood lights in the front.
Exit Signs: 4 – incandescent in office. 2 – incandescent in library.
Motors:
Parking Lot Plugs: 3 in back.
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin		**Date:** February 22, 2006.
Toured By: Ray Bodnar & Don Todorovich		**Construction Date:** ~1960s
Building: Recycling Depot.		**Renovations:**
Address: 113 1st Ave. N.W.		Town shop storage addition added ~ 1980.
L x W x H:	**Area:** 5032 SF	
Building Capacity: 4		
Building Floor Plan: Recycle office & storage area, Town shop storage separate building in the back.		**Occupied Times:** Recycling Depot: M-F from 1-5pm Town Shop – intermittently.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: 6" walls metal clad with drywall interior.
Roof Type/R-value: Metal roof with drywall interior. 6" Batt.
Door Type/weather stripping: 2 – pedestrian doors with poor stripping & caulking 1 – 10'x12' – new vehicle door – good stripping. 1 – 12'x12' – non-insulated vehicle door – poor stripping & old. 1 – pedestrian door – poor stripping & caulking (1/4" gap)
Window type/caulking: 1 – 60"x60" – double pane with no caulking 7 – 46"x56" – double pane with no caulking 1 window cracked.
Other:
MECHANICAL
Heating System: 1 gas unit heater @ 80 MBH 1 old gas furnace @ 80 MBH Ceiling fans not on. Town Shop: 2 gas unit heaters.
Cooling System: Window A/C in office.
Ventilation System: Wall fan c/w BDD behind wall.
HVAC Controls: Standard stats – damaged.
HVAC Maintenance/Training: Temperature is 68ºF in shop (too high)
Water Supply System:
Domestic Hot Water System: 30 gal electric water heater – no insulation on piping.
Water Fixtures: 1 toilet & 1 sink - okay

ELECTRICAL
Indoor Lighting: Recycling Depot: 19 – 8'x2 – T12; 6 – 4'x1 – T12 Town Shop: 18 – 8'x2 – T12 – hardly used.
Outdoor Lighting: None.
Exit Signs: None.
Motors:
Parking Lot Plugs: Not Used.
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 22, 2006
Toured By: Ray Bodnar & Don Todorovich	**Construction Date:** 1978
Building: Fire Hall	**Renovations:**
Address: 33 4th Ave. S.W.	None.
L x W x H: 80 x 60 / **Area:** 4800 SF	
Building Capacity: 12 in office	
Building Floor Plan: Fire Trucks, Fire Chief Office & Meeting Room.	**Occupied Times:** ~ 4 hrs/wk for meetings Plus intermittent for a TOTAL of 8 hrs/wk.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: 6" insulation. Metal clad interior and exterior. R-20.
Roof Type/R-value: Same as walls. R-20.
Door Type/weather stripping: 3 – 14x12 vehicle doors with 5/10" stripping & no caulking. Pedestrian doors are good.
Window type/caulking: 1 – 60"x60" – double pane – good caulking. 2 – 70"x36" – double pane in meeting room
Other:
MECHANICAL
Heating System: Baseboard electric in Fire Chief Office. Baseboard electric in Meeting Room. Need occupancy sensor. 3 – gas unit heaters – 80MBH
Cooling System: None.
Ventilation System: Wall exhaust fan with BDD.
HVAC Controls: Standard stats Temperature in Fire Hall too high @ 68ºF.
HVAC Maintenance/Training:
Water Supply System:
Domestic Hot Water System: 1 – 175L electric HWT. No pipe insulation.
Water Fixtures: Leaky faucet in janitor's room. 2 sinks – high flow. 2 toilets + 1 urinal = all of these are low flow fixtures.

ELECTRICAL
Indoor Lighting: 77 - 4'x2 – T12s.
Outdoor Lighting:
Exit Signs: 1 incandescent.
Motors:
Parking Lot Plugs:
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 22, 2006.
Toured By: Ray Bodnar & Don Todorovich	**Construction Date:** 1962.
Building: Public Works Shop	**Renovations:**
Address: 336 Pth 5 W	None.
L x W x H: 90 x 36 x 14 — **Area:** 3240 SF	
Building Capacity: Typically 6	
Building Floor Plan: Town Heavy Vehicle Storage & Work Shop.	**Occupied Times:** M-F: 8am – 4:30 pm Weekends: 8am – Noon.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: R-12 Metal Clad.
Roof Type/R-value: R20. 2 x 8" Rafter Metal Glad.
Door Type/weather stripping: 2 – pedestrian doors – poor stripping & needs new caulking. 6 – old wooden vehicle doors – poor stripping & caulking (2 of 12' x 12' size; 2 of 12' x 14' size; 3 of 10' x 12' size).
Window type/caulking: 38" x 48" – single pane – poor caulking. 38" x 34" – double pane.
Other:
MECHANICAL
Heating System: 1 – 110/88 MBH – old gas furnace. 1 – 125/100 MBH – gas unit heater – newer.
Cooling System: None.
Ventilation System: 1 wall exhaust fan with hood c/w BDD – leaks.
HVAC Controls: Old Stats (2).
HVAC Maintenance/Training: Dirty furnace filter.
Water Supply System:
Domestic Hot Water System: 1 – 30 gal gas water heater. Piping not insulated.
Water Fixtures: 1 sink & toilet (13.26 LPF).

ELECTRICAL
Indoor Lighting: 6 – 100W incandescent. 8 – 300W – incandescent. 6 – 8'x2 – 60W – T12s.
Outdoor Lighting:
Exit Signs: None.
Motors:
Parking Lot Plugs: 4 plugs
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Natural Gas.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** November 29, 2005
Toured By: Tibor Takach & Jason Boguski	**Construction Date:** 1959
Building: Water Treatment Plant	**Renovations:**
Address: 336 PTH 5W	No significant changes in recent past. VFD's installed recently. New roof installed in 2005, no insulation upgrade.
L x W x H: 32'x37'x14.7' **Area:**	
Building Capacity:	
Building Floor Plan: - Square open floor plan. - Upper and lower level.	**Occupied Times:** 2-4 hours daily.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Concrete block construction; Zonolite filled voids (assumed) – 8" block wall + 4" concrete = R-5
- Concrete block exterior with portion of the building having architectural brick.

Roof Type/R-value:

- Steel decking, tar and gravel built up roof. Roof was replaced in 2005. Ceiling is R-7.5

Door Type/weather stripping:

- 2-46" metal, insulated, exterior doors. One door on upper level and second door on lower level.
- Weather stripping present but appears to be damaged. Light visible through gaps between door and door jam.

Window type/caulking:

- 1 – 46"x12" single pane window at upper level entrance.
- 1 – 46"x96" single pane window to lower level entrance.

Other:

MECHANICAL

Heating System:

- Reznor, Model UDAS 175 –S furnace installed in January 2005.
- Furnace has 115 V, single phase, 60 hz; 4.7A motor.
- Natural gas fired rated at 175,000 BTU/hr normal input; 145,250 BTU/hr thermal output; normal manifold pressure 3.5 inch w.c.
- Temperature maintained at approximately 25ºC during winter months.

Cooling System:

- None present.

Ventilation System:

- 1 – 16"x16" motorized damper.
- 1 – 115V; 1A; Penn Ventilation fan.

HVAC Controls:

- Wall mounted thermostat.

HVAC Maintenance/Training:

Water Supply System:

- Domestic water supply from system pressure.

Domestic Hot Water System:

- 1 – 40 gal, GSW McClary, 2 element hot water heater; model 5E52078; 6000W.

Water Fixtures:

- Hot/cold water hose bib.

ELECTRICAL

Indoor Lighting:

- 8 – standard efficiency; dual lamp fluorescent fixtures. Only one fixture operating at time of visit.
- 3 – Sodium lamps; 300W

Outdoor Lighting:

- 3 – sodium/metal halide exterior lights at entrance.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

- 1 – 240V external plug.

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Water Meters:

- 1 – 200 mm water meter. Old unit. Reliability unknown.
- 1 – 3" Trident water meter is present but not operational. Monitors backwash flows.
- 3 – 3" Neptune turbine flow meters are located at each filter to monitor filtered water volumes from each filter.

Distribution Pumps:

- 2 – 15 hp; Grundfos; MS6000; 3 phase; 60 hz; s.f. 1.15; code H; VAC D; 208/230 V; 54/50.5 A; cosθ 0.86/0.81; rpm 3440/3470; continuous duty; 104 ºF; insulation class F; 81.7% efficiency.
- Distribution pumps are operated through Aquavar AVII VFD's for both distribution pumps.

Backup Power Supply:

- 1 – Ford; 4.9L; 6 cyl; natural gas fired pump.
- Pump is a Peerless; 8 x 8 x 16 ½ vertical turbine fire pump.

Chemical Feed Pumps:

- 1 LMI positive displacement chemical feed pumps. One pump is for 12% sodium hypochlorite; second pump is for blended polyphosphate solution (SLI – 5230).
- 1 – Prominent G4/b chemical feed pump for Flouosilicic Acid solution.

Air Compressor:

- Motor information: Baldor 1.5 hp; frame 145T; 3 phase; 230 V; 4.2A; 1725 rpm; 60 hz; s.f. 1.2; 40 ºC ambient temperature.

Air Scour Blower:

- Motor: General Electric; 5 hp; 1745 rpm; s.f. 1.15; 14.2 A; 220 V.
- Blower: Sutorbuilt; model GACMDPA; Cat. No. 4MP; 3600 rpm; root type blower.

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 240 V; 3 phase; 200 A main service.

NOTES:

Distribution system pressure maintained at approximately 57 psi.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** November 29, 2005
Toured By: Tibor Takach & Jason Boguski	**Construction Date:** 1959
Building: Lift Station #1	**Renovations:**
Address: 449 Bud Ave.	No significant changes in recent past.
L x W x H: 18'x14'x10' **Area:**	
Building Capacity:	
Building Floor Plan: Square open floor plan.	**Occupied Times:** Daily for ~ 10 minutes. Once per week for ~ ½ hour.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Concrete block construction; unknown if insulated with blow in Zonolite. 8" concrete block + ½" rigid = R-2.5

Roof Type/R-value:

- 2x4 framed wood construction.
- Ceiling R-7.5 (1.5" rigid insulation)
- Asphalt shingles.

Door Type/weather stripping:

- 36" metal, insulated, exterior door.
- Weather stripping damaged.

Window type/caulking:

- 1 – 90"x36" single pane exterior window.
- 1 – 160"x24" dual pane window.

Other:

- 36" x 88" ventilation opening.

MECHANICAL

Heating System:

- 2 – wall mount units, coil type; capacity unknown; appear to be ~ 3000 W.
- Temperature maintained at approximately 20ºC during winter months.

Cooling System:

- None present.

Ventilation System:

Wetwell Ventilation:

- Motor: Magnetek; cat. B665; ¾ hp; Type C5; 208/230 V; 4.7/9.2 Amps; 3450 rpm.

Building Ventilation Fan:

- Fantech Model FR2; 530 cfm @ 20" w.c.; 230 W; 115 V.

HVAC Controls:

- Integral to heating unit.

HVAC Maintenance/Training:

Water Supply System:

- None.

Domestic Hot Water System:

- N/A.

Water Fixtures:

ELECTRICAL

Indoor Lighting:

- 2 – Dual lamp standard efficiency fluorescent light fixtures, 40W. (4' T12 @ 2x2)

Outdoor Lighting:

- 1 – Exterior light, 100W.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

- None.

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

- 2 – Flygt; 18 hp (13.4 kW); 1760 rpm; 3 phase; 60 hz; 208 V; 53 amp; cos θ 0.8; model 3153. 180-5043; submersible trash pumps.
- On/off operation.
- Milltronics level control.
- Endress and Hauser; Promag 30F magmeter; 85-260 VAC; 15 VA; order code 30FH2H-MB1BD31A21B
- ONAN; Model DGCB-4960203; diesel genset backup power supply; 3 phase; 60 kW; 0.8 power factor; 75 kW rated.
- 1 – 1 ton electric hoist; 115 V; single phase; 60 hz; 0.73 hp; 121 A.

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 204 V, 200 A main service.

NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin		**Date:** November 29, 2005
Toured By: Tibor Takach & Jason Boguski		**Construction Date:** 2000
Building: Lift Station #2		**Renovations:**
Address: 308 Lake Dr.		No significant changes in the recent past.
L x W x H: 14'x16'	**Area**: 224SF	
Building Capacity:		
Building Floor Plan: Square open floor plan. Separate Electrical and Control Room.		**Occupied Times:** Daily for ~ 10 minutes. Once per week for ~ ½ hr.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- 2x4; insulated wood construction; plywood interior sheathing; metal clad exterior. R-12.

Roof Type/R-value:

- 2x4 framed wood construction.
- Insulated. R-20.
- Metal clad.

Door Type/weather stripping:

- 34" metal, insulated, exterior door, wood frame, weather-stripping.
- No insulation between building framing and door jam.

Window type/caulking:

- No windows.

Other:

- Electrical room dimensions are approximately 12m x 1.5m.

MECHANICAL

Heating System:

- 1 – 4 foot section, 1000W, baseboard heater in electrical room. Electric fan heater.
- 1 – 4800W, Dimplex North America, coil type unit heater.
- Temperature in electrical room maintained at approximately 20ºC during winter months.

Cooling System:

- None present.

Ventilation System:

- 1 – 8" dampered make-up air vent.
- 1 – wet well fan; size unknown.

HVAC Controls:

- Integral to baseboard heating unit.

HVAC Maintenance/Training:

Water Supply System:

- None.

Domestic Hot Water System:

- N/A.

Water Fixtures:

ELECTRICAL

Indoor Lighting:

- 2 – 100W; incandescent light fixtures in electrical room.
- 1 – 150W; incandescent light fixture in pump room.

Outdoor Lighting:

- 1 – Exterior sodium light – high pressure.
- 1 – External alarm beacon.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

- None.

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

- 2 – Flygt trash pumps; model 3120 – 180 – 6197; 1750rpm; 13 A; 5 hp (3.7kW), 230 V; impeller#435
- Milltronics level control.
- 1 – Backup power supply – Leroy Somer Alternator; PTO power supply; Model LSA-43.2S3 J8/4; 40 kW; 40kVa; cosθ 1; single phase; 60 hz; 1800 rpm; 240 V.
-

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 240V, 100A,; 3 phase, main service.

NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** November 29, 2005
Toured By: Tibor Takach & Jason Boguski	**Construction Date: 1985**
Building: **Pumphouse #1**	**Renovations:**
Address: 316 PTH 5W	No significant changes in the recent past.
L x W x H: 12'x18' **Area**: 216SF	
Building Capacity:	
Building Floor Plan:	**Occupied Times:**
Square open floor plan.	½ hr daily.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- 2x4 insulated wall construction. 6" insulation for walls @ R-20.
- Interior and exterior walls are metal clad.

Roof Type/R-value:

- 2x4 framed wood construction. 6" insulation for roof @ R-20.
- Insulated.

Door Type/weather stripping:

- 2- 36" metal, insulated, exterior doors (double door set).
- Weather stripping present and appears to be in good condition.
- One door has 36"x22"; vertical sliding window (single pane)

Window type/caulking:

- 1 – 60"x30" dual pane window with aluminium framing.

Other:

MECHANICAL

Heating System:

- 2 – wall mount units, coil type electric; capacity unknown; appear to be ~3000W. Electric fan heaters.
- Temperature maintained at approximately 20ºC during winter months.

Cooling System:

- None present.

Ventilation System:

- 1 – 12"x12" motorized damper.
- 1 – 115V; 1A; Penn Ventilation fan.

HVAC Controls:

- Integral to heating unit.

HVAC Maintenance/Training:

Water Supply System:

- 1 – cold water hose bib from water treatment plant.

Domestic Hot Water System:

- None.

Water Fixtures:

ELECTRICAL

Indoor Lighting:

- 4 – 150W incandescent light fixtures; three of the fixtures in use at time of visit.

Outdoor Lighting:

- 1 – 75W metal halide exterior light.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

- 1 – dual plug outlet.

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

- 40 hp submersible pump; model 2870115109; 575 V; 3 phase; 60 hz;
- Backup Genset;
- 600V; 120kVA; 96kW; 115A; cosθ 0.8; 60 hz; 1800 rpml Model LSA 44.1 M4C9/4 Leroy Somer alternator powered from PTO.

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 575 V, 200 A main service.

NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** November 29, 2005.
Toured By: Tibor Takach & Jason Boguski	**Construction Date:** 1985
Building: Pumphouse #2	**Renovations:**
Address: 132 Park St.	No significant changes in the recent past.
L x W x H: 12'x18' **Area:** 216 SF	
Building Capacity:	
Building Floor Plan:	**Occupied Times:**
Square open floor plan.	½ hour daily.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- 2x4 insulated wall construction. 6" insulation for walls @ R-20.
- Interior and exterior walls are metal clad.

Roof Type/R-value:

- 2x4 framed wood construction. 6" insulation for roof @ R-20.
- Insulated.

Door Type/weather stripping:

- 2 – 36" metal, insulated, exterior doors (double door set).
- Weather stripping present and appears to be in good condition.
- One door has 36"x22" vertical sliding window (single pane).

Window type/caulking:

- 1 – 60"x30" dual pane window with aluminium framing.

Other:

MECHANICAL

Heating System:

- 2 – wall mount units, coil type electric; capacity unknown, appear to be ~ 3000W. Electric fan heaters.
- Temperature maintained at ~ 20ºC during winter months.

Cooling System:

- None present.

Ventilation System:

- 1 – 12"x12" motorized damper.
- 1 – 115V; 1A' Penn Ventilation fan.

HVAC Controls:

- Integral to heating unit.

HVAC Maintenance/Training:

Water Supply System:

- 1 – cold water hose bib from water treatment plant.

Domestic Hot Water System:

- None.

Water Fixtures:

ELECTRICAL

Indoor Lighting:

- 4 – 150W incandescent light fixtures; three of the fixtures were in use at time of visit.

Outdoor Lighting:

- 1 – 75W metal halide exterior light.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

- 1 – dual plug outlet (disconnected).

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

- 50 hp submersible pump; model 2870115109; 575 V; 3 phase; 60 hz.
- Backup Genset;
- 600V; 120 KVA; 96 kW; 115 A; cosΘ 0.8; 60 hz; 1800 rpm; Model LSA 44.1 M4C9/4 Leroy Somer alternator powered from PTO.

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 575V, 200A main service.

NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Roblin	**Date:** February 22, 2006.
Toured By: Ray Bodnar & Don Todorovich	**Construction Date:** 1980s.
Building: Campground Office.	**Renovations:**
Address: Goose Lake Drive	None.
L x W x H: / **Area:** 744 SF	
Building Capacity: 2	
Building Floor Plan: Office, showers, changeroom & Ice Cream Sales.	**Occupied Times:** Office: 8:30am – 4:30pm from M-F for May-Sept. Ice Cream: 2pm – 9pm – 7days/wk.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Building not heated. Summer use only.
- Brick construction.

Roof Type/R-value:

- Shingled roof sloped.

Door Type/weather stripping:

Window type/caulking:

Other:

MECHANICAL

Heating System:

- None

Cooling System:

- Window A/C.

Ventilation System:

- None.

HVAC Controls:

HVAC Maintenance/Training:

Water Supply System:

Domestic Hot Water System:

- 3 – 175 L – electric tanks with no insulation on piping.

Water Fixtures:

- 3 toilets, 4 sinks, 1 urinal & 4 showers.

ELECTRICAL

Indoor Lighting:

- 4 – 100W – incandescent.
- 8 – 4'x2 – T12s.

Outdoor Lighting:

- 2 – incandescent.

Exit Signs:

- None.

Motors:

Parking Lot Plugs:

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

NOTES

APPENDIX B

TABLES TO CALCULATE ENERGY SAVINGS

TABLE OF CONTENTS – APPENDIX B

Table B.1.1 - Energy Breakdown for the Large Arena (Includes Small Arena)

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	118,759	31%
Lighting	41,533	11%
Hot Water	114,749	30%
Motors	104,271	27%
Total	**379,312**	

Table B.1.2 (a) - Electricity Usage for the Large Arena (Includes Small Arena)

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	60,042	$0	$1,923	$2,210.51
November	0	0	43,842	$0	$1,544	$1,778.55
December	0	0	29,042	$0	$1,702	$1,958.08
January	0	0	29,642	$0	$1,212	$1,399.91
February	0	0	29,200	$0	$1,202	$1,388.12
March	0	0	37,442	$0	$1,395	$1,614.90
April	0	0	11,242	$0	$672	$783.96
May	0	0	7,842	$0	$471	$554.83
June	0	0	21,642	$0	$1,051	$1,215.71
July	0	0	28,442	$0	$1,217	$1,405.17
August	0	0	24,842	$0	$1,129	$1,304.87
September	0	0	11,642	$0	$721	$839.69
TOTAL		**0**	**334,862**	**$0**	**$14,238**	**$16,454**

Table B.1.2(b)- Natural Gas Consumption for the Large Arena (Includes Small Arena)

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	84	869	$48
November	27	279	$23
December	828	8,570	$359
January	1,092	11,302	$469
February	883	9,139	$378
March	771	7,980	$326
April	657	6,800	$279
May	244	2,525	$116
June	38	393	$29
July	38	393	$29
August	0	0	$0
September	0	0	$0
TOTAL	**4,662**	**48,250**	**$2,056**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Arena is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

The Swimming Pool/Changeroom facility uses 3,800 kWh of electric energy from the Arena which costs $187.

Table B.1.3 - Lighting Analysis Summary for the Large Arena (Includes Small Arena)

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Reception Area 100W Incandescants - Convert to compact fluorescents	2	306	$18	86	$5	220	$13
Basement 100W Incandescants - convert to compact fluorescents	2	306	$18	86	$5	220	$13
Reception Area -Convert 8' T12s to 8' T8s (32x2).	64	11,359	$682	5,288	$317	6,071	$365
Basement - Convert 8' T12s to 8' T8s (20x2)	40	7,099	$426	3,305	$198	3,794	$228
Basement - Convert 4' T12s to 4' T8s (9x2)	18	1,349	$81	812	$49	537	$32
Zamboni Room - Convert incandescents to compact fluorescents	2	306	$18	86	$5	220	$13
Cold Storage Room - Convert 150W incandescents to compact fluorescents	8	1,836	$110	477	$29	1,359	$82
Rink - Metal Halides 400W	31	18,972	$1,139	18,972	$1,139	0	$0
TOTALS		**41,533**	**$2,494**	**29,111**	**$1,748**	**12,422**	**$746**

Annual Energy Savings (KWH)	**12,422**
Annual Cost Savings	**$746**
Percent Annual Energy Savings	**30%**

Notes:
These calculations are based on an occupancy rate of 1530 hours/year.
Metal Halides are already energy efficient and do not require upgrading.

Table B.1.4 (a) Window and Door Replacement Calculations for the Large Arena (Includes Small Arena)

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace single pane windows 96"x48" to view inside arena with triple pane (7).	224	1.000	17,438	$1,047	6.25	2,790	$168	14,648	$879
Replace double pane windows - 40"x46" with triple pane windows (4).	51	2.000	1,989	$119	6.25	637	$38	1,353	$81
TOTALS			**19,427**	**$1,166**		**3,427**	**$206**	**16,000**	**$961**

Table B.1.4 (b) Window and Door Infiltration Calculations for the Large Arena (Small Arena)

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Pedestrian doors from heated to outside (2)	10	0.05	125	34	9,798,412	2,872	$172
Pedestrian doors from reception to rink. (8)	40	0.05	125	137	39,193,649	11,487	$690
Arena windows single pane (7)	42	0.025	50	57	16,461,332	4,824	$290
Double pane windows (4)	14	0.025	50	20	5,617,756	1,646	$99
TOTALS						**20,829**	**$1,251**

Table B.1.4 (c) Wall/Roof Insulation Upgrade for the Large Arena (Small Arena)

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Insulate ceiling in heated area.	5760	10.000	44,840	$2,692	40.000	11,210	$673	33,630	$2,019
TOTALS			**44,840**	**$2,692**		**11,210**	**$673**	**33,630**	**$2,019**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.1.5 - Water Usage for the Large Arena (Includes Small Arena)

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Sinks	6	11.4	104,709	1.60	167,535	0.32	33,507	134,028	5,023	$302
Toilets	7	7.1	75,863	13.25	1,005,178	3.98	301,933	703,245	NA	NA
Urinals	5	4.1	31,078	9.50	295,242	3.80	118,097	177,145	NA	NA
Showers	4	1.6	9,563	66.25	633,468	47.30	452,306	181,162	6,789	$408
Total					**2,101,423**		**905,843**	**1,195,580**	**11,811**	**$709**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	70	130	
Number of Toilet Uses/day	3	1	
Number of Toilets	6	6	
Toilet Uses/hour/fixture	4.375	2.708333	7.083333
Number of Sinks	8	8	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	3.28125	8.125	11.40625
Number of Urinals	0	4	
Number of Urinal Uses/day	0	1	
Urinal Uses/hr/fixture	0	4.0625	4.0625
Number of Showers	8	8	
Number of Shower Uses/day	1	1	
Shower Uses/hr/fixture	0.546875	1.015625	1.5625

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	167,535	6,278
Showers	633,468	23,739
Zamboni	480,000	39,697
Total		**69,713**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.05 gallons per flush

Table B.1.6 Heating, Ventilation & Airconditioning Usage for the Large Arena (Includes Small Arena)

Description	Quantity	Leakage (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Install motorized damper in ice plant room.	1	100	28,687,478	8407	$505

Description	Quantity	Current Energy Consumption (kWh)	Energy Savings (kWh)	Cost Savings ($)
Install outdoor thermostat to control rink ventilation	1	93,099	13,965	$838

Description	% of Time Unoccupied	HDD below 70°F	HDD below 59°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat wired to an occupancy sensor set to 15°C (59°F)	82.53%	11,067.7	9,408	118,759	10,292

Description	Quantity	Heating Efficiency	HDD below 70°F	Flow Rate (cfm)	Heat Savings (kWh)
Install countdown timer for greasehood exhaust fan.	1	80%	11,068	2000	3,782

Description	Current Efficiency	New Efficiency	Energy Used for Heating (kWh)	Energy Savings
Replace boiler with high efficiency boiler.	82%	94%	39,697	4,631

Table B.1.7 Energy Consumption and Savings Calculations for Motors in the Large Arena (Includes Small Arena)

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Ice plant motor	100.0	80	1,530	85%	81.6	60.85	93,099	2.40	1.79	2738
Brine pump motor	20.0	16	918	85%	16.3	12.17	11,172	0.48	0.36	329
TOTAL							**104,271**			**3,067**

Table B.2.1 - Energy Breakdown for the Swimming Pool Office, Changerooms & Plant Room

	Energy Consumption (kWh)	% of Total Energy Consumption
Pool Heating	352,693	90%
Lighting	3,800	1%
Hot Water	6,919	2%
Motors	29,671	8%
Total	**393,083**	

Table B.2.2 - Natural Gas Consumption for the Swimming Pool Office, Changerooms & Plant Room

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
October	0	0	$80
November	0	0	$80
December	0	0	$80
January	0	0	$80
February	0	0	$80
March	0	0	$80
April	0	0	$80
May	0	0	$80
June	0	0	$80
July	18,585	192,349	$7,558
August	12,475	129,113	$5,176
September	6,553	67,822	$2,805
TOTAL	**37,613**	**389,283**	**$16,257**

Notes

The Total Charge column includes the energy charge and 14% taxes.

** Uses 3,800 kWh of electric energy from the Arena at a cost of $187.

Table B.2.3 - Lighting Analysis Summary for the SwimmingPool Office, Changerooms & Plant Room

Description	Quantity	Current Conditions		After Improvements		Savings	
		Annual Energy Consumption (kWh)	Annual Cost ($)	Annual Energy Consumption (kWh)	Annual Cost ($)	Energy (kWh)	Annual Cost ($)
Fluorescents - Convert 4' T12s to 4' T8s (39x2)	78	2,981	$179	568	$34	2,413	$145
Incandescents (150W) - Convert to compact fluorescents	3	410	$25	106	$6	303	$18
Outdoor flood lights (100W) - convert to high pressure sodium lamps	9	410	$25	205	$12	205	$12
TOTALS		**3,800**	**$228**	**879**	**$53**	**2,921**	**$175**

Annual Energy Savings (KWH)	**2,921**
Annual Cost Savings	**$175**
Percent Annual Energy Savings	**77%**

Notes:
These calculations are based on an occupancy rate of 910 hours/year.
** Electric service from Arena.

Table B.2.4 - Water Usage for the Swimming Pool Office, Changerooms & Plant Room

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Sinks	6	0.5	2,986	1.60	4,778	0.32	956	3,822	143	$7
Toilets	6	0.4	2,275	13.25	30,144	3.98	9,055	21,089	NA	NA
Urinals	2	0.2	284	9.50	2,702	3.80	1,081	1,621	NA	NA
Showers	6	0.4	2,275	66.25	150,707	47.30	107,608	43,100	1,615	$74
Total					**188,330**		**118,698**	**69,632**	**1,758**	$80

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	5	5	
Number of Toilet Uses/day	3	1	
Number of Toilets	6	6	
Toilet Uses/hour/fixture	0.3125	0.104167	0.416667
Number of Sinks	8	8	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.234375	0.3125	0.546875
Number of Urinals	0	4	
Number of Urinal Uses/day	0	1	
Urinal Uses/hr/fixture	0	0.15625	0.15625
Number of Showers	6	6	
Number of Shower Uses/day	4	4	
Shower Uses/hr/fixture	0.208333	0.208333	0.416667

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	4,778	179
Showers	150,707	5,648
Total	**155,485**	**5,827**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm.
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.05 gallons per flush.

Table B.2.5 Heating, Ventilation & Airconditioning Usage for the Swimming Pool Office, Changerooms & Plant Room

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Upgrade NG pool heater to a high efficiency unit	1	0.82	0.89	24,688

Description	Quantity/Month	Current Energy Use (kWh)	Efficiency	Energy Savings (KWH)	Energy Savings ($)
Install liquid pool covers	3	352,693	0.2	70,539	$3,224

Table B.2.6 Energy Consumption and Savings Calculations for Motors in Swimming Pool Office, Changerooms & Plant Room

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Pool Pump - skimmer	20.0	16	2,268	85%	16.3	12.17	27,601	0.48	0.36	812
Pool Pump	1.5	1	2,268	85%	1.2	0.91	2,070	0.04	0.03	61
TOTAL							**29,671**			**873**

Table B.3.1 - Energy Breakdown for the Community Centre

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	252,431	94%
Lighting	4,497	2%
Hot Water	10,908	4%
Total	**267,836**	

Table B.3.2 (a) - Electricity Usage for the Community Centre

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	7,080	$0	$415	$490.93
November	0	0	5,880	$0	$345	$410.76
December	0	0	6,420	$0	$376	$446.84
January	0	0	8,640	$0	$506	$595.14
February	0	0	6,180	$0	$362	$430.80
March	0	0	5,400	$0	$316	$378.70
April	0	0	6,660	$0	$400	$473.93
May	0	0	6,960	$0	$418	$494.46
June	0	0	5,820	$0	$349	$416.43
July	0	0	9,720	$0	$584	$683.37
August	0	0	6,540	$0	$393	$465.71
September	0	0	2,640	$0	$159	$198.78
TOTAL		**0**	**77,940**	**$0**	**$4,622**	**$5,486**

Table B.3.2 (b) - Natural Gas Consumption for the Community Centre

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	530	5,485	$279
November	1,433	14,831	$618
December	2,605	26,961	$1,046
January	4,119	42,630	$1,608
February	3,266	33,802	$1,275
March	2,740	28,358	$1,049
April	2,319	24,001	$900
May	617	6,386	$457
June	0	0	$0
July	599	6,199	$401
August	33	342	$93
September	87	900	$116
TOTAL	**18,348**	**189,896**	**$7,842**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Community Centre is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.3.3 - Lighting Analysis Summary for the Community Centre

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Bathroom fluorescents - 4' T8s (12x2)	24	340	$20	340	$20	0	$0
Indoor lights - fluorescents - 4' T8s (48x4)	192	2,580	$155	2,580	$155	0	$0
Outdoor lights- high pressure sodium lamps	12	1,577	$95	1,577	$95	0	$0
TOTALS		**4,497**	**$270**	**4,497**	**$270**	**0**	**$0**

Annual Energy Savings (kWh)	**0**
Annual Cost Savings	**$0**
Percent Annual Energy Savings	**0%**

Notes:
These calculations are based on an occupancy rate of 480 hrs/yr.
All lights are energy efficient units. Upgrades are not required.

Table B.3.4 - Water Usage for the Community Centre

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	16	33.2	255,000	0.32	81,600	0.32	81,600	0	0	$0
Toilets	12	12.0	69,000	6.00	414,000	6.00	414,000	0	NA	NA
Urinal	4	30.5	58,500	3.80	222,300	3.80	222,300	0	NA	NA
Total					**717,900**		**717,900**	**0**	**0**	**$0**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	275	325	
Number of WC Uses/day	3	1	
Number of WCs	12	12	
WC Uses/hour/fixture	8.59	3.39	11.98
Number of urinal uses/day	0	3	
Number of urinals	0	4	
urinal uses/hour/fixture	0	30.47	30.47
Number of Faucets	8	8	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	12.89	20.31	33.20

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	81,600	3,058
Total		**3,058**

Note:
All water fixtures are low flow, water efficient units. Therefore, none of the fixtures were upgraded.

Table B.3.5 Energy Savings with Heating, Ventilating, and Air Conditioning for Community Centre

Description	Current Efficiency	New Efficiency	Energy Used for Cooling (kWh)	Energy Savings (kWh)
Replace RTU with high efficiency RTU	10.00	13.00	62,535	13,132

Table B.4.1A - Energy Breakdown for the Library

	Energy Consumption (kWh)	% of Total Energy Consumption
Heating	26,377	50%
Cooling	14,356	27%
Lighting	10,754	20%
Hot Water	1,060	2%
Total	**52,547**	

Table B.4.2A (a) - Electricity Usage for the Library

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	1,080	$0	$63	$90.10
November	0	0	2,750	$0	$161	$201.67
December	0	0	2,200	$0	$129	$164.92
January	0	0	2,130	$0	$125	$160.25
February	0	0	1,980	$0	$116	$150.23
March	0	0	1,790	$0	$105	$137.53
April	0	0	2,230	$0	$134	$170.71
May	0	0	1,940	$0	$116	$150.86
June	0	0	2,010	$0	$121	$155.66
July	0	0	1,640	$0	$98	$130.33
August	0	0	2,780	$0	$167	$208.36
September	0	0	2,580	$0	$155	$194.67
TOTAL		**0**	**25,110**	**$0**	**$1,490**	**$1,915**

Table B.4.2A (b) - Natural Gas Consumption for the Library

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	81	838	$47
November	62	642	$38
December	453	4,688	$202
January	627	6,489	$275
February	513	5,309	$225
March	459	4,751	$199
April	0	0	$0
May	353	3,653	$169
June	49	507	$34
July	30	310	$25
August	0	0	$0
September	24	248	$34
TOTAL	**2,651**	**27,437**	**$1,246**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Library is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.4.3A - Lighting Analysis Summary for the Library

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Upgrade 4'T12s to 4'T8s- convert 4' T12s to 4' T8s (42x4)	168	6,849	$411	4,123	$248	2,726	$164
Replace EXIT incandescent lamp with LED module.	2	526	$32	53	$3	473	$28
Outdoor flood lights (150W) - convert to high pressure sodium lamps	8	499	$30	250	$15	250	$15
Install Parking Lot Controller	6	2,880	$173	1,440	$86	1,440	$86
TOTALS		**10,754**	**$646**	**5,866**	**$352**	**4,888**	**$293**

Annual Energy Savings (KWH)	**4,888**
Annual Cost Savings	**$293**
Percent Annual Energy Savings	**45%**

Notes:

These calculations are based on an occupancy rate of 832 hours/year for the Library.

Table B.4.4A Window and Door Infiltration Calculations for the Library

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Pedestrian Door (1)	5	0.05	125	17	6,048,403	1,773	$81
TOTALS						**1,773**	**$81**

Notes:
Crack length for a door is 1/4 of its perimeter.

Table B.4.5A - Water Usage for the Library

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	4	0.4	1,456	1.60	2,330	0.32	466	1,864	70	$3
Toilets	3	0.3	832	13.25	11,024	3.98	3,311	7,713	NA	NA
Urinal	1	0.8	624	9.50	5,928	3.80	2,371	3,557	NA	NA
Total					**19,282**		**6,148**	**13,133**	**70**	**$3**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	2	2	
Number of WC Uses/day	3	1	
Number of WCs	3	3	
WC Uses/hour/fixture	0.25	0.08	0.33
Number of urinal uses/day	0	3	
Number of urinals	0	1	
urinal uses/hour/fixture	0	0.75	0.75
Number of Faucets	4	4	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	0.19	0.25	0.44

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	2,330	87
Total		**87**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm (energy efficient metering faucets).
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.05 gallons per flush
The current urinals consume 2.5 gpm and the new urinals are 1 gpm.

Table B.4.6A Energy Savings with Heating, Ventilating, and Air Conditioning for Library

Description	% of Time Unoccupied	HDD below 70 °F	HDD below 59° F	Current Energy Used to Heat	Heat Savings (KWH)
Setback thermostats to 15°C (59°F).	90.50%	11067.7	9,408	26,377	3,581

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with high efficiency furnace	1	0.6	0.94	8,968

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Total Energy Savings for HRV (kWh)	Energy Savings for HRV - for Library area (kWh)
Install HRV	1	200	4,203	2,101	1,051

Description	Current Efficiency	New Efficiency	Energy Used for Cooling (kWh)	Energy Savings (kWh)
Replace existing condensing unit with a high efficiency unit	8.00	13.00	14,356	5,025

Table B.4.1B - Energy Breakdown for the Town Administration Building

	Energy Consumption (kWh)	% of Total Energy Consumption
Heating	40,565	57%
Cooling	3,205	4%
Lighting	26,735	37%
Hot Water	1,238	2%
Total	**71,742**	

Table B.4.2B (a) - Electricity Usage for the Town Administration Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	2,120	$0	$124	$159.58
November	0	0	2,370	$0	$139	$176.28
December	0	0	2,900	$0	$170	$211.69
January	0	0	2,340	$0	$137	$174.28
February	0	0	2,750	$0	$161	$201.67
March	0	0	1,810	$0	$106	$138.87
April	0	0	2,850	$0	$171	$213.15
May	0	0	1,640	$0	$98	$130.33
June	0	0	2,140	$0	$128	$164.55
July	0	0	3,420	$0	$205	$252.16
August	0	0	3,210	$0	$193	$237.79
September	0	0	2,390	$0	$143	$181.67
TOTAL		**0**	**29,940**	**$0**	**$1,777**	**$2,242**

Table B.4.2B (b) - Natural Gas Consumption for the Town Administration Building

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	190	1,966	$93
November	193	1,997	$94
December	521	5,392	$230
January	1,070	11,074	$460
February	700	7,245	$303
March	619	6,406	$264
April	516	5,340	$222
May	109	1,128	$68
June	27	279	$61
July	27	279	$24
August	5	52	$14
September	62	642	$41
TOTAL	**4,039**	**41,802**	**$1,874**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Town Administration Building is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.4.3B - Lighting Analysis Summary for the Town Administration Building

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Upgrade 4' T12s to 4' T8s (63x4)	252	25,684	$1,542	15,463	$928	10,221	$614
Replace EXIT incandescent lamp with LED module.	4	1,051	$63	105	$6	946	$57
TOTALS		**26,735**	**$1,605**	**15,568**	**$935**	**11,167**	**$670**

Annual Energy Savings (KWH)	**11,167**
Annual Cost Savings	**$670**
Percent Annual Energy Savings	**42%**

Notes:

These calculations are based on an occupancy rate of 2080hours/year for the Town Administration Building.

Table B.4.4B Window and Door Infiltration Calculations for the Town Administration Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Pedestrian Door (1)	5	0.05	125	17	6,048,403	1,773	$81
TOTALS						**1,773**	**$81**

Notes:
Crack length for the door is 1/4 of their its perimeters.

Table B.4.5B - Water Usage for the Town Administration Building

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	2	1.1	4,420	1.60	7,072	0.32	1,414	5,658	212	$10
Toilets	2	0.7	2,860	13.25	37,895	3.98	11,383	26,512	N/A	N/A
Total					**44,967**		**12,797**	**32,170**	**212**	**$10**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	3	2	
Number of WC Uses/day	3	1	
Number of WCs	2	2	
WC Uses/hour/fixture	0.56	0.13	0.69
Number of urinal uses/day	0	3	
Number of urinals	0	0	
urinal uses/hour/fixture	0	0.00	0.00
Number of Faucets	2	2	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	0.56	0.50	1.06

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	7,072	265
Total		**265**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm (energy efficient metering faucets).
The current toilets are assumed to use 3.5 gallons per flush and the toilets use 1.05 gallons per flush
The current urinals consume 2.5 gpm and the new urinals are 1 gpm.

Table B.4.6B Energy Savings with Heating, Ventilating, and Air Conditioning for Library

Description	% of Time Unoccupied	HDD below 70 °F	HDD below 59 °F	Current Energy Used to Heat (kWh)	Heat Savings (KWH)
Setback thermostats to 59°F.	76.26%	11067.7	9,408	40,565	4,640

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with high efficiency furnace.	1	0.6	0.94	13,792

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Total Energy Savings for HRV (kWh)	Energy Savings for HRV - for Town Admin. Building area (kWh)
Install HRV.	1	200	4,203	2,101	1,051

Table B.5.1 - Energy Breakdown for the Recycling Depot

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	122,554	93%
Lighting	6,518	5%
Hot Water	2,386	2%
Total	**131,458**	

Table B.5.2 (a) - Electricity Usage for the Recycling Depot

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	60	$0	$4	$21.96
November	0	0	50	$0	$3	$21.30
December	0	0	70	$0	$4	$22.63
January	0	0	60	$0	$4	$21.96
February	0	0	60	$0	$4	$21.96
March	0	0	60	$0	$4	$21.96
April	0	0	70	$0	$4	$22.87
May	0	0	60	$0	$4	$22.19
June	0	0	60	$0	$4	$22.19
July	0	0	50	$0	$3	$21.50
August	0	0	40	$0	$2	$20.82
September	0	0	50	$0	$3	$21.50
TOTAL		**0**	**690**	**$0**	**$41**	**$263**

Table B.5.2 (b) - Natural Gas Consumption for the Recycling Depot

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	391	4,047	$180
November	777	8,042	$343
December	2,102	21,755	$893
January	2,895	29,962	$1,226
February	0	0	$0
March	4,166	43,117	$1,739
April	1,730	17,905	$717
May	109	1,128	$58
June	0	0	$0
July	280	2,898	$150
August	152	1,573	$82
September	33	342	$27
TOTAL	**12,635**	**130,768**	**$5,415**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Recycling Depot is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.5.3 - Lighting Analysis Summary for the Recycling Depot

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Recycling Depot							
Replace 4' T12s to 4' T8s(1x6)	6	282	$17	170	$10	112	$7
Replace 8' T12s to 8' T8s (2x19)	38	4,232	$254	1,970	$118	2,262	$136
Town Shop							
Upgrade 8' T12s to 8' T8s (2x18)	36	2,004	$120	933	$56	1,071	$64
TOTALS		**6,518**	**$391**	**3,073**	**$185**	**3,445**	**$207**

Annual Energy Savings (KWH)	**3,445**
Annual Cost Savings	**$207**
Percent Annual Energy Savings	**53%**

Notes:
These calculations are based on an occupancy rate of 960 hours/year.

Table B.5.4 (a) Window and Door Replacement Calculations for the Recycling Depot

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace 12'x12' vehicle door with an insulated door (1).	144	1.578	8,772	$401	6.67	2,075	$95	6,697	$306
Upgrade 60"x60" double pane window with triple pane window (1).	25	2.000	1,201	$55	6.67	360	$16	841	$38
Replace 46"x56" double pane windows with triple pane windows (7).	125	2.000	6,017	$275	6.25	1,926	$88	4,092	$187
TOTALS			**15,991**	**$731**		**4,361**	**$199**	**11,630**	**$532**

Table B.5.4 (b) Window and Door Infiltration Calculations for the Recycling Depot

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Windows (7)	30	0.025	50	41	14,395,198	4,219	$193
Windows (1)	5	0.025	50	7	2,419,361	709	$32
Pedestrian Doors (3)	20	0.05	125	68	24,193,610	7,090	$324
Vehicle Door (1)	5	0.05	125	17	6,048,403	1,773	$81
TOTALS						**13,791**	**$630**

Table B.5.4 (c) Wall/Roof Insulation Upgrade for the Recycling Depot

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade roof insulation	5032	12.000	40,301	$1,842	40	12,090	$553	28,211	$1,289
TOTALS			**40,301**	**$1,842**		**12,090**	**$553**	**28,211**	**$1,289**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.
One pedestrian door has large gap -use 1/2 of its perimeter for crack length.
As of November 1, 2005, the cost of primary natural gas is 0.0457 $/kWh.

Table B.5.5 - Water Usage for the Recycling Depot

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	1	2.0	1,920	0.32	614	0.32	614	0	0	$0
Toilets	1	0.5	480	6.00	2,880	6.00	2,880	0	N/A	N/A
Total					**3,494**		**3,494**	**0**	**0**	**$0**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	0	4	
Number of WC Uses/day	3	1	
Number of WCs	1	1	
WC Uses/hour/fixture	0.00	0.50	0.50
Number of urinal uses/day	0	3	
Number of urinals	0	8	
urinal uses/hour/fixture	0	0.19	0.19
Number of Faucets	1	1	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	0.00	2.00	2.00

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	614	23
Total		**23**

Notes:
The current faucet & toilet are water efficient fixtures.
Upgrades are not required for these fixtures.

Table B.5.6 Heating, Ventilation & Airconditioning Usage for the Recycling Depot

Description	Quantity	Heating Efficiency	HDD below 70°F	Flow Rate (cfm)	Heat Loss (kWh)	Cost ($)
Replace BDD with motorized damper	1	81%	11,068	100	10,377	$474

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Install high efficiency furance	1	0.85	0.95	12,255

Description	% of Time Unoccupied	HDD below 70 °F	HDD below 59°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 15°C (59°F)	89.04%	11067.7	9,407.5	75,983	7,104

Description	% of Time Unoccupied	HDD below 70°F	HDD below 50°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 10°C (50°F)	94.52%	11067.7	7,061.9	46,570	11,152

Description	Area of Ceiling & Top Quarter of Walls (ft^2)	Roof R-value	Heat Savings (kWh)
Run Ceiling Fan	3975.5	24	5,316

Table B.6.1 - Energy Breakdown for the Fire Hall

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	156,900	96%
Lighting	3,402	2%
Hot Water	2,595	2%
Total	**162,897**	

Table B.6.2 (a) - Electricity Usage for the Fire Hall

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	1,810	$0	$106	$138.87
November	0	0	2,880	$0	$169	$210.35
December	0	0	3,090	$0	$181	$224.38
January	0	0	5,060	$0	$297	$355.98
February	0	0	2,540	$0	$149	$187.64
March	0	0	3,780	$0	$222	$270.47
April	0	0	3,180	$0	$191	$235.74
May	0	0	2,260	$0	$136	$172.77
June	0	0	2,890	$0	$174	$215.89
July	0	0	980	$0	$59	$85.16
August	0	0	1,480	$0	$89	$119.38
September	0	0	1,050	$0	$63	$89.95
TOTAL		**0**	**31,000**	**$0**	**$1,834**	**$2,307**

Table B.6.2 (b) - Natural Gas Consumption for the Fire Hall

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	3	31	$13
November	902	9,335	$397
December	2,490	25,771	$1,056
January	2,838	29,372	$1,202
February	2,115	21,890	$890
March	1,806	18,692	$748
April	1,002	10,370	$420
May	730	7,555	$286
June	595	6,158	$99
July	0	0	$0
August	144	1,490	$89
September	119	1,232	$68
TOTAL	**12,744**	**131,897**	**$5,269**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Fire Hall is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.6.3 - Lighting Analysis Summary for the Fire Hall

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Convert 4' T12s fluorescents to 4' T8s (77x2)	154	3,139	$188	1,890	$113	1,249	$75
Replace EXIT incandescent lamp with LED module.	1	263	$16	26	$2	237	$14
TOTALS		**3,402**	**$204**	**1,916**	**$115**	**1,486**	**$89**

Annual Energy Savings (KWH)	**1,486**
Annual Cost Savings	**$89**
Percent Annual Energy Savings	**44%**

Notes:

These calculations are based on an occupancy rate of 416 hours/year.
Assume exit signs are on for 24 hours a day, 365 days of the year.

Table B.6.4 (a) Window and Door Replacement Calculations for the Fire Hall

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade 60"x60" double pane window with triple pane window (1).	25	2.000	1,201	$55	6.67	360	$16	841	$38
Replace 70"x36" double pane windows in meeting room with triple pane (2)	35	2.000	1,682	$77	6.25	538	$25	1,144	$52
TOTALS			**2,883**	**$132**		**898**	**$41**	**1,985**	**$91**

Table B.6.4 (b) Window and Door Infiltration Calculations for the Fire Hall

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Vehicle Door (3)	39	0.05	125	133	47,177,540	13,826	$632
TOTALS						**13,826**	**$632**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.
One pedestrian door has large gap -used 1/2 of its perimeter for crack length.
As of November 1, 2005, the cost of primary natural gas is 0.0457 $/kWh.

Table B.6.5 - Water Usage for the Fire Hall

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	2	3.0	2,496	1.60	3,994	0.32	799	3,195	120	$7
Toilets	2	0.5	416	6.00	2,496	3.98	1,656	840	N/A	N/A
Urinal	1	0.6	234	3.80	889	3.80	889	0	N/A	N/A
Total					**7,379**		**3,344**	**4,035**	**120**	**$7**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	0	12	
Number of WC Uses/day	3	1	
Number of WCs	2	3	
WC Uses/hour/fixture	0.00	0.50	0.50
Number of urinal uses/day	0	3	
Number of urinals	0	8	
urinal uses/hour/fixture	0	0.56	0.56
Number of Faucets	2	2	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	0.00	3.00	3.00

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	3,994	150
Total		**150**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm (energy efficient metering faucets).
The current toilets are assumed to use 3.5 gallons per flush and the toilets use 1.5 gallons per flush
The current urinals consume 2.5 gpm and the new urinals are 1 gpm

Table B.6.6 Heating, Ventilation & Airconditioning Usage for the Fire Hall

Description	Quantity	Heating Efficiency	HDD below 70°F	Flow Rate (cfm)	Heat Loss (kWh)	Cost ($)
Replace BDD with motorized damper	1	81%	11,068	100	10,377	$474

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace unit heaters with high efficiency furnaces	1	0.8	0.95	23,535

Description	% of Time Unoccupied	HDD below 70°F	HDD below 59°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat wired to an occupancy sensor set to 15°C (59°F)	95.25%	11067.7	9,407.5	156,900	15,693

Description	Quantity	Current Efficiency	New Efficiency	Current Energy Required for Heating	Energy Savings (KWH)	$ NI	Peak Winter Load (kW)	Annual Energy Use (kWh)-Incentive	Total Incentive ($)	$ WI
Install heat pump (geothermal)	1	0.81	3	156,900	114,537	$31,140	$3,645	$4,581	$8,226	$22,914

Table B.7.1 - Energy Breakdown for the Public Works Shop

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	121,619	88%
Lighting	14,050	10%
Hot Water	2,836	2%
Total	**138,505**	

Table B.7.2 (a) - Electricity Usage for the Public Works Shop

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	620	$0	$36	$59.37
November	0	0	1,980	$0	$116	$150.23
December	0	0	2,770	$0	$162	$203.00
January	0	0	4,430	$0	$260	$313.90
February	0	0	3,560	$0	$209	$255.78
March	0	0	3,130	$0	$183	$227.05
April	0	0	1,110	$0	$67	$94.06
May	0	0	1,370	$0	$82	$111.85
June	0	0	870	$0	$52	$77.63
July	0	0	270	$0	$16	$36.56
August	0	0	470	$0	$28	$50.25
September	0	0	280	$0	$17	$37.25
TOTAL		**0**	**20,860**	**$0**	**$1,229**	**$1,617**

Table B.7.2 (b) - Natural Gas Consumption for the Public Works Shop

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	136	1,408	$70
November	1,086	11,240	$474
December	1,654	17,118	$705
January	2,656	27,489	$1,126
February	1,885	19,509	$794
March	1,822	18,857	$755
April	1,322	13,682	$551
May	0	0	$0
June	635	6,572	$305
July	0	0	$0
August	100	1,035	$69
September	71	735	$45
TOTAL	**11,367**	**117,645**	**$4,893**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Public Works Shop is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.7.3 - Lighting Analysis Summary for the Public Works Shop

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Incandescants (100W) - convert to compact fluorescents.	6	1,576	$95	441	$26	1,134	$68
Convert indoor incandescent lamps (300W) to compact fluorescents.	8	6,302	$378	1,155	$69	5,147	$309
Maintenance Office convert 60W fluorescent 8' T12s to 8' T8s (6x2).	12	2,332	$140	1,387	$83	945	$57
Install Parking Lot Controller.	8	3,840	$231	1,920	$115	1,920	$115
TOTALS		**14,050**	**$844**	**4,903**	**$294**	**9,147**	**$549**

Annual Energy Savings (KWH)	**9,147**
Annual Cost Savings	**$549**
Percent Annual Energy Savings	**65%**

Notes:
The 8' T12s are 60W lamps.

Table B.7.4 (a) Window and Door Replacement Calculations for the Public Works Shop

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace double pane 38"x34" window with a triple pane window (1).	9	2.000	431	$20	6.25	138	$6	293	$13
Replace single pane 38"x48" window with a triple pane window (1).	13	1.000	1,217	$56	6.25	195	$9	1,023	$47
TOTALS			**1,649**	**$75**		**333**	**$15**	**1,316**	**$60**

Table B.7.4 (b) Window and Door Infiltration Calculations for the Public Works Shop

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Window - single pane 38"x48" (1)	4	0.025	50	5	1,733,875	508	$23
Window - double pane 38"x34" (1).	3	0.025	50	4	1,451,617	425	$19
Pedestrian Doors (2)	10	0.05	125	34	12,096,805	3,545	$162
Vehicle Door 10'x12' (3)	33	0.05	125	113	39,919,457	11,699	$535
Vehicle Door 12'x14' (1)	13	0.05	125	44	15,725,847	4,609	$211
Vehicle Door 12'x12' (2)	26	0.05	125	89	31,451,693	9,218	$421
TOTALS						**30,004**	**$1,371**

Table B.7.4 (c) Wall/Roof Insulation Upgrade for the Public Works Shop

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade roof insulation	3240	20.000	15,569	$712	40	7,785	$356	7,785	$356
TOTALS			**15,569**	**$712**		**7,785**	**$356**	**7,785**	**$356**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.7.5 - Water Usage for the Public Works Shop

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Faucets	1	3.0	7,878	1.60	12,605	0.32	2,521	10,084	378	$17
Toilets	1	0.8	1,970	13.25	26,096	3.98	7,839	18,257	N/A	N/A
Total					**38,701**		**10,360**	**28,341**	**378**	**$17**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	0	6	
Number of WC Uses/day	3	1	
Number of WCs	1	1	
WC Uses/hour/fixture	0.00	0.75	0.75
Number of urinal uses/day	0	3	
Number of urinals	0	0	
urinal uses/hour/fixture	0	0.00	0.00
Number of Faucets	1	1	
Number of Faucet uses/day	3	4	
Faucet uses/hr/fixture	0.00	3.00	3.00

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Faucets	12,605	472
Total		**472**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm (energy efficient metering faucets).
The current toilets are assumed to use 3.5 gallons per flush and the toilets use 1.05 gallons per flush

Table B.7.6 Heating, Ventilation & Airconditioning Usage for the Public Works Shop

Description	Quantity	Heating Efficiency	HDD below 70°F	Flow Rate (cfm)	Heat Loss (kWh)	Cost ($)
Replace BDD with motorized damper	1	81%	11,068	100	10,377	$474

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace unit heater/furance with high efficiency furnace.	1	0.8	0.95	18,243

Description	% of Time Unoccupied	HDD below 70°F	HDD below 59°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 15°C (59°F)	70.02%	11067.7	9,407.5	121,619	8,942

Table B.8.1 - Energy Breakdown for the Water Treatment Plant

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	173,326	65%
Lighting	2,276	1%
Hot Water	977	0%
Motors	91,505	34%
Total	**268,084**	

Table B.8.2 (a) - Electricity Usage for the Water Treatment Plant

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	5,848	$0	$343	$434
November	0	0	5,141	$0	$301	$386
December	0	0	5,084	$0	$298	$383
January	0	0	5,647	$0	$331	$420
February	0	0	4,947	$0	$290	$373
March	0	0	4,863	$0	$285	$368
April	0	0	7,029	$0	$422	$517
May	0	0	4,659	$0	$280	$362
June	0	0	4,689	$0	$282	$364
July	0	0	5,060	$0	$304	$390
August	0	0	9,750	$0	$585	$711
September	0	0	4,593	$0	$276	$358
TOTAL		**0**	**67,310**	**$0**	**$3,996**	**$5,065**

Table B.8.2 (b) - Natural Gas Consumption for the Water Treatment Plant

Month (2004-2005)	**Gas (m^3)**	**Gas (kWh)**	**Total Charge**
October	1,502	15,545	$646
November	1,697	17,563	$715
December	2,414	24,984	$975
January	3,090	31,981	$1,226
February	2,368	24,508	$944
March	2,354	24,363	$913
April	2,086	21,589	$818
May	1,398	14,469	$604
June	896	9,273	$440
July	701	7,255	$362
August	100	1,035	$120
September	793	8,207	$410
TOTAL	**19,399**	**200,774**	**$8,172**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the WTP is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.8.3 - Lighting Analysis Summary for Water Treatment Plant

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Fluorescents- convert 4' T12s to 4' T8s (8x2).	16	856	$51	515	$31	341	$20
Indoor 300W sodium lamps	3	983	$59	983	$59	0	$0
Outdoor - metal halide (400W).	1	437	$26	437	$26	0	$0
Install parking lot controller.	1	90	$5	45	$3	45	$3
TOTALS		**2,276**	**$137**	**1,935**	**$116**	**341**	**$20**

Annual Energy Savings (KWH)	**341**
Annual Cost Savings	**$20**
Percent Annual Energy Savings	**15%**

Notes:

These calculations are based on an occupancy rate of 1092 hours/year for the Water Treatment Plant.

Sodium lamps & metal halide lamps are already energy efficient and do not require upgrading.

Table B.8.4 (a) Window and Door Replacement Calculations for the Water Treatment Plant

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace single pane window 46'x12" at upper level entrance with triple pane (1).	4	1.000	368	$17	6.25	59	$3	309	$14
Replace single pane window - 46"x96" at lower level entrance with triple pane window (1).	31	1.000	2,947	$133	6.25	472	$21	2,476	$112
TOTALS			**3,316**	**$149**		**531**	**$24**	**2,785**	**$126**

Table B.8.4 (b) Window and Door Infiltration Calculations for the Water Treatment Plant

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Exterior insulated pedestrian doors (2).	10	0.05	125	34	12,096,805	3,545	$162
Single pane window at upper level entrance (1).	2	0.025	50	3	1,169,358	343	$16
Single pane window at lower level entrance (1).	6	0.025	50	8	2,862,911	839	$38
TOTALS						**4,727**	**$216**

Table B.8.4 (c) Wall/Roof Insulation Upgrade for the Water Treatment Plant

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade ceiling insulation.	1184	7.500	15,172	$684	40.000	2,845	$128	12,327	$556
TOTALS			**15,172**	**$684**		**2,845**	**$128**	**12,327**	**$556**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.8.5 Heating, Ventilation & Airconditioning Usage for the Water Treatment Plant

Description	% of Time Unoccupied	HDD below 70°F	HDD below 59°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 15°C (59°F)	87.53%	11,067.7	9,408	173,326	17,206

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with a higher efficiency furnace.	1	0.83	0.91	14,975

Table B.8.6 Energy Consumption and Savings Calculations for Motors in the Water Treatment Plant

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Distribution Pump Motor	15.0	12	4,380	82%	12.2	9.13	39,978	0.36	0.27	1176
Distribution Pump Motor	15.0	12	4,380	82%	12.2	9.13	39,978	0.36	0.27	1176
Air Compressor Motor	1.5	1.2	2,920	85%	1.2	0.91	2,665	0.04	0.03	78
Air Scour Blower Motor	5.0	4.0	2,920	85%	4.1	3.04	8,884	0.12	0.09	261
TOTAL							**91,505**			**2,691**

Table B.9.1 - Energy Breakdown for the Lift Station #1

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	57,092	74%
Lighting	453	1%
Motors	19,146	25%
Total	**76,691**	

Table B.9.2 - Electricity Usage for the Lift Station #1

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	4,406	$0	$258	$319.30
November	0	0	4,727	$0	$277	$340.75
December	0	0	6,974	$0	$409	$490.85
January	0	0	6,744	$0	$395	$475.48
February	0	0	7,560	$0	$443	$530.00
March	0	0	5,340	$0	$313	$381.69
April	0	0	11,067	$0	$664	$771.50
May	0	0	4,010	$0	$241	$299.55
June	0	0	10,287	$0	$618	$729.18
July	0	0	2,733	$0	$164	$212.17
August	0	0	9,422	$0	$566	$669.98
September	0	0	3,421	$0	$205	$259.24
TOTAL		**0**	**76,691**	**$0**	**$4,553**	**$5,480**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Lift Station #1 is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.9.3 - Lighting Analysis Summary for Lift Station #1

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Fluorescents- convert 4' T12s to 4' T8s (2x2)	4	15	$1	9	$1	6	$0
Outdoor incandescent - convert to high pressure sodium lamp.	1	438	$26	219	$13	219	$13
TOTALS		**453**	**$27**	**228**	**$14**	**225**	**$14**

Annual Energy Savings (KWH)	**225**
Annual Cost Savings	**$14**
Percent Annual Energy Savings	**50%**

Notes:

These calculations are based on an occupancy rate of 78hours/year for the Lift Station #1.
Outdoor lights are assumed to be kept on for 12 hours a day, 365 days of the year.

Table B.9.4 (a) Window and Door Replacement Calculations for Lift Station #1

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace single pane window 90'"x36" with triple pane (1).	23	1.000	1,752	$105	6.25	280	$17	1,471	$88
Replace double pane window - 160"x24" with triple pane window (1).	31	2.000	1,194	$72	6.25	382	$23	812	$49
TOTALS			**2,945**	**$177**		**662**	**$40**	**2,283**	**$137**

Table B.9.4 (b) Window and Door Infiltration Calculations for the Lift Station #1

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Exterior insulated pedestrian doors (1).	5	0.05	125	17	4,899,206	1,436	$86
Single pane window (1).	5	0.025	50	7	2,057,667	603	$36
Double pane window (1).	8	0.025	50	10	3,004,846	881	$53
TOTALS						**2,919**	**$175**

Table B.9.4 (c) Wall/Roof Insulation Upgrade for Lift Station #1

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade ceiling insulation.	1184	7.500	12,289	$738	40.000	2,304	$138	9,985	$600
Upgrade wall insulation	640	2.500	19,929	$1,197	20.000	2,491	$150	17,438	$1,047
TOTALS			**12,289**	**$738**		**2,304**	**$138**	**9,985**	**$600**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.9.5 Heating, Ventilation & Airconditioning Usage for Lift Station #1

Description	% of Time Unoccupied	HDD below 70°F	HDD below 50°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 10°C (50°F)	99.11%	11,067.7	7,062	57,092	14,336

Table B.9.6 Energy Consumption and Savings Calculations for Motors in Lift Station #1

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Trash Pump Motor	18.0	14	874	82%	14.7	10.95	9,573	0.43	0.32	282
Trash Pump Motor	18.0	14	874	82%	14.7	10.95	9,573	0.43	0.32	282
TOTAL							**19,146**			**563**

Table B.10.1 - Energy Breakdown for the Lift Station #2

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	5,108	63%
Lighting	254	3%
Motors	2,738	34%
Total	**8,100**	

Table B.10.2 - Electricity Usage for the Lift Station #2

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	0	$0	$0	$0.00
November	0	0	1,270	$0	$74	$134.77
December	0	0	0	$0	$0	$0.00
January	0	0	1,540	$0	$90	$152.81
February	0	0	570	$0	$33	$63.04
March	0	0	880	$0	$52	$83.76
April	0	0	550	$0	$33	$62.11
May	0	0	1,180	$0	$71	$105.86
June	0	0	300	$0	$18	$45.62
July	0	0	890	$0	$53	$86.01
August	0	0	340	$0	$20	$48.36
September	0	0	580	$0	$35	$64.79
TOTAL		**0**	**8,100**	**$0**	**$480**	**$847**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Lift Station #2 is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.10.3 - Lighting Analysis Summary for Lift Station #2

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Indoor 100W incandescants - convert to compact fluorescents.	2	23	$1	4	$0	19	$1
Indoor 150W incandescent -convert to compact fluorescent.	1	12	$1	3	$0	9	$1
Outdoor high pressure sodium lamp.	1	219	$13	219	$13	0	$0
TOTALS		**254**	**$15**	**226**	**$14**	**28**	**$2**

Annual Energy Savings (KWH)	**28**
Annual Cost Savings	**$2**
Percent Annual Energy Savings	**11%**

Notes:

These calculations are based on an occupancy rate of 78 hours/year for the Lift Station #2.
The outdoor light is assumed to be kept on for 12 hours a day, 365 days of the year.
The outdoor light is already an energy efficient unit and does not require upgrading.

Table B.10.4 (a) Door Infiltration Calculations for the Lift Station #2

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Exterior insulated pedestrian doors (1).	5	0.05	125	17	4,899,206	1,436	$86
TOTALS						**1,436**	**$86**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.10.5 Heating, Ventilation & Airconditioning Usage for Lift Station #2

Description	% of Time Unoccupied	HDD below 70°F	HDD below 50°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 10°C (50°F)	99.11%	11,067.7	7,062	5,108	1,283

Table B.10.6 Energy Consumption and Savings Calculations for Motors in Lift Station #2

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Trash Pump Motor	5.0	4	450	82%	4.1	3.04	1,369	0.12	0.09	40
Trash Pump Motor	5.0	4	450	82%	4.1	3.04	1,369	0.12	0.09	40
TOTAL							**2,738**			**81**

Table B.11.1 - Energy Breakdown for the Pumphouse #1

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	73,335	76%
Lighting	122	0%
Motors	23,123	24%
Total	**96,580**	

Table B.11.2 - Electricity Usage for the Pumphouse #1

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	640	$0	$38	$67.72
November	0	0	14,750	$0	$864	$926.46
December	0	0	14,010	$0	$821	$893.98
January	0	0	16,460	$0	$965	$1,001.51
February	0	0	16,640	$0	$975	$1,009.41
March	0	0	16,980	$0	$995	$1,024.34
April	0	0	15,230	$0	$914	$956.35
May	0	0	740	$0	$44	$76.20
June	0	0	500	$0	$30	$59.31
July	0	0	160	$0	$10	$36.05
August	0	0	160	$0	$10	$36.05
September	0	0	310	$0	$19	$46.31
TOTAL		**0**	**96,580**	**$0**	**$5,684**	**$6,134**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Pumphouse #1 is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.11.3 - Lighting Analysis Summary for Pumphouse #1

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Indoor 150W incandescent -convert to compact fluorescent.	4	73	$4	28	$2	44	$3
Exterior metal halide light - 75W.	1	14	$1	14	$1	0	$0
Install parking lot controller.	1	36	$2	18	$1	18	$1
TOTALS		**122**	**$7**	**60**	**$4**	**62**	**$4**

Annual Energy Savings (KWH)	**62**
Annual Cost Savings	**$4**
Percent Annual Energy Savings	**51%**

Notes:

These calculations are based on an occupancy rate of 182 hours/year for Pumphouse #1.
Exterior metal halide lamp is already energy efficient and does not require any upgrading.

Table B.11.4 (a) Window and Door Replacement Calculations for Pumphouse #1

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace vertical sliding single pane window 36"x22" with triple pane (1).	6	1.000	428	$26	6.25	69	$4	360	$22
Replace double pane window - 60"x30"with triple pane window (1).	13	2.000	487	$29	6.25	156	$9	331	$20
TOTALS			**915**	**$55**		**224**	**$13**	**691**	**$41**

Table B.11.4 (b) Window and Door Infiltration Calculations for Pumphouse #1

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Single pane vertical sliding window (1).	2	0.025	50	3	947,180	278	$17
Double pane window (1).	4	0.025	50	5	1,469,762	431	$26
TOTALS						**708**	**$43**

Table B.11.4 (c) Wall/Roof Insulation Upgrade for Pumphouse #1

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade ceiling insulation.	216	20.000	841	$50	40.000	420	$25	420	$25
TOTALS			**841**	**$50**		**420**	**$25**	**420**	**$25**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.11.5 Heating, Ventilation & Airconditioning Usage for Pumphouse #1

Description	% of Time Unoccupied	HDD below 70°F	HDD below 50°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 10°C (50°F)	97.92%	11,067.7	7,062	73,335	18,193

Table B.11.6 Energy Consumption and Savings Calculations for Motors in Pumphouse #1

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Submersible Pump Motor	40.0	32	950	82%	32.6	24.34	23,123	0.96	0.72	680
TOTAL							**23,123**			**680**

Table B.12.1 - Energy Breakdown for the Pumphouse #2

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	60,957	79%
Lighting	122	0%
Motors	15,821	21%
Total	**76,900**	

Table B.12.2 - Electricity Usage for the Pumphouse #2

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	7,920	$0	$464	$554.05
November	0	0	1,170	$0	$69	$103.12
December	0	0	1,540	$0	$90	$127.84
January	0	0	2,330	$0	$137	$180.61
February	0	0	1,520	$0	$89	$126.51
March	0	0	330	$0	$19	$47.01
April	0	0	3,520	$0	$211	$262.44
May	0	0	13,060	$0	$784	$872.54
June	0	0	12,190	$0	$732	$833.51
July	0	0	10,280	$0	$617	$728.72
August	0	0	12,010	$0	$721	$825.42
September	0	0	11,030	$0	$662	$780.05
TOTAL		**0**	**76,900**	**$0**	**$4,596**	**$5,442**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Pumphouse #2 is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.12.3 - Lighting Analysis Summary for Pumphouse #2

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Indoor 150W incandescent -convert to compact fluorescent.	4	73	$4	28	$2	44	$3
Exterior metal halide light - 75W.	1	14	$1	14	$1	0	$0
Install parking lot controller.	1	36	$2	18	$1	18	$1
TOTALS		**122**	**$7**	**60**	**$4**	**62**	**$4**

Annual Energy Savings (KWH)	**62**
Annual Cost Savings	**$4**
Percent Annual Energy Savings	**51%**

Notes:

These calculations are based on an occupancy rate of 182 hours/year for Pumphouse #2.
Exterior metal halide lamp is already energy efficient and does not require any upgrading.

Table B.12.4 (a) Window and Door Replacement Calculations for Pumphouse #2

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Replace vertical sliding single pane window 36"x22" with triple pane (1).	6	1.000	428	$26	6.25	69	$4	360	$22
Replace double pane window - 60"x30"with triple pane window (1).	13	2.000	487	$29	6.25	156	$9	331	$20
TOTALS			**915**	**$55**		**224**	**$13**	**691**	**$41**

Table B.12.4 (b) Window and Door Infiltration Calculations for Pumphouse #2

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost ($)
Single pane vertical sliding window (1).	2	0.025	50	3	947,180	278	$17
Double pane window (1).	4	0.025	50	5	1,469,762	431	$26
TOTALS						**708**	**$43**

Table B.12.4 (c) Wall/Roof Insulation Upgrade for Pumphouse #2

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost ($)	Energy (kWh)	Cost ($)
Upgrade ceiling insulation.	216	20.000	841	$50	40.000	420	$25	420	$25
TOTALS			**841**	**$50**		**420**	**$25**	**420**	**$25**

Notes:
Crack length for the doors and windows is 1/4 of their respective perimeters.

Table B.12.5 Heating, Ventilation & Airconditioning Usage for Pumphouse #2

Description	% of Time Unoccupied	HDD below 70°F	HDD below 50°F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Install setback thermostat set to 10°C (50°F)	97.92%	11,067.7	7,062	60,957	15,122

Table B.12.6 Energy Consumption and Savings Calculations for Motors in Pumphouse #2

Description	Rated HP	Required HP	# of hours	Current Motors				Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Eff.	Actual HP	kW	kWh	Actual HP	kW	kWh
Submersible Pump Motor	40.0	32	650	82%	32.6	24.34	15,821	0.96	0.72	465
TOTAL							**15,821**			**465**

Table B.13.1 - Energy Breakdown for the Campground Office

	Energy Consumption (kWh)	% of Total Energy Consumption
Lighting	2,223	27%
Hot Water	5,977	73%
Total	**8,200**	

Table B.13.2 - Electricity Usage for the Campground Office

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
October	0	0	0	$0	$0	$17.96
November	0	0	920	$0	$54	$79.41
December	0	0	160	$0	$9	$28.64
January	0	0	120	$0	$7	$25.97
February	0	0	0	$0	$0	$17.96
March	0	0	280	$0	$16	$36.66
April	0	0	0	$0	$0	$18.08
May	0	0	800	$0	$48	$72.84
June	0	0	0	$0	$0	$18.08
July	0	0	3,240	$0	$195	$239.84
August	0	0	0	$0	$0	$18.08
September	0	0	2,680	$0	$161	$201.51
TOTAL		**0**	**8,200**	**$0**	**$490**	**$775**

Notes

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Campground Office is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.13.3 - Lighting Analysis Summary for the Campground Office

Description	Quantity	Current Conditions		After Improvements		Savings ($)	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost	Energy (kWh)	Annual Cost ($)
Indoor incandescants - convert to compact fluorescents	9	720	$43	202	$12	518	$31
Fluorescents- convert 4' T12s to 4' T8s (8x2)	16	627	$38	378	$23	250	$15
Outdoor incandescents - convert to high pressure sodium lamps	2	876	$53	438	$26	438	$26
TOTALS		**2,223**	**$133**	**1,017**	**$61**	**1,206**	**$72**

Annual Energy Savings (KWH)	**1,206**
Annual Cost Savings	**$72**
Percent Annual Energy Savings	**54%**

Notes:

These calculations are based on an occupancy rate of 800 hours/year for the Office.
Outdoor lights are assumed to be kept on for 12 hours a day, 365 days of the year.

Table B.13.4 - Water Usage for the Campground Office

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings ($)
Sinks	4	0.2	2,100	1.60	3,360	0.32	672	2,688	101	$6
Toilets	3	0.2	800	13.25	10,600	3.98	3,184	7,416	N/A	N/A
Urinals	1	0.1	200	9.50	1,900	3.80	760	1,140	N/A	N/A
Showers	4	0.1	1,200	66.25	79,494	47.30	56,760	22,734	852	$51
Total					**95,354**		**61,376**	**33,978**	**953**	**$57**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	1	1	
Number of Toilet Uses/day	3	1	
Number of Toilets	3	3	
Toilet Uses/hour/fixture	0.125	0.041667	0.166667
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.09375	0.125	0.21875
Number of Urinals	0	1	
Number of Urinal Uses/day	0	1	
Urinal Uses/hr/fixture	0	0.125	0.125
Number of Showers	4	4	
Number of Shower Uses/day	3	3	
Shower Uses/hr/fixture	0.046875	0.046875	0.09375

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	3,360	126
Showers	79,494	2,979
Total	**82,854**	**3,105**

Notes:
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.05 gallons per flush

APPENDIX C

WATER EFFICIENCY

TABLE OF CONTENTS – APPENDIX C

Leaks

- A leak of one drop per second wastes 10,000 litres of water per year. A toilet that runs after a flush can waste 200,000 litres of water per year. Fixing a hot water leak will save energy as well as water.

- Check for differing water meter readings at bedtime and in the morning. If no water has been intentionally used, a difference in meter readings indicates a leak.

- If a few drops of food colouring put in your toilet tank seep into the toilet bowl (without flushing), check the flapper valve, valve seat and flapper lift chain for the source of the leak.

- Conduct a periodic "leak check" a minimum of twice a year on water using fixtures and appliances, including outside hose connections. Replace worn washers, O-rings and faulty fixtures.

On-Site Wastewater Systems

- Wise water management is necessary. All septic systems have limitations and water conservation should be practiced.

- Do not use substitutes for toilet paper. These products may not decompose in the tank and could clog the system.

- Perform regular maintenance checks on your entire system, including regular pump outs of the septic tank and inspection of the disposal field for signs of saturation or leakage.

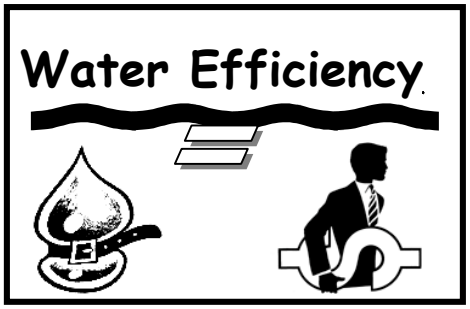
For More Information, Please Contact:

Water Efficiency Coordinator
Pollution Prevention
Manitoba Conservation
123 Main Street, Suite 160
Winnipeg MB R3C 1A5

Phone: (204) 945-8980 or
1-800-282-8069 ext. 8980
Fax: (204) 945-1211
E-mail: lliebgott@gov.mb.ca

Publication Number: 98-06E

Pollution Prevention
Manitoba Conservation



Water Use

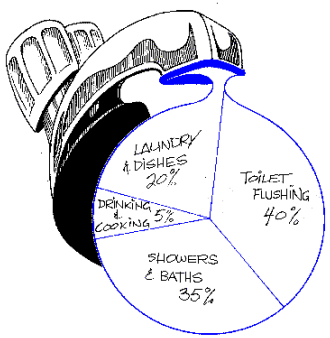
How you can reduce yours!

- Save money.

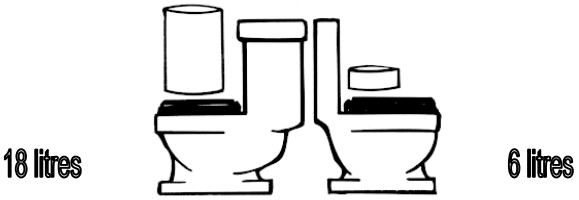
- Delay the need to expand our water and wastewater treatment plants.

- Prolong the life of in-ground sewage disposal systems, i.e., septic fields.

- Protect our water sources.



Bathroom



- Replace toilets that flush 13 to 26 litres of water with 6 litre or dual flush toilets, cutting water used by toilets by half or more. See www.cwwa.ca for toilet performance ratings. In the mean time, reduce water per flush in toilets by up to 35% by installing early closure devices (don't use bricks – as they break down, pieces interfere with the flapper seal).
- Refrain from using the toilet to dispose of trash.
- A partially filled tub uses less water than a long shower; a short shower uses less than a full tub.
- Replace your 20 litre per minute showerhead with a low-flow 9.5 litre per minute showerhead. You'll use less than half the water.
- Make it a habit to be finished your shower in less than 5 minutes.
- Install a water conserving 3.5 litre per minute aerator on your bathroom tap.
- When shaving, rinse the razor in a cup or a partially filled sink instead of letting the tap run.
- Brush teeth using a glass of water to rinse.

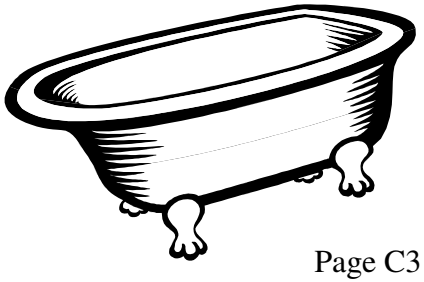
Kitchen & Laundry

- Install a water saving 9 litre per minute aerator on the kitchen tap.
- Rinse dishes in a stoppered sink or basin, not with running water.
- Wash vegetables in a basin or stoppered sink, then quickly rinse using running water.
- Keep drinking water in the fridge. Wash the container and change the water every few days.
- Thaw food in the fridge rather than under a running tap. This conserves both energy and water.

- Compost organic wastes instead of using a sink garbage disposal.
- Buy a low water use dishwasher to save on energy, water and detergent costs.
- Wash only full loads of laundry and dishes.
- Front loading washing machines use less water than top-loading washers do. If unavailable, choose a clothes washer with a suds saver, and water saving cycle.

General Water Use

- Only use water treatment or softening systems, if required. If possible, only use softened water for bathing and cleaning – use unsoftened water for cooking, drinking and watering plants.
- Ensure a water softener regenerates only when the resin is exhausted.
- Turn the system off if you will be away for more than a few days.
- Insulate hot water tank and pipes to reduce the need to run water until it is hot. Install a heat trap on the pipe above your water heater to save energy and water.
- Know location of sink, toilet and main shut off valves in case a pipe or water heater blows, or so you can turn off your water when you are away.
- If your water pipes tend to freeze, do not let the tap run continuously. This wastes water, and overloads sewer systems. Instead, install heat tape or connect a pump-back reservoir system (discuss options with your plumber, electrician or call Manitoba Conservation).



APPENDIX D

INCENTIVE PROGRAMS

TABLE OF CONTENTS – APPENDIX D

Table D.1 Manitoba Hydro Power Smart Incentives

Item	Incentives	Contacts
Compact Fluorescents	$5 - Non-reflectorized screw in lamp, $10 - Reflectorized screw-in lamp, $45 - New hard wired fixture	Kelly Epp at kepp@hydro.mb.ca or 204-474-3615
T8 Electronic Fluorescents	T8 Premium Ballast - $20, T8 Standard Ballast - $15, T8 Dimmable Ballast - $60, 8 Foot T8 Ballast - $35	Kelly Epp at kepp@hydro.mb.ca or 204-474-3615
LED Exit Signs	$45 per new sign	Kelly Epp at kepp@hydro.mb.ca or 204-474-3615
High Pressure Sodium Lighting	The lesser of $500 per kilowatt saved or $100 of lighting fixture cost	Kelly Epp at kepp@hydro.mb.ca or 204-474-3615
Parking Lot Controllers	$25 for each controlled circuit	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Air Barrier System	$0.46 per square foot or $5 per square meter of net wall area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Windows	Depends on replacement window's U-Value and net window area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Geothermal Heat Pump	Manitoba Hydro will pay up to half the cost of a feasabillity study to help decide whether a geothermal heat pump is the right choice for you building. Manitoba Hydro also offers a custom incentive towards the capital cost of your heat pump system, based on the energy savings calculated in the feasability study.	Domenic Marinelli at dmarinelli@hydro.mb.ca or 204-474-4273
High Efficiency Furnaces	$245 for each furnace installed.	Jamie Hopkins at jhopkins@hydro.mb.ca or 204-474-4018
Condensing Boilers	Boilers < 300MBH, Manitoba Hydro will pay $500 + $5/MBH input. Boilers > 300MBH, Manitoba Hydro will pay $2000 + $8/MBH input (retrofits) and $2000 + $5/MBH input (new construction).	Jamie Hopkins at jhopkins@hydro.mb.ca or 204-474-4018
Air Conditioners	Depends on the EER, the cooling capacity, and the incentive factor.	Jamie Hopkins at jhopkins@hydro.mb.ca or 204-474-4018

Notes
For general information and information kits contact:
Power Smart for Business
Phone: 474-3676
Email Address: powersmartforbusiness@hydro.mb.ca

Table D.2. Other Incentive Programs

Program Name	Eligibility	What Type of Projects are Available	Ref. Page	Available Funding	Funding Maximums	Deadline For Applications	Prospect of Funding	Project Sponsor	Contact	Email	Website
EnerGuide for Existing Buildings (EEB)	Comm. & Institutional Bldgs. Aboriginal, northern, rural or remote communities may receive special consideration.	Projects that reduce energy consumption. Includes costs for project planning and development, materials and labour, monitoring and tracking and staffing training and awareness.	13	$7.50/GJ (277.8 kW H)	up to 25% of costs based on energy savings ($250,000 max)	On-going	Good	NRCan	MarieLynn Tremblay	Marie_Lyne.Tremblay@nrcan-rncan.gc.ca	http://oee.nrcan.gc.ca/commercial/existing.cfm?attr=20
Municipal Rural Infrastructure Fund (MRIF)	All MB local governments	Projects that construct, restore or improve infrastructure that ensures sustainable use and management of water and wastewater resources. Projects that construct, restore or improve public arts and heritage infrastructure, such as museums, heritage sites, sites for performings arts, and cultural or community centres. - See detailed program info for more info. Program has many requirements and caveats.	23, 46, 54		2/3 of the approved costs	On-going	Good	Canada-Manitoba Infrastructure Programs		infra@gov.mb.ca	http://www.infrastructure.mb.ca/e/index.html
Renewable Energy Development Initiative (REDI)	…Municipalities…, solar air/water heating, biomass	Projects involving solar air or water heating and clean burning biomass combustion projects.	25	25% of purchase and install of qualifying system	$80,000	31-Mar-07		NRCan		redi.penser@nrcan.gc.ca	http://www2.nrcan.gc.ca/es/erb/erb/english/View.asp?x=455
Community Places Program	Non-profit community organizations in MB, except public schools, universities, hospitals, nursing homes, monnercial coops, federal, provincial and city of Winnipeg departments.	Projects involving the upgrading, construction or acquisition of community facilities available to the general community. Priority given to proposals for critical repairs to extend the life of existing well-used facilities. Projects must provide lasting, long-term benefits to the community.		Up to 50% of first $15,000 and 1/3 of the rest of project	$50,000			Manitoba Culture, Heritage and Tourism	Varies by region	www.gov.mb.ca/chc/grants	http://www.gov.mb.ca/chc/grants
Sustainable Development Innovations Fund (SDIF)	Municipal corporations, local governments, private and non-profit organizations and businesses	Sustainable community development, Eco-efficiency initiatives, environmental stewardship. Emphasis on youth involvement, first nations and northern communities.	55		$50,000 (usually $25,000 or less)		fair	Manitoba Conservation		sdif@gov.mb.ca	http://www.gov.mb.ca/conservation/pollutionprevention/sdif/index.html

APPENDIX E

TRANSPORTATION AND EQUIPMENT EFFICIENCY

TABLE OF CONTENTS – APPENDIX E

Transportation and Equipment Efficiency for Small Municipalities (< 10,000 population).

Municipal governments may wish to:

- Assess Regulatory, Standards & Industry "Best Practices" to ensure compliance and demonstrated "Due Diligence". Includes Provincial, Federal, Society of Automotive Engineers (SAE), Canadian Standards Association (CSA), American National Standards Institute (ANSI), Workplace Safety & Health audits, Safety inspections, Workplace Hazardous Materials Information System (WHMIS), Transportation of Dangerous Goods regulation (TDG), etc.

- Review current fuelling habits & education on "economical operation" (Driver training, minimal idling, proper lubricants for seasonal operation etc.)

- Review "Alternative Fuel" options, e.g., Diesel and Biodiesel, Propane, Compressed Natural Gas (CNG). Note: Electric Vehicles are not an option yet due to initial cost and the prevailing ambient temperatures experienced in Manitoba

- Consider recycling initiatives for disposal of Fleet Waste Stream products, eg. tires, lubricating oil, anti-freeze, aerosol cans, paints, controlled products, ferrous & non-ferrous scrap metal, plastics etc.

Other Opportunities:

Transportation Demand Management

- Education & awareness programs on ride-sharing, telecommuting & teleconferencing

Encouragement of Alternative Modes of Transportation

- Possibility of van based transit or "pool" operations for commuting within towns & outlying areas. May be viable for transporting groups of employees to & from work locations

- Provision of bike racks, lockable bike containers or small fenced compounds at key locations

- Education & awareness programs on vehicle emissions, "fuel saving" driving habits etc.

Traffic & Parking Management

- Possibility of synchronizing traffic lights (if installed) and implementing parking fees etc. to manage parking

CHOOSING A VEHICLE

Vehicle Construction

The following points are important when considering fuel efficiency.

- A five speed manual transmission is about 5% more efficient than an automatic.
- Smaller engines use less fuel.
- Front wheel drive vehicles are lighter and therefore more fuel efficient than rear wheel drive vehicles
- SUV's tend to have low fuel efficiency
- Front wheel drive vehicles provide better traction than rear wheel drive in most cases.
- Small engines with a turbocharger can help make up the power difference between large and small engines by using energy from hot exhaust.

Vehicle Ratings

The Office of Energy Efficiency of Natural Resources Canada, issues a list of the most fuel efficient vehicles in each of a number of categories. See their website for the latest list.

Extra Features

Air conditioning, power steering, and roof racks are some of the big energy using extras. Air conditioning can increase your fuel consumption by 10 to 20 percent in city driving. A fully loaded roof rack can add 25% to your fuel costs. Even empty, it will add about 1% due to wind resistance

DRIVING ECONOMICALLY

Driving technique is critical to fuel economy.

- Maintain recommended tire pressure to maximize fuel efficiency and tire life.
- Keep your engine well tuned and maintained.
- One minute of idling uses more fuel than restarting the engine.
- Avoid jack-rabbit starts.
- An open sun roof and open windows increase air resistance, especially on the highway. Use the car's ventilation system instead.
- Most cars use 10% less fuel when driven at 55 miles per hour as opposed to 62, or 90 kilometers as opposed to 100.
- Adjust your speed in advance of changes in traffic flow. Take your foot off the accelerator and progressively gear down rather than accelerating up to a stop sign and breaking hard.

ENGINE BLOCK HEATERS - IS THERE A SAVINGS?

- In sub-freezing temperatures, the first 15 to 20 minutes of driving, after a cold start cause the engine to use about 30% more fuel than a warm engine.
- A timer can be installed for your vehicle's block heater to start warming the engine a couple hours before you head out.
-

- With the cost of electricity accounted for, you should still come out ahead, over the course of a winter.

FUEL OPTIONS

- Diesel engines are more fuel efficient than gasoline engines, as Diesel contains 10% more energy per unit volume than gasoline. Higher diesel engine costs are offset by increased fuel economy and engine life.
- Many fleet operators are converting their vehicles to biodiesel for cost advantages and a cleaner burn.
- There are many advantages to a dual-fuel system, which allows you to switch between gasoline and propane or natural gas with the flick of a switch.
- Hybrid vehicles…

From the Office of Energy Efficiency, Natural Resources Canada:

Buying a Fuel-Efficient Vehicle

- Fuel consumption can vary widely from one vehicle to the next. Whether you're buying new or used, the choices you make today will either save you money (through reduced fuel consumption) or cost you money for years to come.

- How big is big enough? It's always a good idea to avoid buying more vehicle than you need. Larger vehicles tend to be heavier and have bigger and more powerful engines, so consider buying the most fuel-efficient vehicle that meets your everyday needs.

- If you're buying a new vehicle, check the EnerGuide label for its fuel consumption rating. EnerGuide labels are now affixed to all new light-duty vehicles sold in Canada.

- Fuel consumption ratings for all new cars, light-duty trucks and vans sold in Canada are also available in the free Fuel Consumption Guide. You can download a PDF version of the Guide, or call 1 800 387-2000 to order your free copy. Past editions are available, so you can also check fuel consumption ratings for used vehicles.

- Have a look at the list of the most recent winners of the EnerGuide Awards, presented each model year to the manufacturers of the most fuel-efficient vehicles in different classes – two-seater, subcompact, compact, mid-sized and large cars, as well as station wagons, vans, pickup trucks and special purpose vehicles.

- Your choice of transmission will directly affect the cost of the vehicle and its fuel consumption. As a general rule, a manual transmission is more fuel efficient than an automatic, assuming you shift properly. If you buy an automatic, the more gears, the better.

- Four-wheel drive and all-wheel drive offer superior traction and braking under slippery conditions, but the weight and friction of additional drivetrain parts can increase fuel consumption by 5 to 10 percent compared with two-wheel drive vehicles. How often would you need to use this option, and is it worth the extra fuel cost for as long as you own the vehicle?

- Under normal driving conditions, smaller engines deliver better fuel economy than larger engines. Choose the smallest engine that meets your everyday needs.

- Are you willing to pay a fuel penalty for as long as you own your vehicle just to have the convenience of options such as power windows, seats and mirrors? Many options increase fuel consumption by adding weight, increasing aerodynamic drag, or drawing extra power from the engine.

- Do you really need an air conditioner? Operating an air conditioner in hot weather can increase fuel consumption by more than 20 percent in city driving. Consider using the car's ventilation system and options such as a sunroof and tinted glass.

- For most drivers, cruise control saves fuel on the highway by keeping your speed constant and avoiding inadvertent speeding.

- Explore your fuel options. Will a fuel-efficient diesel vehicle meet your needs? What about propane or natural gas, which produce fewer greenhouse gas emissions and are cheaper to use than gasoline or diesel fuel? Ethanol fuel blends are also widely used by Canadian motorists. And hybrid vehicles, which use a combination of high-power batteries and an internal combustion engine, are beginning to appear on the North American market.

Please note – this list of websites is not comprehensive. They have not been reviewed for accuracy, but may provide ideas and options appropriate for some municipalities.

Other vehicle and equipment information can be found on the Internet at:
http://oee.nrcan.gc.ca/publications/infosource/home/index.cfm?act=category&PrintView=N&Text=N

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://www.edmunds.com/advice/specialreports/articles/102946/article.html

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://snow.grounds-mag.com/ar/grounds_maintenance_september_2/

http://www.missoulian.com/articles/2003/11/15/news/local/news03.txt

http://rocktoroad.com/grader.html

http://news.thomasnet.com/fullstory/29180/3281

http://www.forester.net/gx_0501_graders.html

http://www.epa.gov/greenkit/quick_start.htm#greenfleet

Self Audit

Municipal Operations -Efficiency Survey

(Transportation, Road Repair, Snow Clearance, Waste Disposal, etc.)

Name of Organisation: _____
Address: _____
_____
_____
Contact Name: _____
Phone No. _____
Name of person completing form: _____
Date: _____

Vehicles and Construction Equipment						
	Gasoline	**Diesel**	**CNG**	**Propane**	**Other**	**Total**
Total Fuel Usage L/Year						
Greenhouse Gas Emissions (tonnes)						

Fuel Use Minimization Considerations

 What type of vehicles/equipment, if any, are you planning to replace in the next few years?_____
_____
_____

 Can you downsize these vehicles/equipment?
Comments:_____
_____
_____

 Can you make process or other changes to minimize use of, or eliminate these vehicles/equipment? Comments:_____
_____
_____

 Do you have a policy in place to make fuel efficiency one of the vehicle/equipment purchase requirements? Yes ___ No ___

 Have you made operational changes such as reducing idling time of vehicles and equipment, and using block heaters and timers to reduce warm up time?
Yes ___ No ___

 Have you encouraged more energy efficient driving behaviour through training, policies, and ongoing reminders? Yes ___ No ___

 Do you have procedures in place to detect and rectify leakage of above-ground and under-ground fuel storage tanks? Yes __ No ___

 Do you use automatic shut-off fill nozzles at pumps? Yes ___ No ___

Comments

_____
_____
_____
_____
_____
_____

APPENDIX F

ENERGY CONSUMPTION MONITORING SPREADSHEETS AND GRAPHS

TABLE OF CONTENTS – APPENDIX F

Table F.1 - Energy Consumption Monitoring Data for the Arena

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	60,042	60,042	440.9	60,042		0		#DIV/0!		0		#DIV/0!
November	43,842	43,842	623.6	43,842		0		#DIV/0!		0		#DIV/0!
December	2,942	2,942	1013.3	2,942		0		#DIV/0!		0		#DIV/0!
January	29,642	29,642	1170.5	29,642		0		#DIV/0!		0		#DIV/0!
February	29,200	29,200	881.8	29,200		0		#DIV/0!		0		#DIV/0!
March	37,442	37,442	800.1	37,442		0		#DIV/0!		0		#DIV/0!
April	11,242	11,242	359.9	11,242		0		#DIV/0!		0		#DIV/0!
May	7,842	7,842	271.3	7,842		0		#DIV/0!		0		#DIV/0!
June	21,642	21,642	102.3	21,642		0		#DIV/0!		0		#DIV/0!
July	28,442	28,442	61	28,442		0		#DIV/0!		0		#DIV/0!
August	24,842	24,842	103.8	24,842		0		#DIV/0!		0		#DIV/0!
September	11,642	11,642	191.6	11,642		0		#DIV/0!		0		#DIV/0!
TOTAL	308,762	308,762	6020.1	308,762	0	0	0	#DIV/0!	0	0	0	#DIV/0!

	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.1 - Energy Consumption Monitoring Graph for the Arena

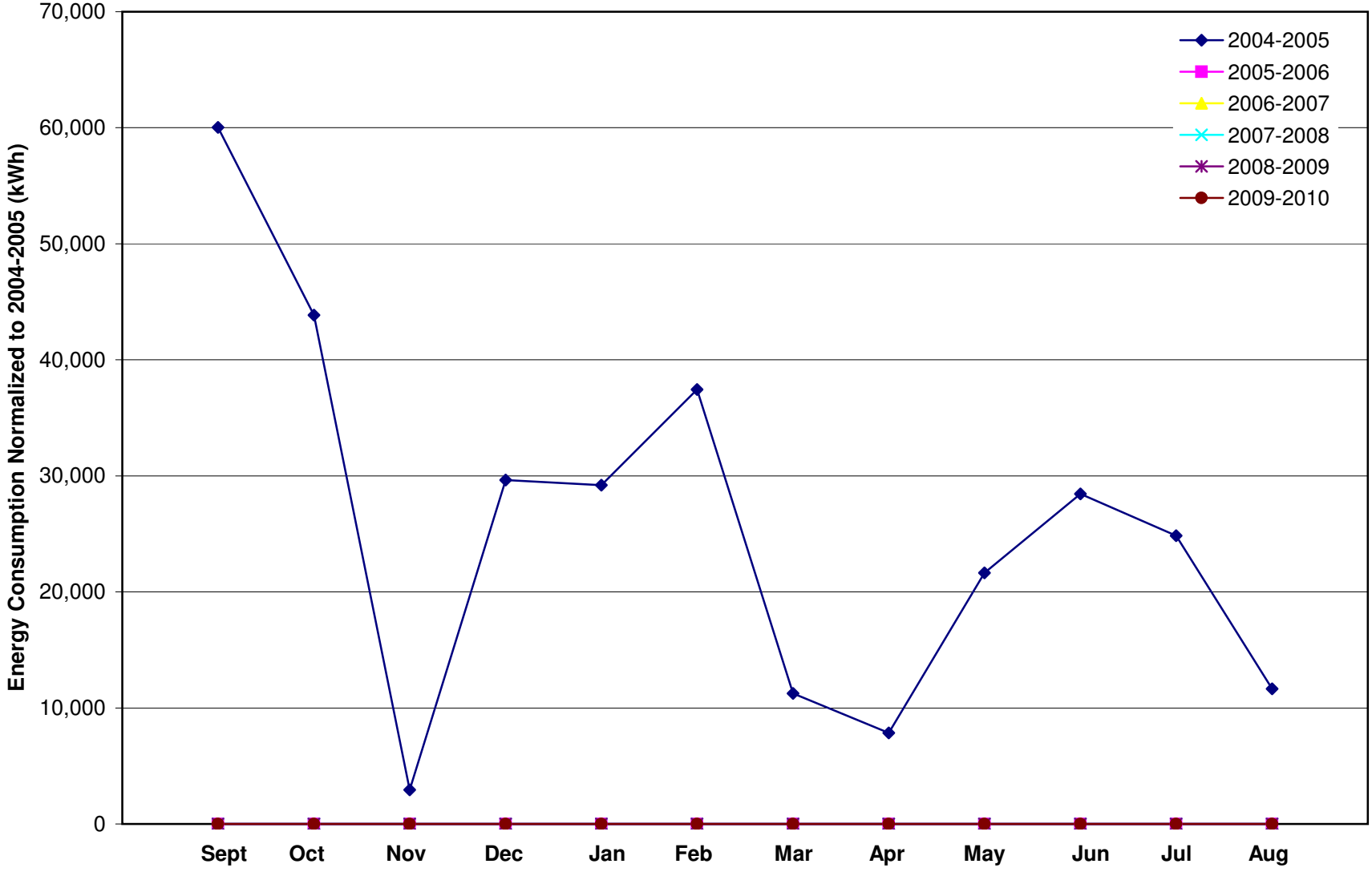


Table F.2 - Energy Consumption Monitoring Data for the Swimming Pool Office & Changerooms

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	0	0	0	440.9	0			0		#DIV/0!			0		#DIV/0!
November	0	0	0	623.6	0			0		#DIV/0!			0		#DIV/0!
December	0	0	0	1013	0			0		#DIV/0!			0		#DIV/0!
January	0	0	0	1171	0			0		#DIV/0!			0		#DIV/0!
February	0	0	0	881.8	0			0		#DIV/0!			0		#DIV/0!
March	0	0	0	800.1	0			0		#DIV/0!			0		#DIV/0!
April	0	0	0	359.9	0			0		#DIV/0!			0		#DIV/0!
May	0	0	0	271.3	0			0		#DIV/0!			0		#DIV/0!
June	0	0	0	102.3	0			0		#DIV/0!			0		#DIV/0!
July	0	18,585	192,349	61	192,349			0		#DIV/0!			0		#DIV/0!
August	0	12,475	129,113	103.8	129,113			0		#DIV/0!			0		#DIV/0!
September	0	6,553	67,822	191.6	67,822			0		#DIV/0!			0		#DIV/0!
TOTAL	0	37,613	389,283	6020	389,283	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.2 - Energy Consumption Monitoring Graph for the Swimming Pool Office & Changerooms

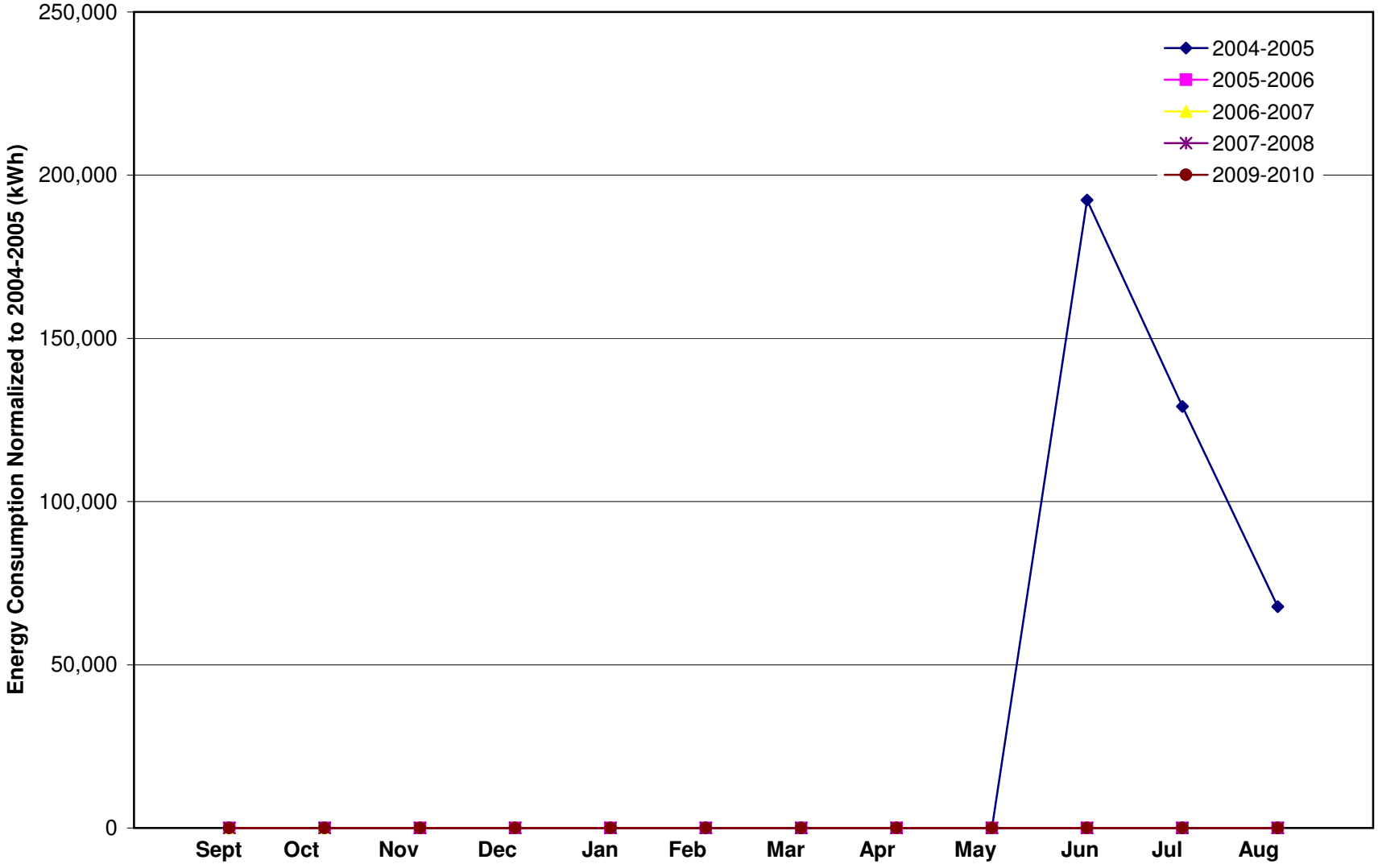


Table F.3 - Energy Consumption Monitoring Data for the Community Centre

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	7,080	530	12,565	440.9	12,565			0		#DIV/0!			0		#DIV/0!
November	5,880	1,433	20,711	623.6	20,711			0		#DIV/0!			0		#DIV/0!
December	6,420	2,605	33,381	1013	33,381			0		#DIV/0!			0		#DIV/0!
January	8,640	4,119	51,270	1171	51,270			0		#DIV/0!			0		#DIV/0!
February	6,180	3,266	39,982	881.8	39,982			0		#DIV/0!			0		#DIV/0!
March	5,400	2,740	33,758	800.1	33,758			0		#DIV/0!			0		#DIV/0!
April	6,660	2,319	30,661	359.9	30,661			0		#DIV/0!			0		#DIV/0!
May	6,960	617	13,346	271.3	13,346			0		#DIV/0!			0		#DIV/0!
June	5,820	0	5,820	102.3	5,820			0		#DIV/0!			0		#DIV/0!
July	9,720	599	15,919	61	15,919			0		#DIV/0!			0		#DIV/0!
August	6,540	33	6,882	103.8	6,882			0		#DIV/0!			0		#DIV/0!
September	2,640	87	3,540	191.6	3,540			0		#DIV/0!			0		#DIV/0!
TOTAL	77,940	18,348	267,836	6020	267,836	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.3 - Energy Consumption Monitoring Graph for the Community Centre

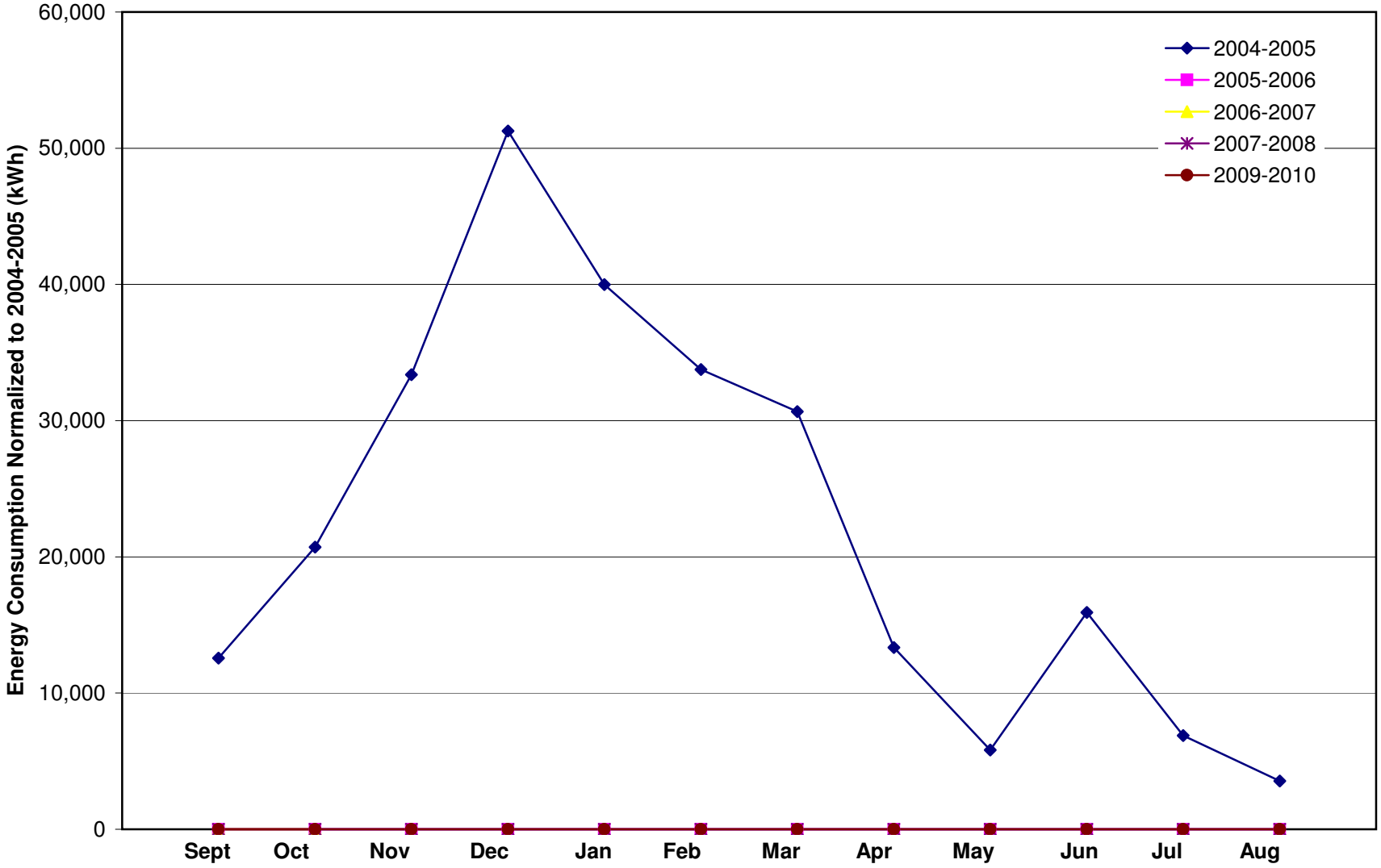


Table F.4A - Energy Consumption Monitoring Data for the Library

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	1,080	81	1,918	440.9	1,918			0		#DIV/0!			0		#DIV/0!
November	2,750	62	3,392	623.6	3,392			0		#DIV/0!			0		#DIV/0!
December	2,200	453	6,888	1013	6,888			0		#DIV/0!			0		#DIV/0!
January	2,130	627	8,619	1171	8,619			0		#DIV/0!			0		#DIV/0!
February	1,980	513	7,289	881.8	7,289			0		#DIV/0!			0		#DIV/0!
March	1,790	459	6,541	800.1	6,541			0		#DIV/0!			0		#DIV/0!
April	2,230	0	2,230	359.9	2,230			0		#DIV/0!			0		#DIV/0!
May	1,940	353	5,593	271.3	5,593			0		#DIV/0!			0		#DIV/0!
June	2,010	49	2,517	102.3	2,517			0		#DIV/0!			0		#DIV/0!
July	1,640	30	1,950	61	1,950			0		#DIV/0!			0		#DIV/0!
August	2,780	0	2,780	103.8	2,780			0		#DIV/0!			0		#DIV/0!
September	2,580	24	2,828	191.6	2,828			0		#DIV/0!			0		#DIV/0!
TOTAL	25,110	2,651	52,547	6020	52,547	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.4A - Energy Consumption Monitoring Graph for the Library

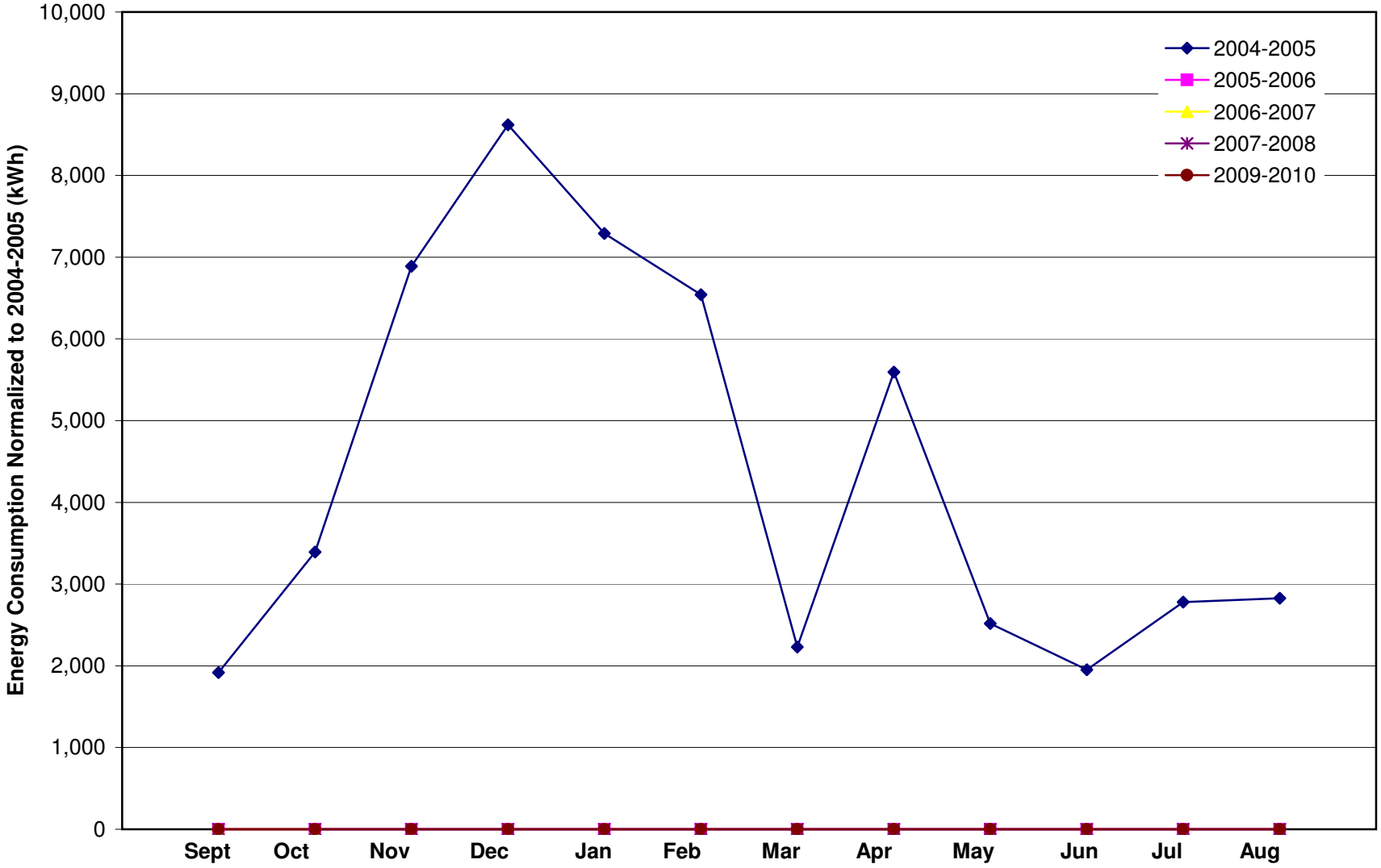


Table F.4B - Energy Consumption Monitoring Data for the Town Administration Building

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	2,120	190	4,086	440.9	4,086			0		#DIV/0!			0		#DIV/0!
November	2,370	193	4,367	623.6	4,367			0		#DIV/0!			0		#DIV/0!
December	2,900	521	8,292	1013	8,292			0		#DIV/0!			0		#DIV/0!
January	2,340	1,070	13,414	1171	13,414			0		#DIV/0!			0		#DIV/0!
February	2,750	700	9,995	881.8	9,995			0		#DIV/0!			0		#DIV/0!
March	1,810	619	8,216	800.1	8,216			0		#DIV/0!			0		#DIV/0!
April	2,850	516	8,190	359.9	8,190			0		#DIV/0!			0		#DIV/0!
May	1,640	109	2,768	271.3	2,768			0		#DIV/0!			0		#DIV/0!
June	2,140	27	2,419	102.3	2,419			0		#DIV/0!			0		#DIV/0!
July	3,420	27	3,699	61	3,699			0		#DIV/0!			0		#DIV/0!
August	3,210	5	3,262	103.8	3,262			0		#DIV/0!			0		#DIV/0!
September	2,390	62	3,032	191.6	3,032			0		#DIV/0!			0		#DIV/0!
TOTAL	29,940	4,039	71,742	6020	71,742	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.4B - Energy Consumption Monitoring Graph for the Town Administration Building

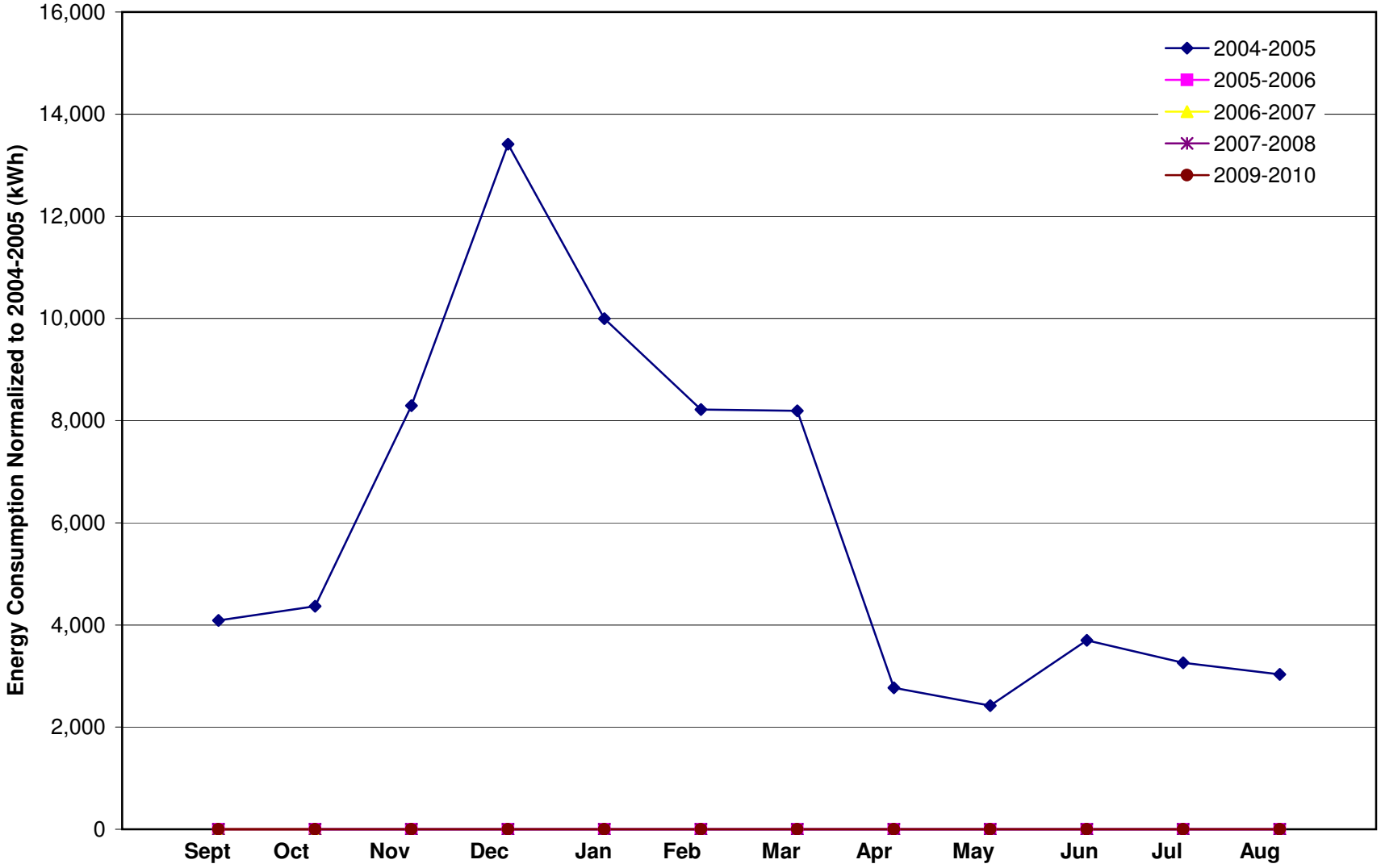


Table F.5 - Energy Consumption Monitoring Data for the Recycling Depot

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	60	391	4,107	440.9	4,107			0		#DIV/0!			0		#DIV/0!
November	50	777	8,092	623.6	8,092			0		#DIV/0!			0		#DIV/0!
December	70	2,102	21,825	1013	21,825			0		#DIV/0!			0		#DIV/0!
January	60	2,895	30,022	1171	30,022			0		#DIV/0!			0		#DIV/0!
February	60	0	60	881.8	60			0		#DIV/0!			0		#DIV/0!
March	60	4,166	43,177	800.1	43,177			0		#DIV/0!			0		#DIV/0!
April	70	1,730	17,975	359.9	17,975			0		#DIV/0!			0		#DIV/0!
May	60	109	1,188	271.3	1,188			0		#DIV/0!			0		#DIV/0!
June	60	0	60	102.3	60			0		#DIV/0!			0		#DIV/0!
July	50	280	2,948	61	2,948			0		#DIV/0!			0		#DIV/0!
August	40	152	1,613	103.8	1,613			0		#DIV/0!			0		#DIV/0!
September	50	33	392	191.6	392			0		#DIV/0!			0		#DIV/0!
TOTAL	690	12,635	131,458	6020	131,458	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.5- Energy Consumption Monitoring Graph for the Recycling Depot

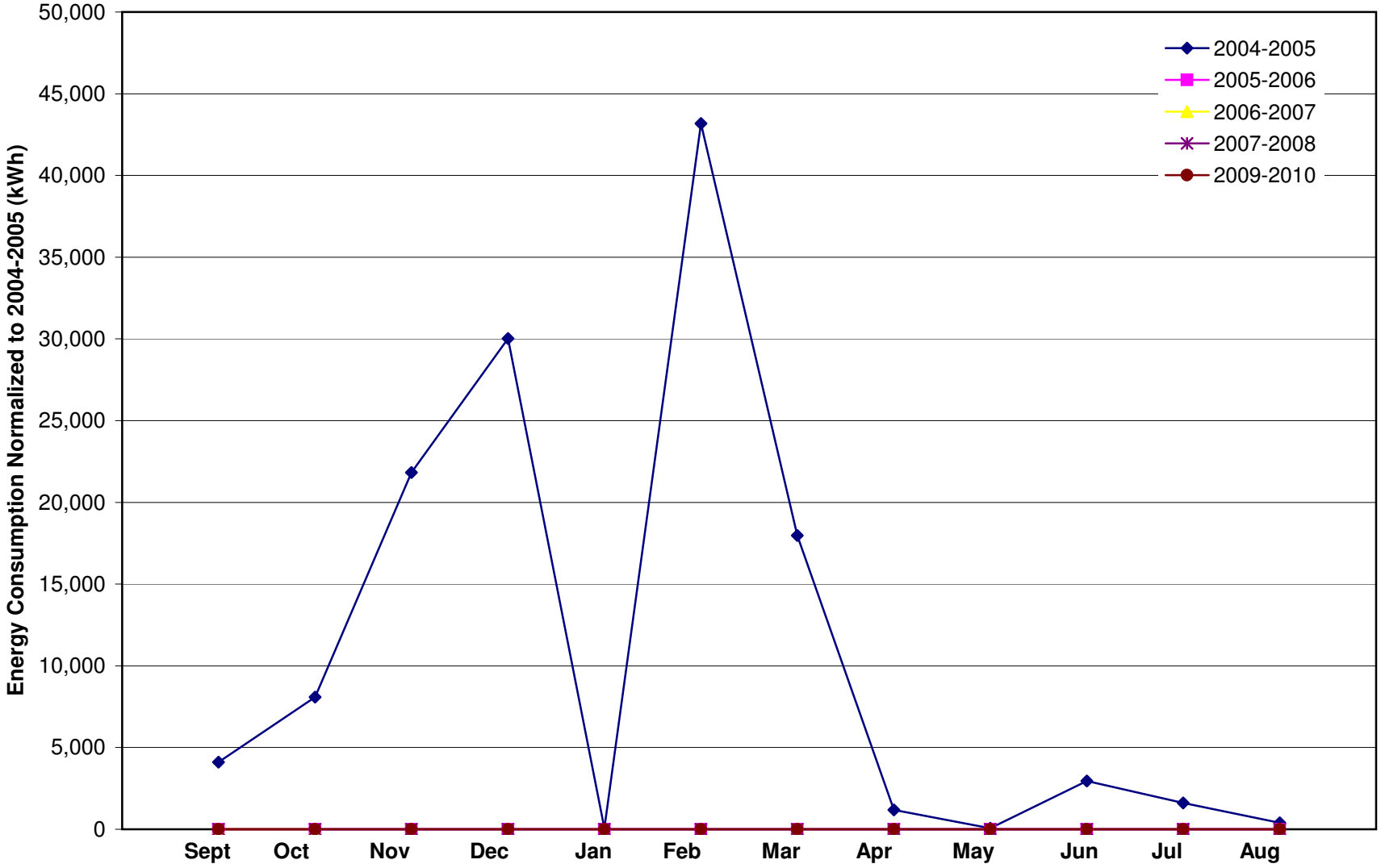


Table F.6 - Energy Consumption Monitoring Data for the Fire Hall

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	1,810	3	1,841	440.9	1,841			0		#DIV/0!			0		#DIV/0!
November	2,880	902	12,215	623.6	12,215			0		#DIV/0!			0		#DIV/0!
December	3,090	2,490	28,861	1013	28,861			0		#DIV/0!			0		#DIV/0!
January	5,060	2,838	34,432	1171	34,432			0		#DIV/0!			0		#DIV/0!
February	2,540	2,115	24,430	881.8	24,430			0		#DIV/0!			0		#DIV/0!
March	3,780	1,806	22,472	800.1	22,472			0		#DIV/0!			0		#DIV/0!
April	3,180	1,002	13,550	359.9	13,550			0		#DIV/0!			0		#DIV/0!
May	2,260	730	9,815	271.3	9,815			0		#DIV/0!			0		#DIV/0!
June	2,890	595	9,048	102.3	9,048			0		#DIV/0!			0		#DIV/0!
July	980	0	980	61	980			0		#DIV/0!			0		#DIV/0!
August	1,480	144	2,970	103.8	2,970			0		#DIV/0!			0		#DIV/0!
September	1,050	119	2,282	191.6	2,282			0		#DIV/0!			0		#DIV/0!
TOTAL	31,000	12,744	162,897	6020	162,897	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.6- Energy Consumption Monitoring Graph for the Fire Hall

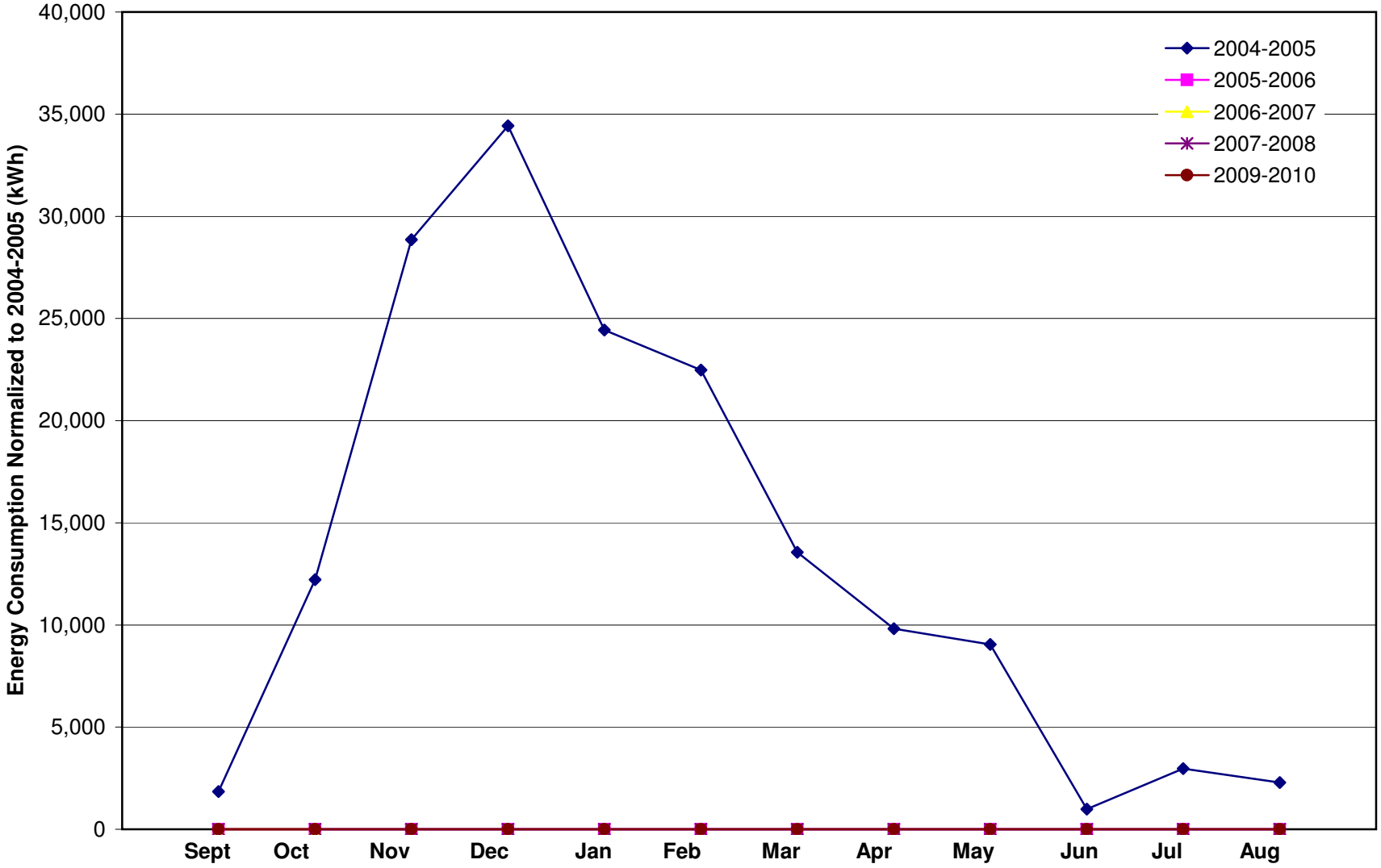


Table F.7 - Energy Consumption Monitoring Data for the Public Works Shop

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	620	136	2,028	440.9	2,028			0		#DIV/0!			0		#DIV/0!
November	1,980	1,086	13,220	623.6	13,220			0		#DIV/0!			0		#DIV/0!
December	2,770	1,654	19,888	1013	19,888			0		#DIV/0!			0		#DIV/0!
January	4,430	2,656	31,919	1171	31,919			0		#DIV/0!			0		#DIV/0!
February	3,560	1,885	23,069	881.8	23,069			0		#DIV/0!			0		#DIV/0!
March	3,130	1,822	21,987	800.1	21,987			0		#DIV/0!			0		#DIV/0!
April	1,110	1,322	14,792	359.9	14,792			0		#DIV/0!			0		#DIV/0!
May	1,370	0	1,370	271.3	1,370			0		#DIV/0!			0		#DIV/0!
June	870	635	7,442	102.3	7,442			0		#DIV/0!			0		#DIV/0!
July	270	0	270	61	270			0		#DIV/0!			0		#DIV/0!
August	470	100	1,505	103.8	1,505			0		#DIV/0!			0		#DIV/0!
September	280	71	1,015	191.6	1,015			0		#DIV/0!			0		#DIV/0!
TOTAL	20,860	11,367	138,505	6020	138,505	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.7- Energy Consumption Monitoring Graph for the Public Works Shop

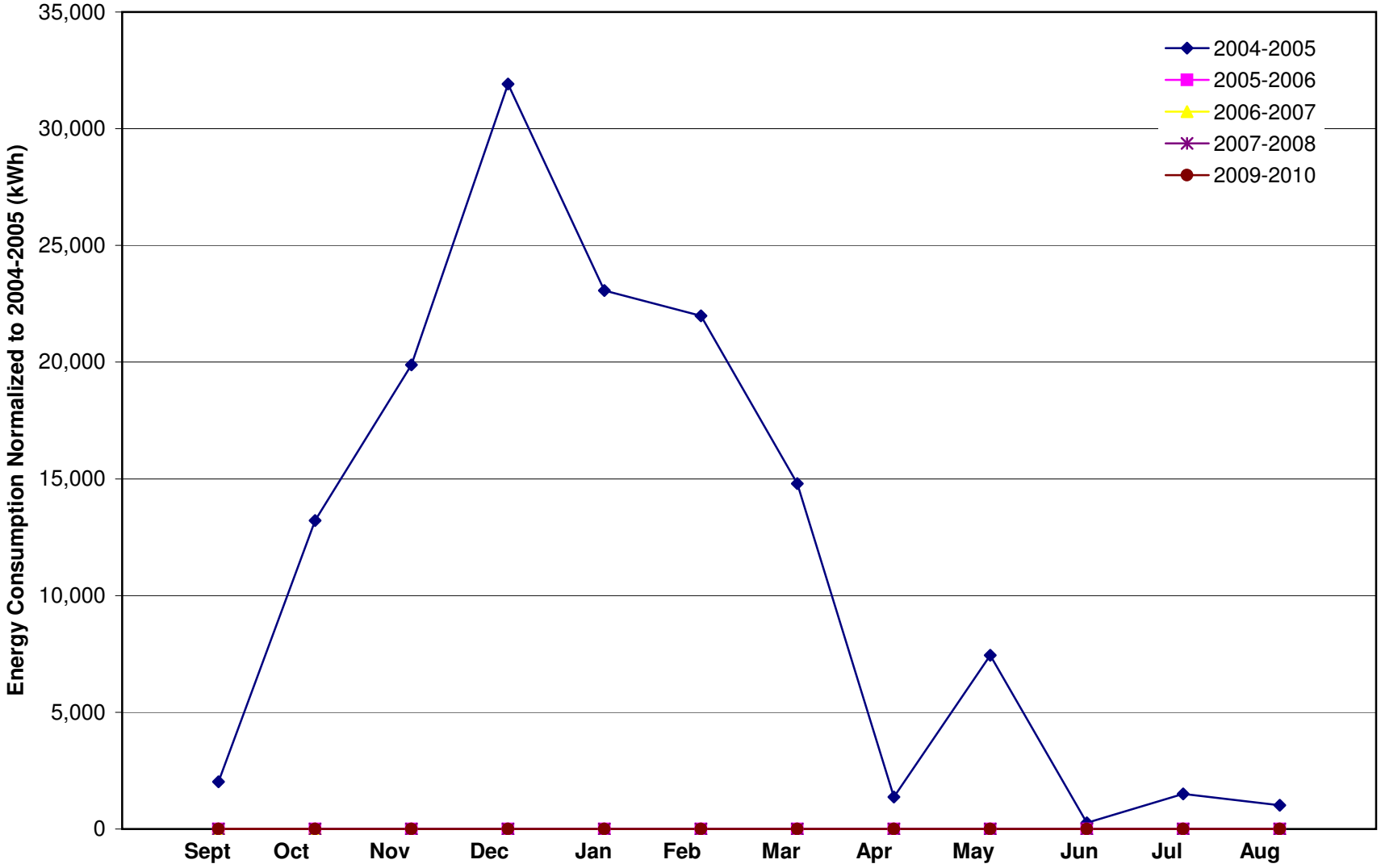


Table F.8 - Energy Consumption Monitoring Data for the Water Treatment Plant

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	5,848	1,502	21,393	440.9	21,393			0		#DIV/0!			0		#DIV/0!
November	5,141	1,697	22,704	623.6	22,704			0		#DIV/0!			0		#DIV/0!
December	5,084	2,414	30,068	1013	30,068			0		#DIV/0!			0		#DIV/0!
January	5,647	3,090	37,628	1171	37,628			0		#DIV/0!			0		#DIV/0!
February	4,947	2,368	29,455	881.8	29,455			0		#DIV/0!			0		#DIV/0!
March	4,863	2,354	29,226	800.1	29,226			0		#DIV/0!			0		#DIV/0!
April	7,029	2,086	28,618	359.9	28,618			0		#DIV/0!			0		#DIV/0!
May	4,659	1,398	19,128	271.3	19,128			0		#DIV/0!			0		#DIV/0!
June	4,689	896	13,962	102.3	13,962			0		#DIV/0!			0		#DIV/0!
July	5,060	701	12,315	61	12,315			0		#DIV/0!			0		#DIV/0!
August	9,750	100	10,785	103.8	10,785			0		#DIV/0!			0		#DIV/0!
September	4,593	793	12,800	191.6	12,800			0		#DIV/0!			0		#DIV/0!
TOTAL	67,310	19,399	268,084	6020	268,084	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.8 - Energy Consumption Monitoring Graph for the Water Treatment Plant

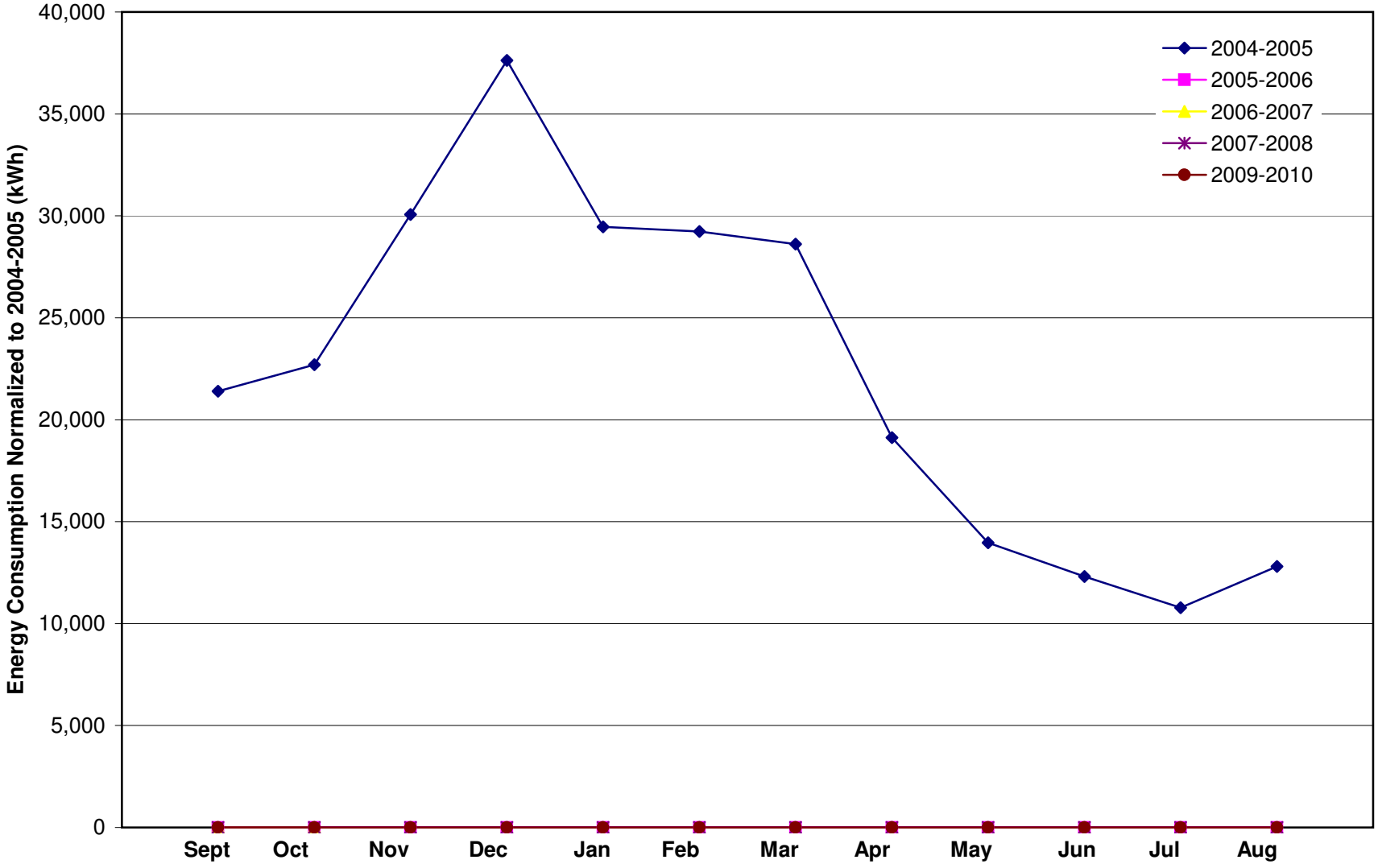


Table F.9 - Energy Consumption Monitoring Data for the Lift Station #1

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	4,406	4,406	440.9	4,406		0		#DIV/0!		0		#DIV/0!
November	4,727	4,727	623.6	4,727		0		#DIV/0!		0		#DIV/0!
December	6,974	6,974	1013.3	6,974		0		#DIV/0!		0		#DIV/0!
January	6,744	6,744	1170.5	6,744		0		#DIV/0!		0		#DIV/0!
February	7,560	7,560	881.8	7,560		0		#DIV/0!		0		#DIV/0!
March	5,340	5,340	800.1	5,340		0		#DIV/0!		0		#DIV/0!
April	11,067	11,067	359.9	11,067		0		#DIV/0!		0		#DIV/0!
May	401	401	271.3	401		0		#DIV/0!		0		#DIV/0!
June	10,287	10,287	102.3	10,287		0		#DIV/0!		0		#DIV/0!
July	2,733	2,733	61	2,733		0		#DIV/0!		0		#DIV/0!
August	9,422	9,422	103.8	9,422		0		#DIV/0!		0		#DIV/0!
September	3,421	3,421	191.6	3,421		0		#DIV/0!		0		#DIV/0!
TOTAL	73,082	73,082	6020.1	73,082	0	0	0	#DIV/0!	0	0	0	#DIV/0!

	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.9 - Energy Consumption Monitoring Graph for the Lift Station #1

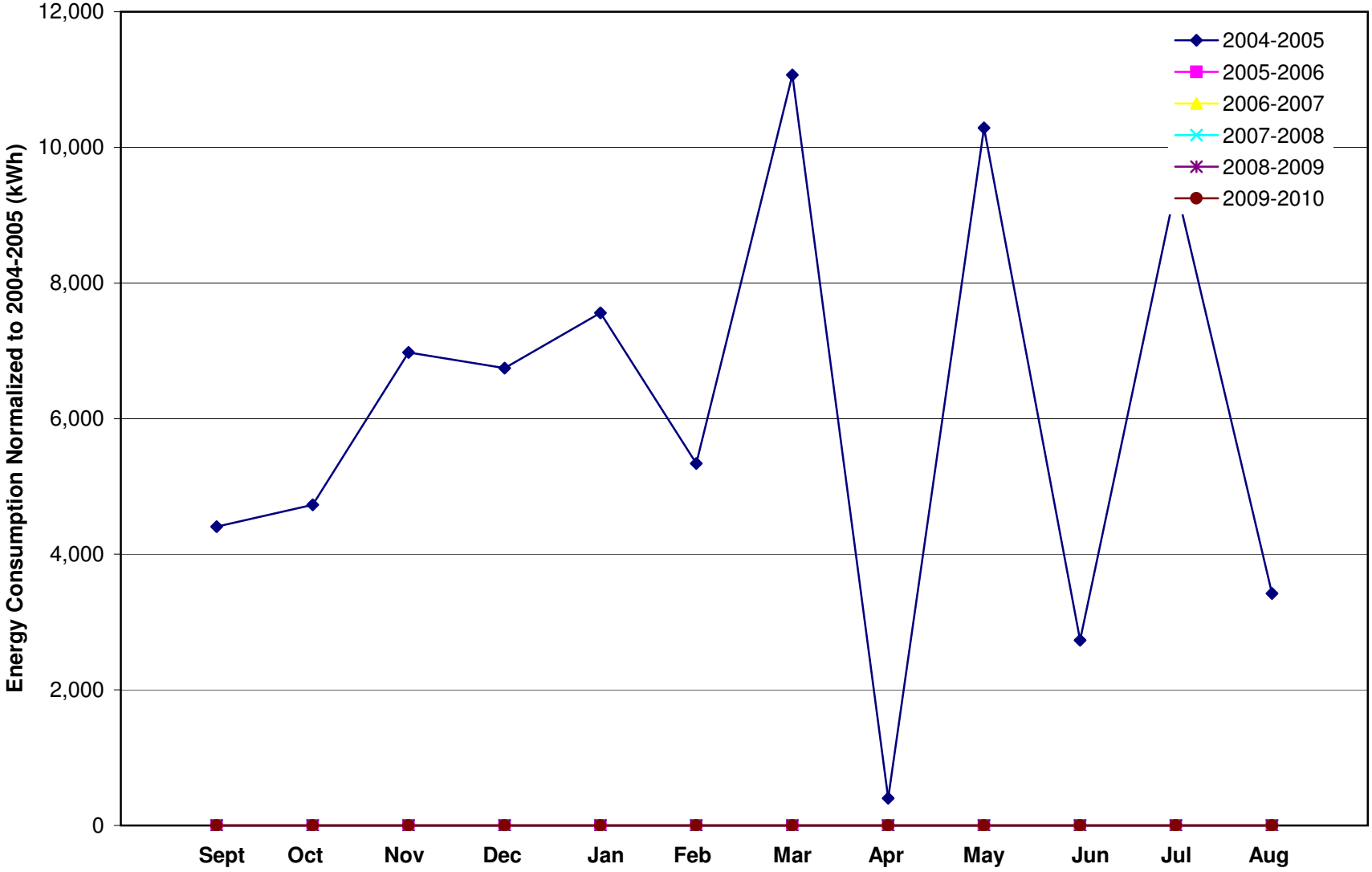


Table F.10 - Energy Consumption Monitoring Data for the Lift Station #2

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	0	0	440.9	0		0		#DIV/0!		0		#DIV/0!
November	1,270	1,270	623.6	1,270		0		#DIV/0!		0		#DIV/0!
December	0	0	1013.3	0		0		#DIV/0!		0		#DIV/0!
January	1,540	1,540	1170.5	1,540		0		#DIV/0!		0		#DIV/0!
February	570	570	881.8	570		0		#DIV/0!		0		#DIV/0!
March	880	880	800.1	880		0		#DIV/0!		0		#DIV/0!
April	550	550	359.9	550		0		#DIV/0!		0		#DIV/0!
May	1,180	1,180	271.3	1,180		0		#DIV/0!		0		#DIV/0!
June	300	300	102.3	300		0		#DIV/0!		0		#DIV/0!
July	890	890	61	890		0		#DIV/0!		0		#DIV/0!
August	340	340	103.8	340		0		#DIV/0!		0		#DIV/0!
September	580	580	191.6	580		0		#DIV/0!		0		#DIV/0!
TOTAL	8,100	8,100	6020.1	8,100	0	0	0	#DIV/0!	0	0	0	#DIV/0!

	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.10 - Energy Consumption Monitoring Graph for the Lift Station #2

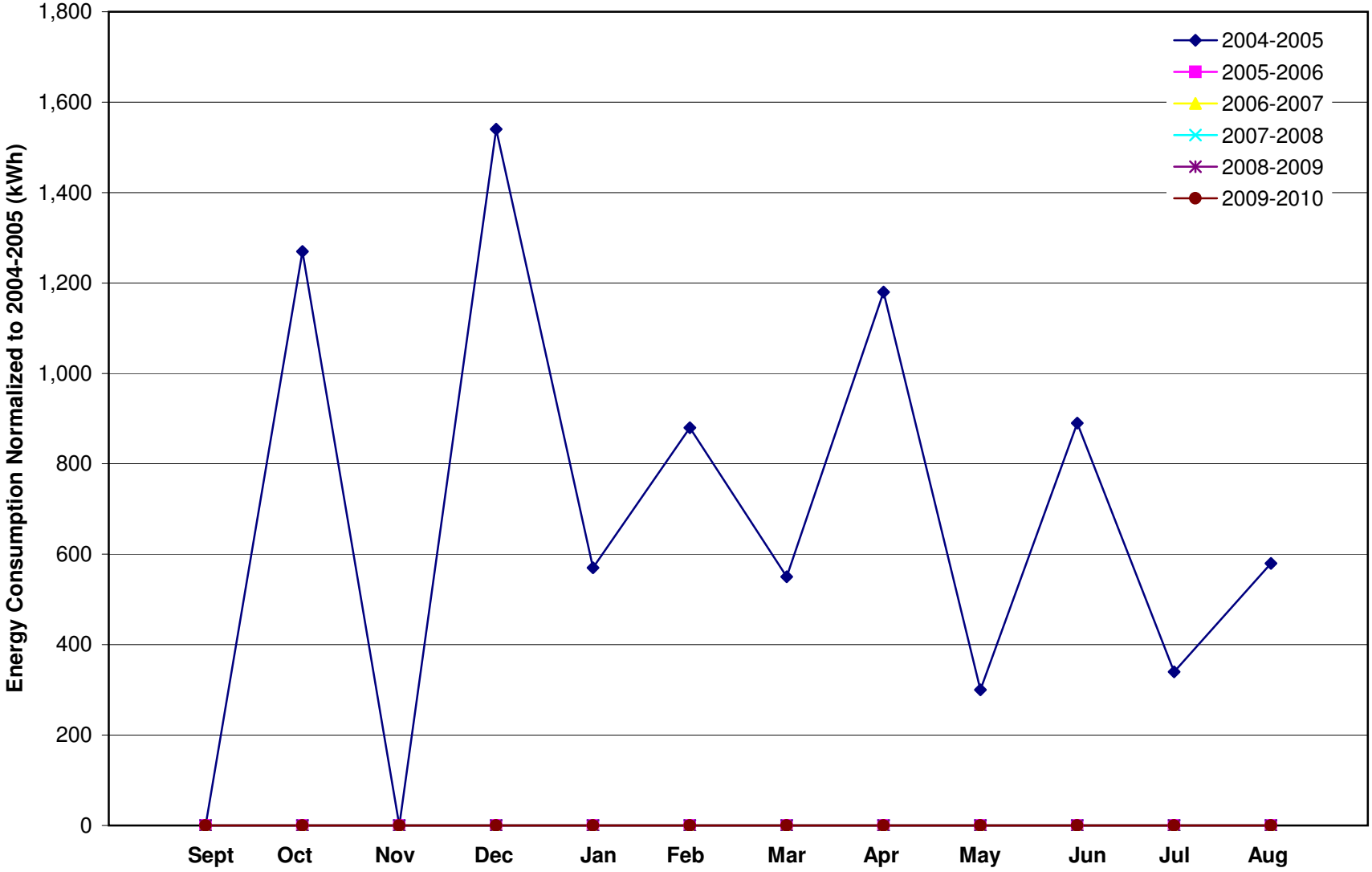


Table F.11 - Energy Consumption Monitoring Data for the Pumphouse #1

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	640	640	440.9	640		0		#DIV/0!		0		#DIV/0!
November	14,750	14,750	623.6	14,750		0		#DIV/0!		0		#DIV/0!
December	14,010	14,010	1013.3	14,010		0		#DIV/0!		0		#DIV/0!
January	16,460	16,460	1170.5	16,460		0		#DIV/0!		0		#DIV/0!
February	16,640	16,640	881.8	16,640		0		#DIV/0!		0		#DIV/0!
March	16,980	16,980	800.1	16,980		0		#DIV/0!		0		#DIV/0!
April	15,230	15,230	359.9	15,230		0		#DIV/0!		0		#DIV/0!
May	740	740	271.3	740		0		#DIV/0!		0		#DIV/0!
June	500	500	102.3	500		0		#DIV/0!		0		#DIV/0!
July	160	160	61	160		0		#DIV/0!		0		#DIV/0!
August	160	160	103.8	160		0		#DIV/0!		0		#DIV/0!
September	310	310	191.6	310		0		#DIV/0!		0		#DIV/0!
TOTAL	96,580	96,580	6020.1	96,580	0	0	0	#DIV/0!	0	0	0	#DIV/0!

	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.11 - Energy Consumption Monitoring Graph for the Pumphouse #1

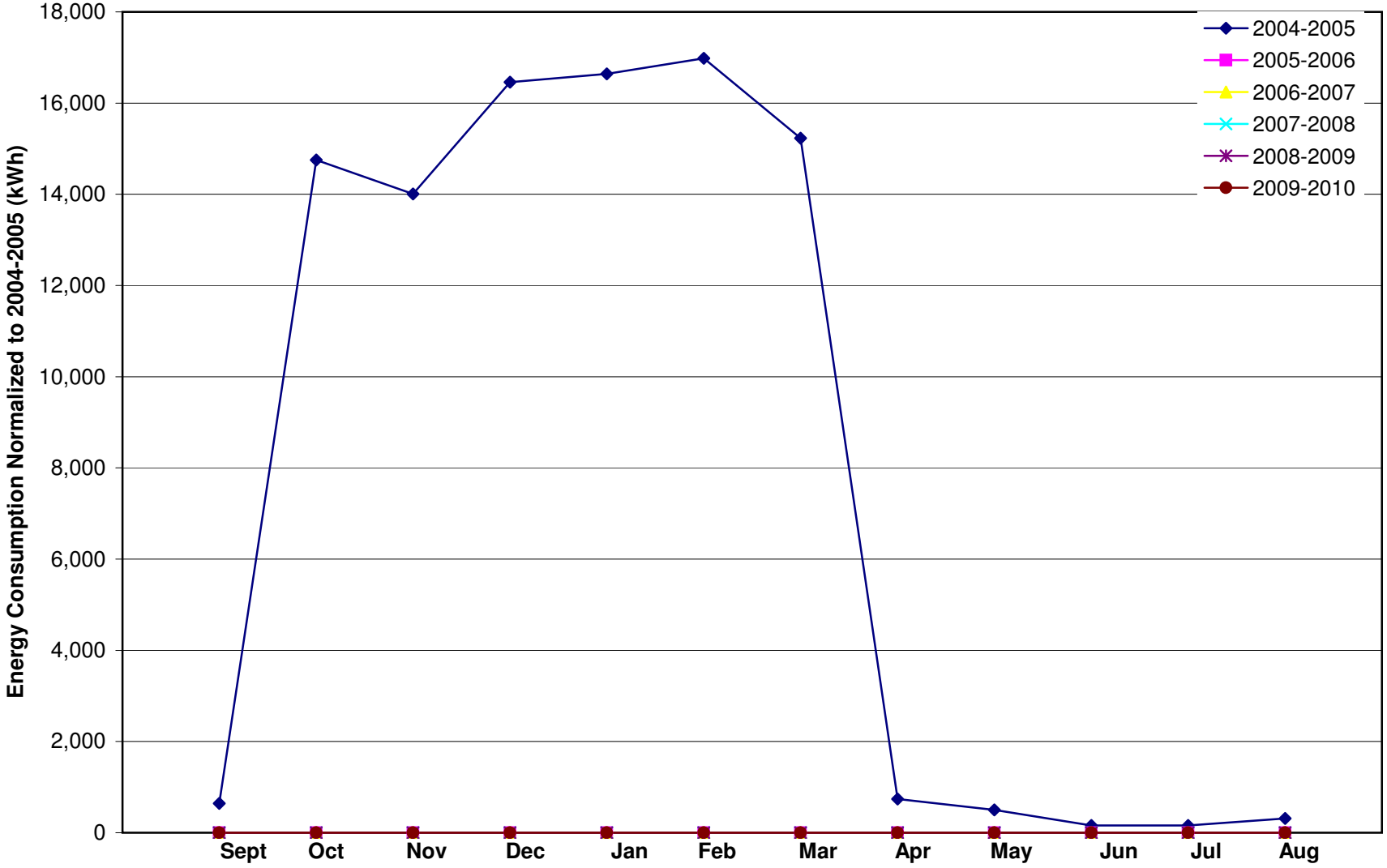


Table F.12 - Energy Consumption Monitoring Data for the Pumphouse #2

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	7,920	7,920	440.9	7,920		0		#DIV/0!		0		#DIV/0!
November	1,170	1,170	623.6	1,170		0		#DIV/0!		0		#DIV/0!
December	1,540	1,540	1013.3	1,540		0		#DIV/0!		0		#DIV/0!
January	2,330	2,330	1170.5	2,330		0		#DIV/0!		0		#DIV/0!
February	1,520	1,520	881.8	1,520		0		#DIV/0!		0		#DIV/0!
March	330	330	800.1	330		0		#DIV/0!		0		#DIV/0!
April	3,520	3,520	359.9	3,520		0		#DIV/0!		0		#DIV/0!
May	13,060	13,060	271.3	13,060		0		#DIV/0!		0		#DIV/0!
June	12,190	12,190	102.3	12,190		0		#DIV/0!		0		#DIV/0!
July	10,280	10,280	61	10,280		0		#DIV/0!		0		#DIV/0!
August	12,010	12,010	103.8	12,010		0		#DIV/0!		0		#DIV/0!
September	11,030	11,030	191.6	11,030		0		#DIV/0!		0		#DIV/0!
TOTAL	76,900	76,900	6020.1	76,900	0	0	0	#DIV/0!	0	0	0	#DIV/0!

	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.12 - Energy Consumption Monitoring Graph for the Pumphouse #2

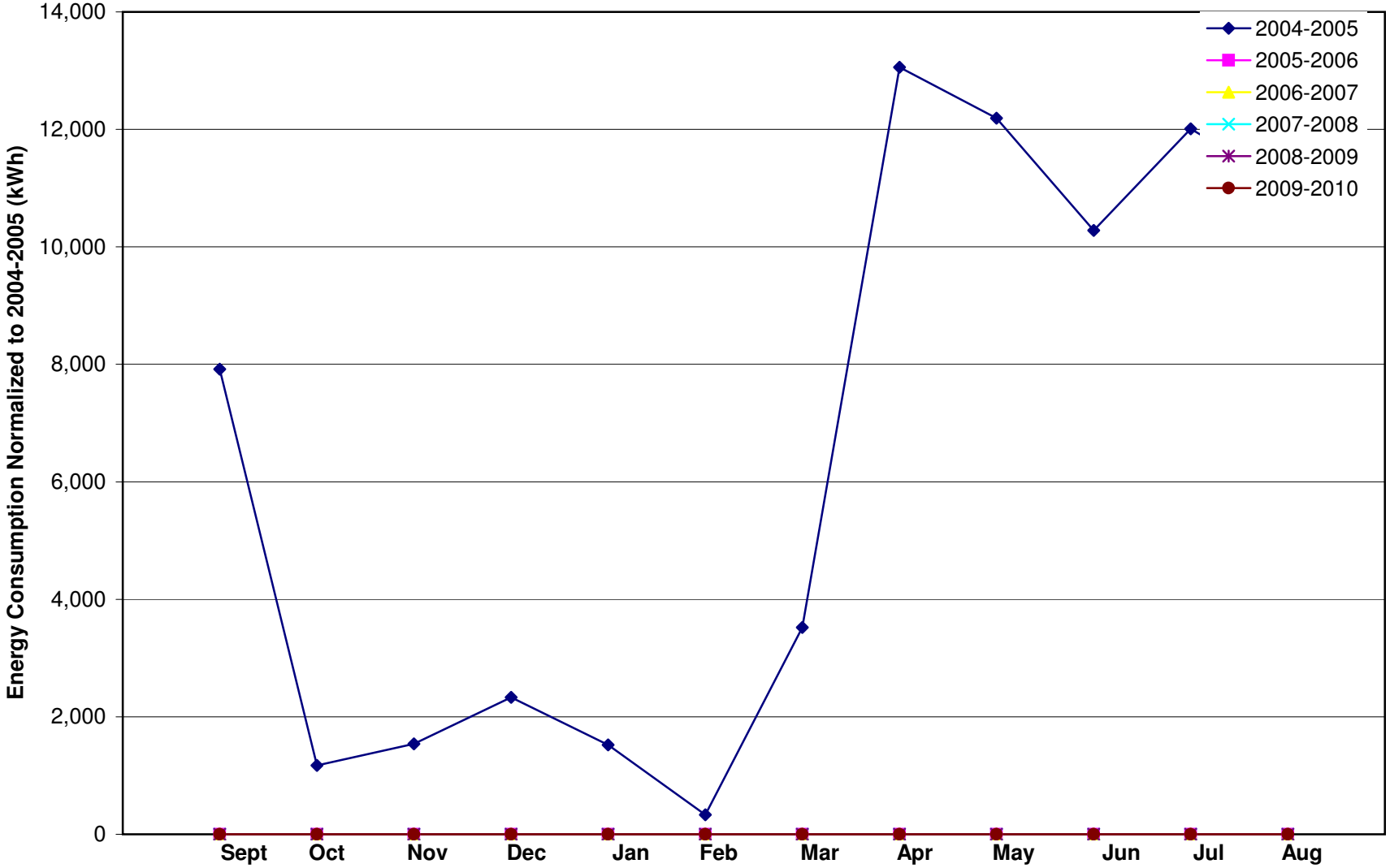


Table F.13 - Energy Consumption Monitoring Data for the Campground Office

	2004-2005				2005-2006				2006-2007			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October	0	0	440.9	0		0		#DIV/0!		0		#DIV/0!
November	920	920	623.6	920		0		#DIV/0!		0		#DIV/0!
December	160	160	1013.3	160		0		#DIV/0!		0		#DIV/0!
January	120	120	1170.5	120		0		#DIV/0!		0		#DIV/0!
February	0	0	881.8	0		0		#DIV/0!		0		#DIV/0!
March	280	280	800.1	280		0		#DIV/0!		0		#DIV/0!
April	0	0	359.9	0		0		#DIV/0!		0		#DIV/0!
May	800	800	271.3	800		0		#DIV/0!		0		#DIV/0!
June	0	0	102.3	0		0		#DIV/0!		0		#DIV/0!
July	3,240	3,240	61	3,240		0		#DIV/0!		0		#DIV/0!
August	0	0	103.8	0		0		#DIV/0!		0		#DIV/0!
September	2,680	2,680	191.6	2,680		0		#DIV/0!		0		#DIV/0!
TOTAL	8,200	8,200	6020.1	8,200	0	0	0	#DIV/0!	0	0	0	#DIV/0!

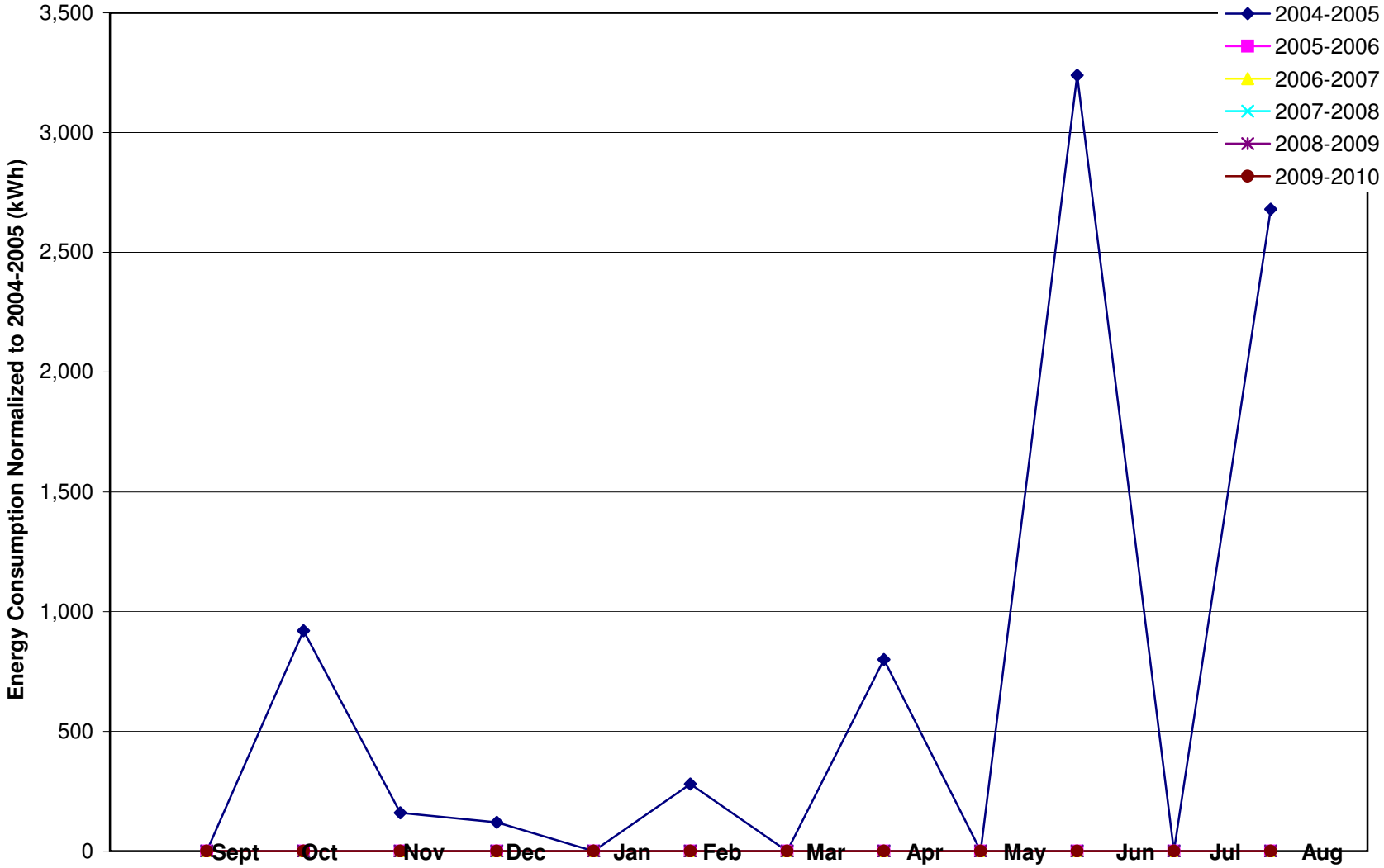
	2007-2008				2008-2009				2009-2010			
Month	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Total Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
October		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
November		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
December		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
January		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
February		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
March		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
April		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
May		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
June		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
July		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
August		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
September		0		#DIV/0!		0		#DIV/0!		0		#DIV/0!
TOTAL	0	0	0	#DIV/0!	0	0	0	#DIV/0!	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) taken from the electricity bills, next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Winnipeg, Manitoba:
http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=27119&Year=2005&Month=10&Day=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.13 - Energy Consumption Monitoring Graph for the Camground Office



Environment Canada Environnement Canada

[français] [Back]

Daily Data Report for October 2004

Notes on Data Quality.

ROBLIN
MANITOBA

Latitude: 51° 10' N **Longitude:** 101° 22' W **Elevation:** 539.50 m
Climate ID: 5012469 **WMO ID:** 71553 **TC ID:** WXB

Daily Data Report for October 2004

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days C	Cool Deg Days C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01	4.4	-4.0	0.2	17.8	0.0	0.8	0.0	0.8	0		
02	15.7	-6.9	4.4	13.6	0.0	0.6	0.0	0.6	0		
03	8.1	-7.0	0.6	17.4	0.0	0.0	0.0	0.0	0		
04	14.9	-9.0	3.0	15.0	0.0	0.7	0.0	0.7	0		
05	21.4	1.8	11.6	6.4	0.0	0.0	0.0	0.0	0		
06	26.7	2.6	14.7	3.3	0.0	0.0	0.0	0.0	0		
07	21.6	6.4	14.0	4.0	0.0	0.0	0.0	0.0	0		
08	17.3	1.9	9.6	8.4	0.0	0.0	0.0	0.0	0		
09	22.7	1.5	12.1	5.9	0.0	0.0	0.0	0.0	0		
10	17.0	5.5	11.3	6.7	0.0	0.0	0.0	0.0	0		
11	18.8	-0.8	9.0	9.0	0.0	0.0	0.0	0.0	0		
12	14.7	4.4	9.6	8.4	0.0	0.0	0.0	0.0	0		
13	8.1	-3.3	2.4	15.6	0.0	0.0	0.0	0.0	0		
14	9.4	1.4	5.4	12.6	0.0	3.8	0.0	3.8	0		
15	3.0	-6.4	-1.7	19.7	0.0	0.6	0.0	0.6	0		
16	0.6	-9.2	-4.3	22.3	0.0	0.0	0.0	0.0	0		
17	-1.8	-5.0	-3.4	21.4	0.0	0.0	0.0	0.0	0		
18	-2.0	-6.0	-4.0	22.0	0.0	0.0	3.5	3.5	0		
19	2.0	-2.1	-0.1	18.1	0.0	0.0	3.7	3.7	0		
20	-0.6	-2.6	-1.6	19.6	0.0	0.0	1.7	1.7	0		
21	1.8	-1.0	0.4	17.6	0.0	0.0	0.0	0.0	0		
22	1.8	0.2	1.0	17.0	0.0	0.7	0.0	0.7	0		
23	2.3	0.0	1.2	16.8	0.0	0.0	0.0	0.0	0		
24	1.3	-1.8	-0.3	18.3	0.0	0.0	0.0	0.0	0		
25	5.6	-5.0	0.3	17.7	0.0	0.0	0.0	0.0	0		
26	7.8	-3.4	2.2	15.8	0.0	0.0	0.0	0.0	0		
27	8.0	3.0	5.5	12.5	0.0	0.0	0.0	0.0	0		
28	9.3	5.9	7.6	10.4	0.0	0.0	0.0	0.0	0		
29	6.4	0.3	3.4	14.6	0.0	0.0	0.0	0.0	0		
30	3.4	-2.2	0.6	17.4	0.0	0.0	0.0	0.0	0		
31	6.8	-2.0	2.4	15.6	0.0	0.0	0.0	0.0	0		
Sum				**440.9**	**0.0**	**7.2**	**8.9**	**16.1**			
Avg	**8.9**	**-1.4**	**3.8**								
Xtrm	**26.7**	**-9.2**									

Legend

[empty] = No data available

M = Missing

Page F30

APPENDIX G

THE MUNICIPALITIES TRADING COMPANY OF MANITOBA LTD. REPORT

TABLE OF CONTENTS - APPENDIX G

Member Services

The Municipalities Trading Company of Manitoba Ltd. (MTCML) allows AMM members to purchase products and services at lower prices through the power of bulk buying. This year was another great success. Sales remained consistent and the stable pool of official suppliers continued to change and grow. The products sales have consistently remained between 6.5 and 7.4 million dollars for the last 4 years.

The MTCML provides a major source of revenue for the AMM and allows the AMM membership dues to remain one of the lowest in Canada. This past year, the MTCML was able to rebate another $350,000 to our members based on their MTCML sales, bringing the cumulative rebate over the past four years to $1,250,000.

MTCML Official Suppliers

Official Suppliers are very important to the success of the MTCML. These suppliers offer hundreds of products and services that municipalities use. The Trading Company has individual contracts with each of these suppliers that ensure the best possible pricing for the purchasing members. In return, suppliers have direct contact with Manitoba's municipal market and can be a part of regular marketing opportunities through the AMM (mailings, Convention, trade shows, etc.) Each of our suppliers has shown long term commitment to the MTCML, creating a stable purchasing environment for the members of the AMM.

Corporate Members

At present fourteen companies make up the Corporate Members list of the AMM, five of these new for 2004/2005. These members assist the buying group in providing many services and hosting various events throughout the year.

*Last year, the MTCML was able to rebate **$350,000** to our members based on their MTCML sales, bringing the total rebate over the past four years to **$1,250,000**.*

Major Programs

There are also two major buying programs offered by the Trading Company. These programs are owned by the AMM membership, managed by the AMM and each administered by a company that has expertise in the program area.

Petroleum Products Buying Group (PPBG)

AMM has entered into contracts with both Imperial Oil and Petro Canada, on behalf of all of our participating Members, for the supply of gasoline, diesel and lubricants. Our objective is to combat one-sided pricing advantages enjoyed by petroleum suppliers and to assist our Members to purchase fuel at a lower cost while still supporting the local fuel dealers. Currently there are 77 AMM Members who purchase over 6,000,000 litres of fuel each year and about 130 other municipalities in Saskatchewan and Alberta who purchase an additional 29,000,000 litres of fuel annually.

The concept of AMM purchasing large volumes of fuel on behalf of our Members and the careful analysis of industry pricing means fuel savings for member municipalities in all three provinces. At the same time, local fuel dealers are supported. The program is administered by Prairie Fuel Advisors Inc., who also act as our purchasing agent.

The only cost for joining the PPBG is 1.2¢ per litre for the fuel purchased and 10¢ per litre for lubricants. A municipality may withdraw from the PPBG at any time, and there is no cost to withdraw.

Member Services

M.T.C.M.L.

Insurance

All AMM members outside of Winnipeg participate in the insurance program, administered by Hayhurst Elias Dudek on behalf of the AMM. Coverage includes property/road machinery and equipment; crime (loss of money); comprehensive general liability; errors and omissions liability; environmental impairment (pollution) liability; fire vehicle insurance; plus accident insurance for Councils, fire departments, ambulance services, and other 'volunteers'.

A major part of the program is the $3,500,000 annual self-insurance loss pool that keeps premiums much lower than if individual municipalities purchased their own coverage. Insurance is purchased from various providers for coverage in excess of the $3,500,000 annual loss pool amount, to provide complete protection. This allows the opportunity for significant refunds in low-claims years.

Last year, the AMM was able to offer an average 5% reduction in our insurance rates. As well, as a result of excellent risk management by municipalities, the AMM was able to refund $918,000 to municipalities out of the insurance loss pool.

Official Suppliers have shown long-term commitment to the MTCML.

MTCML Official Suppliers

Acklands Grainger Inc.
Airmaster Sales
Armtec
Bridgestone Canada Inc.
CD Awards
Darwen Road Technologies Ltd.
Denray Tire
Dust Free Road Maintenance
Fort Distributors Ltd.
Grand & Toy
Guardian Traffic Services Manitoba Ltd.
Hayhurst Elias Dudek Inc.
Kal Tire
MTS
Michelin
Norquay Printers Ltd.
PCO Orkin Swat Team
Prairie Fuel Advisors Inc.
Shippam & Associates Inc.
Souris Rock Shop
Tirecraft
Westcon Equipment & Rentals
Westman Steel Industries

AMM Corporate Members

Borland Construction
Cochrane Engineering
Guertin Equipment
Hayhurst Elias Dudek
Innovative Municipal Products Inc.
Manitoba Aboriginal and Northern Affairs
Manitoba Heavy Construction Association
Manitoba Hydro
Manitoba Mixed Concrete Association
Manitoba Pork Council
Mazer Group Construction Equipment
Robert Watson, Attorney
Strong-Coley & Associates
Westcon Equipment & Rentals Ltd.