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LIGHTING	Wallace Emerson AIR - 9
Current Condition and Operational Methods of Equipment	The facility was found to operate an assortment of lighting systems. All linear fluorescent luminaires operate T8 lamps and energy efficient electronic ballasts. Various incandescent and compact fluorescent surface-mount and recessed luminaire types were found throughout the facility. EXIT signs have been converted to L.E.D. (Light Emitting Diode) light source. The gymnasium is illuminated by 400W metal halide luminaires. The pool is illuminated by 400W metal halide luminaires. Exterior artificial ice surfaces are illuminated by high wattage pole mount luminaires. The exterior building lighting systems are generally a combination of low wattage metal halide and high-pressure sodium wall-mount luminaires. Luminaires are controlled by photocell or time clock.
Current Space Conditions	Light levels for most areas meet or exceed I.E.S.N.A. recommended levels for recreational facilities.
Proposed Modifications	**Retrofit** Existing T12 fluorescent luminaires to be relamped and reballasted with reduced wattage T8 lamps and low ballast factor electronic ballasts. Existing luminaires operating 4' T8 lamps will also be relamped and reballasted with reduced wattage T8 lamps and low ballast factor electronic ballasts. Select incandescent luminaires will be relamped with screw-in compact fluorescent lamps or replaced with new linear fluorescent luminaires one for one. **Redesign** Redesign of gymnasium with new T5 electronically ballasted luminaires. Occupancy sensors to be installed to enhance control of new lighting system. **Sensors** Sensors to be installed in select change rooms, washrooms and offices.
Impact on Maintenance	With the installation of new lighting equipment, the operations staff will have minimal lamp and ballast failures for the firs few years of operation, provided the lamps and ballasts perform as per manufacturers specifications.
Impact on Non-Utility Costs	The installation of new T8 fluorescent lamps will provide the occupants with a much higher Colour Rendering Index (CRI) as compared to the standard fluorescent T12 lamps due to the addition of Rare Earth Phosphors. High frequency electronic ballasts operating at frequencies grater than 20,000Hz virtually eliminate all ballast noise and lamp flicker associated with common fluorescent magnetic ballast lighting systems.

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New Skills or Procedures Requirement	N/A
Expected Useful Life of Equipment	20,000 hours for T8 lamps. 60,000 to 100,000 hours for high frequency electronic ballasts. 50,000 cycles for occupancy sensors 20-years on new fluorescent luminaire housing.
Warranty	Installation on workmanship one-year Linear fluorescent T8 lamps two-years High frequency electronic ballasts five-years Occupancy Sensors five-years New Luminaires one-year on housing

WATER	Wallace Emerson AIR - 9
Current Condition and Operational Methods of Equipment	Cinergy's site audit reviewed all domestic water consumption fixtures. Within this facility, flush valve toilets, and faucets are water inefficient.
Current Space Conditions	N/A
Proposed Modifications	**Not included in this project** Cinergy proposes the installation of water efficient water fixtures to replace the existing inefficient fixtures. Toilets with flush valves – Install new 6.0L low flush bowl and flush valve assembly. Qty of 17 units. Faucet aerators – Install new vandal-proof, non-aerating low flow aerators. Qty of 17 units.
Impact on Maintenance	The installation of new fixtures will eliminate any on going maintenance on the existing older fixtures.
Impact on Non-Utility Costs	The installation of new fixtures will eliminate existing replacement parts inventory costs. The installation of new fixtures will streamline the City's inventory of fixtures and replacement parts.
New Skills or Procedures Requirement	N/A
Expected Useful Life of Equipment	Flush valves 10 - 15 years (Not included in base project) Toilet bowls 15 - 25 years (Not included in base project) Aerators 10 - 15 years (Not included in base project)
Warranty	1 year

BAS – STANDARD ARENA	Wallace Emerson AIR - 9
Current Condition and Operational Methods of Equipment	The facility currently has a Siemens automation system that monitors the refrigeration plant. There are space thermostats that control the buildings various heating devices. <u>Unit Heater and Exhaust Fan</u>: The existing compressor room, office and washrooms are either heated by electric

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	or gas unit heaters. These heaters are operated throughout the ice season and beyond. They are normally cycled to maintain the space temperature according to the setpoint set at the local line thermostat or self contained thermostats. In some cases, these thermostats are not functioning properly due to age and lack of maintenance; the heaters are sometimes running 24 hours a day. In the summer, the exhaust fan is cycled on/off to maintain the space temperature at the preset setpoint at the local line thermostat in the compressor room in particular. Zamboni Water Heater: The hot water heated by electric heaters is used to fill the Zamboni tank for the flooding of the ice rink(s). In some cases, the hot water tank will feed the hot water supply to the seasonal washrooms. Since the outdoor rink facility is opened about 3 months for the ice season, the use of the hot water is not necessary beyond that period. Additional heat losses can be found through the poorly or no insulated pipes.Brine Pump: The brine pump(s) is running continuously throughout the ice season. The existing supply and return brine temperatures are being monitored by the existing Honeywell or Cimco system. In the event of very cold days when the outside temperature is below -7°C, the ice pad can be maintained without the need of running the brine pump(s).
Current Space Conditions	Space temperature 22-25 °C. Domestic hot water temperature is maintained at 43° – 54°C (110° – 130°F). Brine temperature maintained at -11.7°C to -12°C (10°F - 11°F).
Proposed Modifications	Building Automation System (BAS): A direct digital control system will be installed to operate the facility more efficiently. The installation will allow for remote access of the facility through a modem. An operator workstation will be installed in the facility which will include controls graphics, operation schedules, and set point modification capabilities. The existing Siemens automation control panel will be removed and the points will be integrated into the new controls system. Unit Heater and Exhaust Fan: It is proposed to install a space temperature sensor at each zone and the space temperature will be monitored through the EMCS system. The space temperature will be maintained at a night setback temperature setpoint at night through a time of day schedule setup in the EMCS system during the ice season, and will setback throughout the day beyond the ice season. The exhaust fan will be cycled on/off to maintain a setback space temperature in the compressor

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	room in the summer. The EMCS will open the intake louver and exhaust louver first when the compressor room space temperature is higher than its setpoint, and the exhaust fan will be started by the end switch installed at the intake louvers upon its fully opening. Zamboni Water Heater: During the ice season, water temperature will be monitored and the power to the water tank will be enabled or disabled accordingly. Gas consumption to the domestic hot water tank will be cut off after the ice season through an EMCS system. Zamboni door switch will be installed and interlocked to the EMCS system therefore when the door is open, the Zamboni room heating will not run. This will conserve unnecessary heating. Calculated savings is based only on the heater savings. Brine Pump: It is proposed to modify the interlock control of the brine pumps from the compressor control circuit, so that the brine pumps will be controlled by the EMCS system in series with the existing control. By installing a reliable outdoor air temperature sensor, the brine pump will be shut down when outdoor temperature is below -7°C. In order to prevent the freezing of the brine solution in the system, the brine pump will be re-activated when the outdoor temperature is below -15°C and will run continuously.
Impact on Maintenance	The EMCS system need to be checked and maintained every year. The unit heaters will operate less frequently and will therefore require less scheduled maintenance.
Impact on Non-Utility Costs	N/A
New Skills or Procedures Requirement	No training will be required. Training for an EMCS system will be done through a global scheme.
Expected Useful Life of Equipment	10-15 years
Warranty	1 Year

VENDMISER	Wallace Emerson AIR - 9
Current Condition and Operational Methods of Equipment	There are two soft drink vending machine(s) located within the facility. The refrigeration compressor in these units operates to maintain constant, cool temperatures within the units, ensuring that the beverages remain cool.
Current Space Conditions	N/A
Proposed Modifications	**Not included in this project** Cinergy proposes the installation of a control device that monitors occupancy and reduces the lighting and

VENDMISER	Wallace Emerson AIR - 9
	compressor load on the vending machines. This controller is self-learning and self programs to occupancy conditions without any manual interface. The unit is installed only on machines that serve cold beverages.
Impact on Maintenance	None
Impact on Non-Utility Costs	None
New Skills or Procedures Requirement	None
Expected Useful Life of Equipment	Vending Machine controller – 15 years
Warranty	1 year

Power Factor Correction	Wallace Emerson AIR - 9
Current Condition and Operational Methods of Equipment	Power factor is the ratio between the KW and the KVA drawn by an electrical load where the KW is the actual load power and the KVA is the apparent load power. It is a measure of how effectively the current is being converted into useful work. For large users (greater than 50 kW), Toronto Hydro charges electrical demand charges for both actual load power, KW and apparent load power, KVA. Since Toronto Hydro uses separate KW and KVA charges, a power factor of less than unity (100%) effectively pays more KVA charges than necessary.
Current Space Conditions	All sites audited have a power factor less than 90%.
Proposed Modifications	It is proposed to reduce the KVA component by adding capacitive reactance capacitors (KVAr) to the electrical system. As kVAr is added to the system, the KVA is reduced to the maximum amount of KW. However, the closer the power factor gets to 100%, a disproportionate amount of kVAr is required. In order to reach the optimum payback, 95% to 97% power factor is targeted. Power factor correction will consist of a certain amount of fixed capacitance (static, connected all of the time) designed to maximize demand levels throughout the year. Additional capacitors may be required which will be connected to the compressor loads which are only energized when the compressors are operating. Scope of installation for this facility: Install 50 kVAr 208 volts(66 kVAr 240 volts) on 200 amp disconnect plus two 15 kVAr 208 volt (20 kvar at 240) switched units on 50 HP compressors and one 25 kVAr switched on the 75 HP Compressor.
Impact on Maintenance	The capacitors require the same type of maintenance as a standard transformer. Generally checking the connections and cleaning (in a dirty environment) on an annual basis is

Power Factor Correction	Wallace Emerson AIR - 9
	required. Each of the capacitor banks has an LED that indicates operational/fuse failure.
Impact on Non-Utility Costs	A capacitor reduces current on the system and will result in increased capacity to switches, transformers and wiring upstream of the capacitor.
New Skills or Procedures Requirement	None.
Expected Useful Life of Equipment	Design life on the capacitors is 20 years with a life expectancy of 15 years.
Warranty	1 year parts and labour and 3 year pro-rated manufacturer's cell warranty.