

**TOWNSHIP OF LONG BEACH
MUNICIPAL COMPLEX
ENERGY ASSESSMENT**

for

**NEW JERSEY
BOARD OF PUBLIC UTILITIES**

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1.0 INTRODUCTION AND BACKGROUND

The Township of Long Beach Municipal Complex is a 27,275 square foot facility consisting of two interconnected buildings; the municipal office building, and police station and courthouse. The 10,595 square foot, two story police station and courthouse building was constructed in 1992; the 16,680 square foot two story municipal office structure was built in 1996 and is joined to the courthouse area via a breezeway. The Long Beach police station operates 24/7 and is occupied by up to 25 people during the daytime and 10 people overnight. Court sessions are held twice a month for several hours each. The municipal building is typically occupied during normal business hours Monday through Friday.

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.



2.0 EXECUTIVE SUMMARY

This report details the results of the Township of Long Beach Municipal Complex, a 27,275 square foot facility consisting of the municipal office building, and police station and courthouse. The police/courthouse was constructed in 1992, the municipal office structure in 1996; the facilities are joined by a breezeway.

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of \$12,500 for the recommended ECMs may be realized with a payback of 5.7 years.

The ECMs identified in this report will allow for the building to reduce its energy usage and if pursued has the opportunity to qualify for the New Jersey SmartStart Buildings Program and/or Direct Install Program. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

Summary of Energy Conservation Measures – Municipal Complex							
Energy Conservation Measure		Approx. Cost (\$)	Approx. Annual Savings (\$)	Payback w/o Incentive	Potential Incentive* (\$)	Payback w/ Incentive	Recommended for Implementation (X)
ECM-1	Install Demand Control Ventilation	10,500	900	11.7	6,300	4.7	X
ECM-2	Temperature Setback - Courtroom	1,200	400	3.0	700	1.3	X
ECM-3	Install Gas-Fired Heat in Lab	3,000	500	6.0	-	6.0	X
ECM-4	Install Premium Efficiency Motors	1,200	100	9.0	700	5.0	X
ECM-5	Install Storm Windows	14,200	2,000	7.0	-	7.1	X
ECM-6	Increase Ceiling Insulation - Municipal Office Building	3,100	100	>25	-	>25	
ECM-7	Install Wall Insulation and Siding	29,600	2,100	14.1	-	14.1	X
ECM-8	Install Door Seals	1,100	200	5.6	-	5.5	X
ECM-9	Replace Domestic Hot Water Heater - Police	3,000	300	8.6	300	9.0	X
ECM-10	Lighting Replacements	27,400	3,600	7.7	16,400	3.1	
ECM-11	Install Occupancy Sensors	13,700	3,200	4.2	8,200	1.7	
ECM-12	Lighting Replacements with Occupancy Sensors	41,100	6,000	6.8	24,700	2.7	X
* Incentive shown is the maximum amount potentially available per the NJ SmartStart or Pay For Performance Programs.							

3.0 EXISTING CONDITIONS

3.1 Building - General

The Township of Long Beach Municipal Complex is a 27,275 square foot facility consisting of the municipal office building, police station and courthouse, baseball/softball field, and tennis courts. The 10,595 square foot, two story police station and courthouse were constructed in 1992; 16,680 square foot, two story municipal office building in 1996. In addition to the court room and court offices, other spaces in the police sector include dispatch, records, holding cell, offices, locker rooms, and a sallyport. There is also a detached crime lab located on the east side of the building. The municipal building consists of town offices, including Construction/Inspections & Zoning Department, Assessor, Payments, Revenue & Finance, Municipal Clerk, Land Use Board, Mayoral Office, Public Works Administration, and Water/Sewer. There is also a large multi-purpose room located on the second floor.

The police station operates 24/7 and is staffed by up to 25 people during the daytime and 10 people during overnight hours. Offices on the second floor are typically unoccupied overnight. Court sessions are held twice a month for several hours and are typically attended by about 20 people. Additionally, the court office is open 9:00 AM to 3:30 PM, Monday through Friday with two full-time employees. The municipal building is typically occupied by up to 40 people from 8:00 AM to 4:00 PM, Monday through Friday. Hours and occupancy of the multi-purpose room vary depending on meeting schedules and town functions; this space has a capacity for about 100 people.

The two structures were constructed four years apart; however, the building envelopes were constructed in the same manner. Exterior walls consist of painted cedar shake siding over 30 lb. felt paper and 1/2" plywood sheathing, on 2x6 wood framing with R-19 batt insulation, and finished with 1/2" gypsum board on the interior. Exterior wall construction allows noticeable infiltration and cold drafts on windy days, resulting in occupant discomfort. Additionally, while cedar siding holds up well to weather conditions, it requires repainted every 3-5 years to prevent damage. The siding at the complex appears to be in fair to good condition and well maintained. The roofs are sloped at a 4.25" rise to 12" run and peak along the center of the building. Roof and ceiling construction consists of asphalt shingles over 30 lb. felt paper and 1/2" plywood sheathing on 2x8 rafters. Between the joists is 6" R-19 batt insulation supported by 1/2" gypsum board; a suspended ceiling with acoustic tiles is exposed to the occupied space. Roof assemblies on both buildings are in good condition.

The municipal office building was constructed with deeper ceiling joists, which provides an opportunity to install additional insulation.

Most exterior doors are insulated steel with tempered security glass. There are also several insulated steel doors with no glass; the courtroom vestibule has two solid oak doors. Most door seals are worn, have visible gaps, and are in need of replacement. All windows were manufactured by Andersen and constructed with vinyl clad wood frames and wood sashes with double pane glazing. Most windows are double-hung style, there are also several awning style units and inoperable picture windows. The window units show noticeable deterioration and rotting to the wood sash along the interior. Additionally, rooms with more windows are typically much colder and experience excessive draftiness on windy days, which are fairly frequent along the Atlantic coast.

In 2005, most major mechanical equipment was replaced with new equipment which includes air handling units (AHU) and boilers. Due to the high salt content in the air along the Atlantic coast,

equipment located outdoors rusts and rots at an accelerated rate; therefore, condensing units are replaced on an as needed basis.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity is delivered by Atlantic City Electric and supplied by Liberty Power Holdings which began in February 2010. Natural gas supplied and delivered by New Jersey Natural Gas (NJNG). Potable water is provided by the municipally owned water department free of charge.

The complex has four electric meters serving the buildings, the sign identifying the facility, and baseball/softball field. From December 2009 through November 2010, the combined electric usage for all four meters was approximately 273,650 kWh at a cost of about \$40,200. Review of electricity bills during this period showed that the complex was charged at the following rates: supply unit cost of \$0.133 per kWh; demand unit cost of \$5.74 per kW; and blended unit cost of \$0.147 per kWh. Electrical usage was generally higher in the summer months when air conditioning equipment was operational. From November 2009 through October 2010, gas-fired equipment consumed about 8,250 therms of natural gas. Based on the annual cost of \$11,600, the blended price for natural gas was \$1.412 per therm. Natural gas consumption was highest in winter months for heating. See Appendix A for a detailed utility analysis.

Natural gas commodity supply and delivery is presently purchased from NJNG; electricity commodity is supplied by Liberty Power Holdings and delivered by Atlantic City Electric. The delivery component will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party; as is currently the case with electricity. The electricity or natural gas commodity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. According to the U.S. Energy Information Administration, the average commercial unit costs of electricity and natural gas in New Jersey during the same periods as those noted above was \$0.141 per kWh and \$0.959 per therm. When compared to the average state values, it is recommended that the present electricity supplier be maintained and a third party natural gas supplier be pursued. A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

Hot water (HW) is the primary heating medium utilized in the municipal complex. Five Weil-McLain HW boilers serve the two buildings; two are located in the second floor mechanical room of the municipal office building. These boilers are Ultra-310 high efficiency condensing boilers with an input of 310 MBh and output of 289 MBh. The police station area is equipped with two Weil McLain GV-6 cast-iron direct-vent HW boilers with an input of 175 MBh and output of 153 MBh. A third GV-6 light-commercial boiler is located in the courthouse mechanical room and serves equipment for the courtroom and court offices. As previously noted, the five boilers were replaced in 2005 and are all in good condition. Hydronic equipment served by the boilers includes AHUs, duct mounted heating coils, baseboard fintube units, and unit heaters. Supplemental electric heating equipment has been installed in numerous perimeter rooms and vestibules in both buildings. This equipment includes cabinet unit heaters and baseboard units used on an as-needed basis.

Located in the second floor mechanical room, (5) Carrier heating and cooling AHUs serve the municipal office building. The police and courthouse building utilizes (3) Carrier AHUs, (1) York AHU, and (1) Rheem furnace, which are located throughout the building. All occupied spaces within the two buildings

are air conditioned. Each of the (9) AHUs and the (1) furnace are equipped with direct expansion (DX) cooling coils and connected to a dedicated remote condensing unit located outdoors. The (5) remote condensers serving the municipal office building have a total cooling capacity of about 38 tons; the (5) units serving the police stations and courthouse building have a total capacity of approximately 36 tons. As previously stated, all AHUs were replaced in 2005 and the single furnace was installed in 2006; all are in good condition. Remote condensing units are replaced on an as-needed basis and rust out at an accelerated rate due to the high salt content in the air.

Other HVAC equipment includes mini-split AC units which serve the server rooms and several exhaust fans for the restrooms, locker rooms, mechanical rooms, and sallyport. The detached crime lab utilizes a 14,000 Btuh window AC unit and electric baseboard heating units. Specifics on mechanical equipment can be found within the equipment inventory located in Appendix T.

3.4 Control Systems

The majority of HVAC controls have been upgraded as equipment has been replaced. All thermostats for AHUs in areas not occupied 24/7 have been upgraded to programmable units. The five boilers are equipped with a temperature reset control unit which adjusts the heating hot water (HHW) loop temperature with the outdoor air temperature. Point of use equipment such as unit heaters and baseboard heaters are controlled by mechanical dial-type thermostats. Additionally, some electric heating equipment and the mini-split AC units have integral controls.

Temperature setpoints and schedules vary depending on the usage and occupancy of the space. Typical setpoints in the municipal office building are 69°F heating and 73°F cooling during occupied times, and 65°F heating and 77°F cooling during unoccupied times; these values vary slightly between thermostats per space and occupant comfort. The first floor of the police station does not utilize temperature setback since this area is active 24/7; setpoints are currently 71°F for heating and 73°F cooling. However, the second floor has a programmable thermostat programmed for overnight setback. The courtroom utilizes two mechanical thermostats; the first controls the AHU and is set to 68°F for heating and 72°F cooling, the second unit controls the (5) perimeter electric baseboard heating units and is set to 72°F. Temperature setback is currently not implemented in the courtroom due to issues with pipes freezing above the ceiling. Heating and cooling temperatures in the court offices and foyer are monitored by three thermostats located in the foyer. The units are older mechanical type and adjusted manually.

3.5 Lighting/Electrical Systems

Lighting fixtures throughout the municipal office building are typically equipped with energy efficient electronic ballasts and 4' 32 watt fluorescent T-8 lamps or 2' 32 watt fluorescent U-tube T-8 lamps. There are also numerous 31 watt recessed fixtures which utilize two 13 watt compact fluorescent lamps. Constructed several years earlier, the police/courthouse building primarily utilizes inefficient lighting fixtures with magnetic ballasts and 4' 34 watt T-12 fluorescent lamps. Interior lighting is manually controlled by wall switches. In addition, exit signs in both buildings are a mixture of units which use older incandescent lighting and newer LED lighting. Lighting fixtures which should be targeted for upgrade include those with magnetic ballasts, T-12 fluorescent lamps, and incandescent bulbs.

Exterior building lighting is provided by a combination of incandescent flood lamps, high pressure sodium and metal halide wall packs, and high pressure sodium lamp posts along the courthouse porch. Additionally, parking lot and site lighting is supplied by (23) light posts with high pressure sodium bulbs. All exterior building lighting is controlled by timers; the (23) light posts are operated by a photocell.

Emergency backup power to the police station is provided by a Stamford natural gas generator, which appears to be original to the building, capable of supplying 150 kW and 187 kVA of 208 volt/3 phase power. The unit is located on the east side the complex within a metal enclosure.

3.6 Plumbing Systems

The municipal office building utilizes a 40 gallon A.O. Smith 40,000 Btuh gas-fired water heater to generate domestic hot water (DHW). Located in the second floor mechanical room, this unit was installed in 2007. The police station/courthouse building is equipped with a 100 gallon State Industries 75,100 Btuh gas-fired water heater. Since there is only one rarely used shower in the building and the remaining DHW load is minimal, the water heater is oversized for the current usage. Additionally, the detached crime lab is also outfitted with a small DHW heater. This 6 gallon electric unit is manufactured A.O. Smith and has a 1,500 watt heating element.

All plumbing fixtures in the complex are standard flow typical for the 1990s, and in fair condition. More water-efficient flush valves and faucets could be installed to reduce water usage. However, since the complex is connected to the municipally owned water department and water is supplied at no charge, there are no monetary benefits from reduced usage.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Install Demand Control Ventilation

The courtroom and multi-purpose room each utilize a single Carrier AHU for primary HVAC requirements. According to building drawings, these units are scheduled to supply 300 CFM of outdoor air (OA) to the courtroom and 200 CFM OA to the multi-purpose room. Each AHU draws fresh air in through an OA intake and blends it with return air prior to being treated and discharged into the respective space. Since there are no controls on the fresh air intakes, the same amount of OA is treated regardless of the ventilation demand determined by occupancy. Therefore, the units are constantly ventilating the areas for maximum occupancy. Utilizing demand control ventilation (DCV) would regulate the amount of OA induced to each space based on the CO₂ levels detected within the room or return air duct. A DCV system is based on the principle that the number of people within the space is proportional to the concentration of CO₂. This ECM evaluates providing the code required or maximum design capacity of fresh air to the courtroom and multi-purpose room only when the level of CO₂ dictates. The result will be a decrease in the amount of OA necessary to be treated therefore, reduce the annual heating and cooling loads.

According to the 2009 International Mechanical Code, both the courtroom and multi-purpose room require 5 CFM/person of OA. Therefore, based on the occupancy schedule for each room, it was determined that the average required amount of OA within the space during occupied hours is about 125 CFM for both the courtroom and the multi-purpose room. Savings for this measure will result from reduced OA rates during occupied hours and the elimination of OA during unoccupied hours. The calculations determined that installing a DCV system in the courtroom and multi-purpose room is expected to yield a combined annual savings of 490 therms and 1,590 kWh.

Implementation of this measure requires installation of OA controls on the two AHUs serving the courtroom and multi-purpose room. This includes installing CO₂ sensors within the return air ducts and upgrades to the OA damper actuators. Additionally, a programmable logic controller (PLC) will be necessary to control the OA damper position based on the CO₂ readings.

DCV equipment has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 7,350 therms and 23,850 kWh, and \$13,500.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-1 Install Demand Control Ventilation

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
10,500	0	1,590	490	0	900	0	900	0.3	6,300	11.7	4.7

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.2 ECM-2 Temperature Setback – Courtroom

The courtroom utilizes two mechanical thermostats for temperature control; the first controls the AHU and is set at 68°F for heating and 72°F cooling; the second controls the (5) perimeter electric baseboard heating units and is set to 72°F. Per the town court session and meeting schedules, it was estimated that the courtroom is occupied on average only 4 hours per week, leaving 164 hours of unoccupied time. By replacing the mechanical thermostats with new programmable models, both thermostats can be programmed to set back the unoccupied space temperature to save heating and cooling energy. Building personnel indicated that manually setting back the courtroom unoccupied space temperature had been attempted; however, this resulted in freezing issues with piping located in the ceiling. Therefore, this measure also includes installing a pipe heat trace system to prevent freezing. This ECM models the expected savings of adjusting the unoccupied temperature setpoints to 60°F during heating and 80°F during cooling periods. In the calculations for this measure, occupied temperature setpoints were maintained per those in use at the time of the energy audit.

To calculate the benefits of night setback, a block load building model was created to approximate the existing energy load for the courtroom. The block load, provided in Appendix D, models the maximum overall cooling and heating load for the space, taking into account various parameters such as roof, wall, and window construction; total envelope surface area; ventilation and infiltration loads; space occupancy; internal heat generation; and other sources of heat gains and losses. By entering this calculated maximum load into a spreadsheet containing bin temperature data, the total accumulated year-round cooling and heating energy requirements were determined for the courtroom. Bin data for Long Beach was not available; therefore, data from Atlantic City, NJ was used. The bin temperature spreadsheets are included in Appendix D.

To determine the proposed energy usage in the courtroom during temperature setback, a second bin spreadsheet was created for the new accumulated heating and cooling loads. This model was identical to the existing usage spreadsheets except the unoccupied temperatures were adjusted as noted above. In addition, the energy required to operate a 100 linear foot (2.5 kW/foot) heat trace system was included. The difference in heating therms and kWh, and cooling kWh between the initial and proposed models is taken as the savings. Following implementation of this measure, the building's annual natural gas and electricity consumption may be reduced by approximately 200 therms and 790 kWh, respectively.

Programmable thermostats and heat tracing have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 3,000 therms, 11,850 kWh, and \$6,000.

The implementation cost and savings related to this ECM are presented in Appendix D and summarized below:

ECM-2 Temperature Setback – Courtroom

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,200	0	790	200	0	400	0	400	4.0	700	3.0	1.3

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.3 ECM-3 Install Gas-Fired Heat in Lab

The detached crime lab utilizes approximately 12 linear feet (LF) of electric baseboard heating units estimated at 250 W/LF, totaling 3.0 kW. While electric heating equipment is more efficient, the cost of electricity relative to natural gas is overall less economical. Replacing the existing electric baseboard heaters with a gas-fired wall heater would reduce the annual cost of heating the crime lab.

Using bin weather data for nearby Atlantic City, NJ, the annual hours of operation required to maintain the lab balance point of 55°F were estimated and then applied to the baseboard heaters' electrical power requirements. This yielded the existing units' annual utility consumption, or about 5,400 kWh. Using the efficiency of a standard gas-fired wall heater, the amount of natural gas required to produce the equivalent amount of heating energy was found to be about 230 therms. In addition to the electrical demand savings, switching from electric to gas-fired heating equipment in the crime lab is expected to save approximately \$500 annually.

Gas-fired wall heaters have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at (4,140) therms, 97,200 kWh, and \$9,000.

The implementation cost and savings related to this ECM are presented in Appendix E and summarized below:

ECM-3 Install Gas-Fired Heat in Lab

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total					
\$	kW	kWh	Therms	kGals	\$	\$	\$	\$	Years	Years
3,000	3.0	5,400	(230)	0	500	0	500	2.0	NA	6.0

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.4 ECM-4 Install Premium Efficiency Motors

Heating hot water in the municipal building is distributed by two 2 HP circulation pumps with a rated efficiency of 78.5%. This measure assessed replacing the two pump motors with premium efficiency totally enclosed fan cooled (TEFC) motors. Premium motors require less power to operate and, therefore, reduce overall electrical consumption.

According to NEMA premium values, a 2 HP, TEFC motor will operate at a minimum efficiency of 87.1%. Using bin weather data for Atlantic City, NJ, the hours at which the outside air temperature was below 60°F were totaled and divided by two to estimate the annual runtime of each motor. Utilizing the motor efficiencies and HPs, the power demand for the existing and proposed motors was calculated and applied to the estimated annual hours of operation to determine electrical utility requirements. It is estimated that installing a new premium efficiency TEFC motor in each circulation pump would result in an annual reduction of 880 kWh.

Premium motors have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 15,840 kWh, and \$1,800.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized below:

ECM-4 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,200	0.3	880	0	0	100	0	100	0.5	700	12.0	5.0

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.5 ECM-5 Install Storm Windows

All windows are constructed with vinyl clad wood frames and wood sashes with double pane glazing. Window units show noticeable deterioration and rotting to the wood sash along the interior. Additionally, rooms with more windows are typically significantly colder and experience excessive draftiness on windy days. Due to age, construction type and condition, the windows incur excess air infiltration and provide average thermal resistance to heat transfer. An assessment considered installing exterior storm windows to decrease heating and cooling energy losses as well as increasing occupant comfort.

Per the building energy audit and manufacturer's published data, it was found that the existing windows have a U-value of 0.6 and an infiltration rate of about 0.4 CFM/LF. To calculate the savings for this measure, the baseline energy loss was found by applying these values to the total square footage and perimeter length of the existing windows in conjunction with weather bin data. The proposed energy loss was then determined using the expected U-value of 0.4 and infiltration rate of 0.2 CFM/LF, with exterior storm windows installed. The difference in heating and cooling losses through the windows resulted in an annual savings of about 1,270 therms and 1,600 kWh.

Storm windows have an expected life of 30 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 38,100 therms, 48,000 kWh, and \$60,000.

The implementation cost and savings related to this ECM are presented in Appendix G and summarized below:

ECM-5 Install Storm Windows

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
14,200	0	1,600	1,270	0	2,000	0	2,000	3.2	NA	7.1	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.6 ECM-6 Install Ceiling Insulation – Municipal Office Building

Typical roof and ceiling construction consists of asphalt shingles over 30 lb. felt paper and 1/2" plywood sheathing on 2x8 rafters. Between the joists is 6" R-19 batt insulation supported by 1/2" gypsum board, and a suspended ceiling with acoustic tiles exposed to the occupied space. As previously noted, the second story of the municipal office building was constructed with deeper 2x10 ceiling joists which offer an opportunity to install an additional 3" of insulation. This ECM addressed blowing in 3" of loose-fill cellulose insulation (R-3.5/inch) between the ceiling joists of the second floor municipal office building to minimize heating and cooling energy losses.

To calculate the savings, the heat losses through the roof assembly of the second floor municipal office area were found using the existing wall's R-value of 25.3 and bin weather data for nearby Atlantic City, NJ. The values were then totaled to determine the existing annual energy losses. Heating and cooling energy loss values were then determined with a thermal resistance which included the additional R-10.5 of loose-fill insulation. The annual energy savings of blowing insulation in between the ceiling joists is expected to be about 100 therms and 40 kWh.

Loose-fill insulation has an expected life of 24 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 960 therms, 240 kWh, and \$2,400.

The implementation cost and savings related to this ECM are presented in Appendix H and summarized below:

ECM-6 Install Ceiling Insulation – Municipal Office Building

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
3,100	0	40	100	0	100	0	100	(0.2)	NA	>25	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.7 ECM-7 Install Wall Insulation and Siding

Exterior walls of the complex consist of painted cedar shake siding over 30 lb. felt paper and 1/2" plywood sheathing, on 2x6 wood framing with R-19 batt insulation, and finished with 1/2" gypsum board on the interior. The exterior walls allow noticeable infiltration and cold drafts on windy days. In addition, as previously noted, cedar siding should be repainted every 3-5 years. This ECM addressed installation of 1" rigid board insulation (R-3.5) and vinyl siding over the existing cedar shake siding. The added material and increased R-value would reduce infiltration and heat transfer through the exterior walls, resulting in both heating and cooling energy savings. Additionally, the vinyl siding would eliminate the need for painting every 3-5 years, saving in maintenance costs.

To calculate the savings, the heat losses through the exterior walls were determined using the existing walls' R-value of 20.7 (U-.048), infiltration rate of 0.2 CFM/LF, and bin weather data. The values were totaled to calculate existing annual heating and cooling energy losses. Energy loss values were then determined with a thermal resistance which included the additional insulation and vinyl siding and a

reduced infiltration rate of 0.1 CFM/LF. The annual energy savings of installing 1” rigid board insulation and vinyl siding to the exterior walls is expected to be about 570 therms and 940 kWh.

Additional savings will result from eliminating the need to paint the existing cedar shake siding every 3-5 years. Estimating that the complex is painted every 5 years at a cost of \$5,800 equates to an annual maintenance savings of about \$1,200. With a life expectancy of 50 years for vinyl siding, it would cost approximately \$57,500 to maintain the existing cedar shake siding during this time.

While the payback period for this measure does not fall within the normal parameters for recommendation, the longevity of the proposed installation and estimated maintenance savings, and addressing the occupant discomfort warrant that this measure be recommended for implementation.

Vinyl siding and insulation board have an expected life of 50 years, according to the manufacturer, and savings over the life of the project are estimated at 28,500 therms, 47,000 kWh, and \$57,500 in maintenance; totaling \$105,000.

The implementation cost and savings related to this ECM are presented in Appendix I and summarized below:

ECM-7 Install Wall Insulation and Siding

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
29,600	0	940	570	0	900	1,200	2,100	2.5	NA	14.1	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.8 ECM-8 Install Door Seals

Numerous exterior doors, including the vestibule areas, rear of the municipal office building, and sliding police door have noticeable gaps around the door perimeter and at the center joint of double door assemblies. The lack of effective door seals results in air infiltration and heat transfer between the conditioned space and outdoors. Installing new door seals would minimize infiltration and reduce energy consumption.

The energy savings calculation compared the existing estimated infiltration rate of 0.53 CFM/LF to the proposed infiltration rate of 0.20 CFM/LF, based on installation of the new door seals. It is assumed that the infiltration air is constant throughout the year and weather bin data was used to determine the annual heating and cooling loads generated as a result. It was found that installing new seals on doors located at the areas identified will save an estimated 120 therms and 210 kWh annually.

Door seals have an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 1,200 therms, 2,100 kWh, and \$2,000.

The implementation cost and savings related to this ECM are presented in Appendix J and summarized as follows:

ECM-8 Install Door Seals

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,100	0	210	120	0	200	0	200	0.8	NA	5.5	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.9 ECM-9 Replace Domestic Hot Water Heater – Police

Domestic hot water for the police building is generated by a 100 gallon State Industries 75,100 Btuh gas-fired water heater which is oversized for current HW demand. During periods of little or no HW use, the unit must still heat the water within the storage tank. Energy required to maintain the 100 gallons of HW temperature setpoint during times of zero demand are known as standby losses; the heating required is exacerbated because the heater size is excessive for demand requirements.. This measure evaluates replacing the existing DHW heater with a tankless, gas-fired, condensing HW heater to eliminate standby losses and produce DHW more efficiently.

According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during HW heater standby. This value was applied to the total volume of the existing DHW heater storage tank to determine the annual standby losses. Proposed efficiency was based on the Takagi Flash TH-1 tankless, condensing hot water heater; it was calculated that 250 therms would be saved per year. A more detailed hot water demand analysis may be necessary to verify proper sizing. The new water heater will require gas and water piping modifications, venting, and electrical connections.

Tankless hot water heaters have an expected life of 13 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 3,250 therms, totaling \$3,900.

The implementation cost and savings related to this ECM are presented in Appendix K and summarized below:

ECM-9 Replace Domestic Hot Water Heater – Police

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
3,000	0	0	250	0	300	0	300	0.3	300	10.0	9.0

* Incentive shown is per the New Jersey Smart Start Program, Gas Water Heating Application. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.10 ECM-10 Lighting Replacements

A comprehensive fixture survey was conducted of the entire complex. Each switch and circuit was identified, and the number of fixtures, locations, and existing wattage established (Appendix T).

Inefficient lighting fixtures include those that utilize T-12 fluorescent lamps, T-8 U-tube lamps, incandescent screw type bulbs and incandescent exit signs. Upgrading these lighting fixtures to more efficient technology provides electrical energy savings year round.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to estimated time of operation. The difference between energy requirements resulted in a total annual savings of 22,760 kWh with an electrical demand reduction of about 8.0 kW. Supporting calculations, including assumptions for lighting hours and annual energy usage for each fixture, are provided in Appendix L.

Retrofitting fixtures that utilize T-12 lamps would require replacement with electronic ballasts and T-8 lamps; T-8 U-tube lamps would be replaced with standard straight T-8 fluorescent lamps; incandescent bulbs would be replaced with compact fluorescent spiral light bulbs or flood lamps where applicable; and incandescent exit signs replaced with LEDs.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 341,400 kWh and \$54,000.

The implementation cost and savings related to this ECM are presented in Appendix L and summarized below:

ECM-10 Lighting Replacements

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
27,400	8.0	22,760	0	0	3,600	0	3,600	1.0	16,400	7.6	3.1

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-12.

4.11 ECM-11 Install Occupancy Sensors

Review of the comprehensive lighting survey determined that lighting in several areas such as restrooms, offices, break rooms, and conference rooms is typically operated continuously throughout the day regardless of occupancy. Therefore, installing an occupancy sensor in these spaces to turn off lights when the areas are unoccupied was assessed; resulting in electrical energy savings.

Using a process similar to that utilized in section 4.10, the energy savings for this measure were calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture. The difference between the two values resulted in an annual savings of 24,400 kWh. Eight remote ceiling-mounted occupancy sensors and (44) wall-mounted occupancy sensors are required for this measure.

Occupancy sensors have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 366,000 kWh and \$48,000.

The implementation cost and savings related to this ECM are presented in Appendix M and summarized as follows:

ECM-11 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
13,700	0	24,400	0	0	3,200	0	3,200	2.5	8,200	4.3	1.7

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM-12.

4.12 ECM-12 Lighting Replacements with Occupancy Sensors

Due to interactive effects, the energy and cost savings for occupancy sensors and lighting upgrades are not cumulative. This measure is a combination of ECMs-10 and 11 to allow for maximum energy and demand reduction.

The lighting retrofits and controls have an expected lifetime of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 614,850 kWh and \$90,000.

The implementation cost and savings related to this ECM are presented in Appendix N and summarized below:

ECM-12 Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
41,100	8.0	40,990	0	0	6,000	0	6,000	1.2	24,700	6.9	2.7

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The complex will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives will be from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects in facilities whose demand in any of the preceding 12 months exceeds 200 kW. However, the 200 kW/month average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. American Recovery and Reinvestment Act (ARRA) funding, when available, may allow oil, propane and municipal electric customers to be eligible for the P4P Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The standard incentive pays \$0.10 per square foot, up to a maximum of \$50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional \$0.05 per square foot, up to a maximum of \$25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy saving and designed to pay approximately 60% of the total performance-based incentive. Base incentives deliver \$0.11/kWh and \$1.10/therm not to exceed 30% of total project cost.

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool. Incentive #3 base incentives deliver \$0.07/kWh and \$0.70/therm not to exceed 20% of total project cost.

Combining incentives #2 and #3 will provide a total of \$0.18/ kWh and \$1.8/therm not to exceed 50% of total project cost. Additional incentives for #2 and #3 are increased by \$0.005/kWh and \$0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

5.1.2 New Jersey Smart Start Program

For this program, specific incentives for energy conservation measures are calculated on an individual basis utilizing the 2010 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices.

If the complex qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total site energy reduction, and savings will be applied towards the Pay for Performance incentive. A project is not applicable for both New Jersey incentive programs.

5.1.3 Energy Efficient and Conservation Block Grant

Following is a brief summary of the Energy Efficient and Conservation Block Grant (EECBG) program. The Energy Efficiency and Conservation Block Grant Complete Program Application Package should be consulted for rules and regulations.

Additional funding is available to local government entities through the EECBG, a part of New Jersey's Clean Energy program (NJCEP). The grant is for local government entities only, and can offset the cost of energy reduction implementation to a maximum of \$20,000 per building.

This program is provided in conjunction with NJCEP funding and any utility incentive programs; the total amount of the three incentives combined cannot exceed 100% of project cost. Funds shall first be provided by NJCEP, followed by the EECBG and any utility incentives available to the customer. The total amount of the incentive shall be determined TRC Solutions, a third party technical consulting firm for the NJCEP.

In order to receive EECBG incentives, local governments must not have received a Direct Block Grant from the US Department of Energy. A list of the 512 qualifying municipalities and counties is provided on the NJCEP website. Qualifying municipalities must participate in at least one eligible Commercial & Industrial component of the NJCEP, utility incentive programs, or install building shell measures recommended by the Local Government Energy Audit Program. Eligible conservation programs through NJCEP include:

- Direct Install
- Pay for Performance
- NJ SmartStart Buildings for measures recommended by a Local Government Energy Audit (LGEA) or an equivalent audit completed within the last 12 months
- Applicants may propose to independently install building shell measures recommended by a LGEA or an equivalent audit. The audit must have been completed within the past 12 months.
- Any eligible utility energy efficiency incentive program

Most facilities owned or leased by an eligible local government within the State of New Jersey are eligible for this grant. Ineligible facilities include casinos or other gambling establishments, aquariums, zoos, golf courses, swimming pools, and any building owned or leased by the United States Federal Government. New construction is also ineligible.

5.1.4 ARRA Initiative "Energy Efficiency Programs through the Clean Energy Program"

The American Recovery and Reinvestment Act (ARRA) Initiative is available to New Jersey oil, propane, cooperative and municipal electric customers who do not pay the Societal Benefits Charge. This charge can be seen on any electric bill as the line item "SBC Charge." Applicants can participate in this program in conjunction with other New Jersey Clean Energy Program initiatives including Pay for Performance, Local Government Energy Audits, and Direct Install programs.

Funding for this program is dispersed on a first come, first serve basis until all funds are exhausted. The program does not limit the municipality to a minimum or maximum incentive, and the availability of funding cannot be determined prior to application. If the municipality meets all qualifications, the

application must be submitted to TRC Energy Solutions for review. TRC will then determine the amount of the incentive based on projected energy savings of the project. It is important to note that all applications for this incentive must be submitted before implementation of energy conservation measures.

Additional information is available on New Jersey's Clean Energy Program website.

5.1.5 Direct Install Program

The Direct Install Program targets small and medium sized facilities where the peak electrical demand does not exceed 200 kW in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies. On a case-by-case basis, the program manager may accept a project for a customer that is within 10% of the 200 kW peak demand threshold.

The 200 kW peak demand threshold has been waived for local government entities that receive and utilize their Energy Efficiency and Conservation Block Grant as discussed in section 5.1.3 in conjunction with Direct Install.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 60% of the costs for lighting, HVAC, motors, natural gas, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can significantly reduce the implementation cost of energy conservation projects.

The program pays a maximum amount of \$50,000 per building, and up to \$250,000 per customer per year. Installations must be completed by a Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website at <http://www.njcleanenergy.com>. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this document.

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

Under incentive #1 of the New Jersey Pay for Performance Program, the 27,275 square foot Municipal Complex is eligible for about \$1,400 toward development of an Energy Reduction Plan. When calculating the total amount under Incentives #2 and #3, all energy conservation measures are applicable as the amount received is based on site wide energy improvements. Since the overall energy reduction for the complex is estimated to exceed the 15% minimum, the Municipal Complex is eligible to receive monies based on Incentives #2 and #3 as discussed above in section 5.1.1. In total, incentives through the NJ P4P program are expected to total about \$19,600, reducing the total project payback from 8.4 years to 6.8 years. See Appendix O for calculations.

5.2.2 New Jersey Smart Start Program

The Long Beach Municipal Complex is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about \$4,300 and includes installing premium efficiency motors, a tankless gas-fired DHW heater, and lighting system upgrades.

5.2.3 Energy Efficient and Conservation Block Grant

The Municipal Complex is owned by local government which makes it eligible for this incentive. The incentive amount is determined by TRC Solutions and has a maximum value of \$50,000. Further information, including the application, can be found at:

www.njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants

5.2.4 Direct Install Program

The Municipal Complex is potentially eligible to receive funding from the Direct Install Program. This money can be in addition to incentives from the Energy Efficiency and Conservation Block Grant. The total implementation cost for all ECMs potentially eligible for Direct Install funding is about \$54,000 and includes demand control ventilation, temperature setback, premium efficiency motors and upgrades to the lighting system. The program would pay 60%, or about \$32,400 of these initial costs, leaving only \$21,600 to be paid out of pocket. Direct Install funding has the potential to significantly reduce the payback period of Energy Conservation Measures. For the Municipal Complex, the Direct Install Program brings the simple payback of all measures from about 8.6 years, to approximately 6.0 years. If approved for the maximum \$50,000 in funds through the Energy Efficiency and Conservation Block Grant, the facility would only be responsible for \$55,600 of the energy efficiency improvements, further improving the total project payback to approximately 4.4 years.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

Geothermal heat pumps (GHP) transfer heat between the constant temperature of the earth and the building to maintain the building's interior space conditions. Below the surface of the earth throughout New Jersey the temperature remains in the low 50°F range throughout the year. This stable temperature provides a source for heat in the winter and a means to reject excess heat in the summer. With GHP systems, water is circulated between the building and the piping buried in the ground. The ground heat exchanger in a GHP system is made up of a closed or open loop pipe system. Most common is the closed loop in which high density polyethylene pipe is buried horizontally at 4-6 feet deep or vertically at 100 to 400 feet deep. These pipes are filled with an environmentally friendly antifreeze/water solution that acts as a heat exchanger. In the summer, the water picks up heat from the building and moves it to the ground. In the winter the system reverses and fluid picks up heat from the ground and moves it to the building. Heat pumps make collection and transfer of this heat to and from the building possible.

The building uses a gas-fired, hot water boiler, split system AHUs with DX cooling, and electric baseboard heating units to meet the HVAC requirements. With exception to the hydronic heating system, most of the existing equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be removed or overhauled; and either a low temperature closed loop water source heat pump system or a water to water heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground.

This measure is not recommended because the extent of HVAC system renovation needed for implementation greatly outweighs the savings over the life of the equipment.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. A structural analysis would be required to determine if the roof framing could support a cell array.

The PVWATTS solar power generation model was utilized to calculate PV power generation. The closest city available in the model is Atlantic City, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix P.

The State of New Jersey incentives for non-residential PV applications is \$0.75/watt up to 30 kW of installed PV array with a maximum system capacity of 50 kW. Federal tax credits are also available for renewable energy projects up to 30% of installation cost. Municipalities do not pay federal taxes; therefore, would not be able to utilize the federal tax credit incentive.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission

producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2010 is \$600; this is the amount that must be paid per SREC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2011 is expected to be \$700/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of \$487/ SREC per year and this number was utilized in the cash flow for this report.

From December 2009 through November 2010 the entire Municipal Complex had a maximum electricity demand of 63.02 kW and a minimum of 43.69 kW. The monthly average over the observed 12 month period was 54.38 kW. The existing load justifies the use of the maximum incentive cap of 50 kW of installed PV solar array; where incentives can be applied to only 30 kW of the system. The system costs for PV installations were derived from contractor budgetary pricing in the state of New Jersey for estimates of total cost of system installation. It should be noted that the cost of installation is currently about \$5.00 per watt or \$5,000 per kW of installed system, for a 50 kW system. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix P and summarized as follows:

Photovoltaic (PV) Rooftop Solar Power Generation – 50 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
\$	kW	kWh	Therms	\$	\$	\$	\$	Years	Years
250,000	0	62,520	0	9,200	9,200	22,500	30,400	>25	5.7

*Incentive based on New Jersey Renewable Energy Program for non-residential applications of \$0.75 per Watt of installed capacity

** Estimated Solar Renewable Energy Certificate Program (SREC) for 15 years at \$487/1000 kWh

While the payback period is within the parameters for recommended measures, further investigation of possible installation locations, available space, required system maintenance, and local installation costs are suggested prior to consideration for implementation. At 100 square feet per kW of PV panels (rule of thumb), the proposed PV power generation system would require 5,000 square feet of open roof space, which may not be fully available. However, panels with a higher kW output per square foot will necessitate less open area to meet the suggested system capacity.

6.2.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, another fluid, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later

utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by gas-fired water heaters and, therefore, this measure would offer natural gas utility savings.

Currently, an incentive is not available for installation of thermal solar systems. A Federal tax credit of 30% of installation cost for the thermal applications is available; however, the Township of Long Beach does not pay Federal taxes and, therefore, would not benefit from this program.

The implementation cost and savings related to this ECM are presented in Appendix Q and summarized as follows:

Solar Thermal Domestic Hot Water Plant – Municipal Office Building

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
12,200	0	0	70	100	NA	>25	NA

* No incentive is available in New Jersey at this time.

Solar Thermal Domestic Hot Water Plant – Police Department / Courthouse Building

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
12,200	0	0	180	300	NA	>25	NA

* No incentive is available in New Jersey at this time.

This measure is not recommended.

6.3 Wind

Small wind turbines use a horizontal axis propeller, or rotor, to capture the kinetic energy of the wind and convert it into rotary motion to drive a generator which usually is designed specifically for the wind turbine. The rotor consists of two or three blades, usually made from wood or fiberglass. These materials give the turbine the needed strength and flexibility, and have the added advantage of not interfering with

television signals. The structural backbone of the wind turbine is the mainframe, and includes the slip-rings that connect the wind turbine, which rotates as it points into changing wind directions, and the fixed tower wiring. The tail aligns the rotor into the wind.

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a \$3.20 per kWh incentive. Systems producing over 16,000 kWh will receive \$51,200 for the first 16,000 kWh of production with an additional \$0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and is, therefore, not eligible for the tax credit incentive.

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Long Beach area, the map indicates a mean annual wind speed of about 15 miles per hour. For the Municipal Complex, there are site restrictions such as parking lots and surrounding structures that would greatly affect a tower location. Additionally, town ordinances dictate that no structure can stand more than 32' tall.

A wind speed map is included in Appendix R.

This measure is not recommended due to town regulations which prohibit any structure greater than 32' in height.

6.4 Combined Heat and Power Generation (CHP)

Combined heat and power, cogeneration, is self-production of electricity on-site with beneficial recovery of the heat byproduct from the electrical generator. Common CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The Municipal Complex has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-

fired unit. Purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

This measure is not recommended.

6.5 Biomass Power Generation

Biomass power generation is a process in which waste organic materials are used to produce electricity or thermal energy. These materials would otherwise be sent to the landfill or expelled to the atmosphere. To participate in NJCEP's Customer On-Site Renewable Energy program, participants must install an on-site sustainable biomass or fuel cell energy generation system. Incentives for bio-power installations are available to support up to 1MW-dc of rated capacity.

*Class I organic residues are eligible for funding through the NJCEP CORE program. Class I wastes include the following renewable supply of organic material:

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills
- Food wastes
- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

- Digestion of sewage sludge
- Landfill gas facilities
- Combustion of wood wastes to steam turbine
- Gasification of wood wastes to reciprocating engine
- Gasification or pyrolysis of bio-solid wastes to generation equipment

* from NJOCE Website

This measure is not recommended due to noise issues and because the Municipal Complex does not have a steady waste stream to utilize as a fuel source.

6.6 Demand Response Curtailment

Presently, electricity is delivered by Atlantic City Electric, which receives the electricity from regional power grid RFC. Atlantic City Electric is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the

electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. The Long Beach Municipal Complex had a monthly average electricity demand of 54.38 kW and a maximum demand of 63.02 kW from December 2009 through November 2010

This measure is not recommended because the facility does not have adequate load to meet the required minimum load reduction.

7.0 EPA PORTFOLIO MANAGER

The United States Environmental Protection Agency (EPA) is a federal agency in charge of regulating environment waste and policy in the United States. The EPA has released the EPA Portfolio Manager for public use. The program is designed to allow property owners and managers to share, compare and improve upon their facility's energy consumption. Inputting such parameters as electricity, heating fuel, building characteristics and location into the website based program generates a naturalized energy rating score out of 100. Once an account is registered, monthly utility data can be entered to track the savings progress and retrieve an updated energy rating score on a monthly basis.

The Long Beach Municipal Complex is considered an average energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 65 kBtu/ft²/year. The EUI can be improved by addressing wasted energy from such sources as excess ventilation, electric heating, poor building envelope components, oversized water heaters, and inefficient lighting systems. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 48 kBtu/ft²/year. The EPA Portfolio Manager did not generate an energy rating score for this building because more than 10% of the floor area falls into the category "Other", which is not eligible for an energy star rating.

A full EPA Energy Star Portfolio Manager Report is located in Appendix S.

The user name and password for the building's EPA Portfolio Manager Account has been provided to Angela Andersen, Recycling Coordinator for the Township of Long Beach.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Township of Long Beach Municipal Complex in Long Beach, New Jersey identified potential ECMs for demand control ventilation, temperature setback, gas-fired heat, and premium efficiency motors. Storm windows, insulation upgrades, door seals, domestic hot water heater replacement, and lighting upgrades with occupancy sensors were also assessed. Potential annual savings of \$12,500 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Install Demand Control Ventilation

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
10,500	0	1,590	490	0	900	0	900	0.3	6,300	11.7	4.7

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

ECM-2 Temperature Setback – Courtroom

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,200	0	790	200	0	400	0	400	4.0	700	3.0	1.3

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

ECM-3 Install Gas-Fired Heat in Lab

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
3,000	3.0	5,400	(230)	0	500	0	500	2.0	NA	6.0	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

ECM-4 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,200	0.3	880	0	0	100	0	100	0.5	700	12.0	5.0

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

ECM-5 Install Storm Windows

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
14,200	0	1,600	1,270	0	2,000	0	2,000	3.2	NA	7.1	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

ECM-7 Install Wall Insulation and Siding

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
29,600	0	940	570	0	900	1,200	2,100	2.5	NA	14.1	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

ECM-8 Install Door Seals

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
1,100	0	210	120	0	200	0	200	0.8	NA	5.5	NA

* There is no incentive available through the New Jersey Smart Start or Direct Install Programs for this ECM. See section 5.0 for other incentive opportunities.

ECM-9 Replace Domestic Hot Water Heater – Police

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
3,000	0	0	250	0	300	0	300	0.3	300	10.0	9.0

* Incentive shown is per the New Jersey Smart Start Program, Gas Water Heating Application. See section 5.0 for other incentive opportunities.

ECM-12 Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
\$	kW	kWh	Therms	kGals	\$	\$	\$		\$	Years	Years
41,100	8.0	40,990	0	0	6,000	0	6,000	1.2	24,700	6.9	2.7

* Incentive shown is per the New Jersey Direct Install Program. See section 5.0 for other incentive opportunities.

APPENDIX A

Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project No.: 22349
Long Beach Municipal Complex
6805 Long Beach Blvd

Electric Service
Delivery - Atlantic City Electric
Supplier - Liberty Power Holdings (Starting Feb-2010 on all accounts)

Account No.: 1113 0869 9995
Meter No.: 9566762

Month	Consumption (kWh)	Demand (kW)	Charges			Unit Costs		
			Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-09	26,000	45.20	\$3,608.77	\$354.82	\$3,253.95	\$ 0.139	\$ 0.125	\$ 7.85
January-10	20,960	45.20	\$2,928.84	\$299.38	\$2,629.46	\$ 0.140	\$ 0.125	\$ 6.62
February-10	25,000	43.60	\$3,737.93	\$273.41	\$3,464.52	\$ 0.150	\$ 0.139	\$ 6.27
March-10	18,320	39.20	\$2,476.19	\$256.32	\$2,219.87	\$ 0.135	\$ 0.121	\$ 6.54
April-10	18,000	47.20	\$2,619.70	\$247.78	\$2,371.92	\$ 0.146	\$ 0.132	\$ 5.25
May-10	20,840	51.20	\$3,131.97	\$299.69	\$2,832.28	\$ 0.150	\$ 0.136	\$ 5.85
June-10	22,720	56.80	\$3,302.58	\$336.82	\$2,965.76	\$ 0.145	\$ 0.131	\$ 5.93
July-10	23,920	59.60	\$3,456.20	\$341.65	\$3,114.55	\$ 0.144	\$ 0.130	\$ 5.73
August-10	24,000	58.00	\$3,518.96	\$378.34	\$3,140.62	\$ 0.147	\$ 0.131	\$ 6.52
September-10	22,440	54.00	\$3,256.33	\$309.55	\$2,946.78	\$ 0.145	\$ 0.131	\$ 5.73
October-10	16,840	43.20	\$2,548.62	\$273.32	\$2,275.30	\$ 0.151	\$ 0.135	\$ 6.33
November-10	21,160	43.20	\$3,160.61	\$311.02	\$2,849.59	\$ 0.149	\$ 0.135	\$ 7.20
Total	260,200	59.60	\$37,746.70	\$3,682.10	\$34,064.60	\$ 0.145	\$ 0.131	\$ 6.28

Account No.: 0891 1299 9993
Meter No.: 105727232

Month	Consumption (kWh)	Demand (kW)	Charges			Unit Costs		
			Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-09	1,287	5.23	\$211.40	\$16.80	\$194.60	\$ 0.164	\$ 0.151	\$ 3.21
January-10	1,211	4.91	\$194.33	\$12.25	\$182.08	\$ 0.160	\$ 0.150	\$ 2.49
February-10	1,166	5.06	\$200.46	\$8.51	\$191.95	\$ 0.172	\$ 0.165	\$ 1.68
March-10	436	4.23	\$70.56	\$4.56	\$66.00	\$ 0.162	\$ 0.151	\$ 1.08
April-10	229	4.71	\$44.20	\$0.00	\$44.20	\$ 0.193	\$ 0.193	\$ -
May-10	357	3.64	\$69.35	\$2.62	\$66.73	\$ 0.194	\$ 0.187	\$ 0.72
June-10	529	1.38	\$91.64	\$0.00	\$91.64	\$ 0.173	\$ 0.173	\$ -
July-10	552	1.67	\$94.89	\$0.00	\$94.89	\$ 0.172	\$ 0.172	\$ -
August-10	649	3.64	\$114.46	\$3.31	\$111.15	\$ 0.176	\$ 0.171	\$ 0.91
September-10	468	3.88	\$86.32	\$4.18	\$82.14	\$ 0.184	\$ 0.176	\$ 1.08
October-10	258	3.49	\$51.33	\$0.00	\$51.33	\$ 0.199	\$ 0.199	\$ -
November-10	815	4.77	\$144.77	\$8.18	\$136.59	\$ 0.178	\$ 0.168	\$ 1.71
Total	7,957	5.23	\$1,373.71	\$60.41	\$1,313.30	\$ 0.173	\$ 0.165	\$ 1.30

Account No.: 1250 9289 9983
Meter No.: 105728185

Month	Consumption (kWh)	Demand (kW)	Charges			Unit Costs		
			Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-09	113	0.23	\$23.60	\$0.00	\$23.60	\$ 0.209	\$ 0.209	\$ -
January-10	309	1.26	\$54.05	\$0.00	\$54.05	\$ 0.175	\$ 0.175	\$ -
February-10	53	0.27	\$14.43	\$0.00	\$14.43	\$ 0.272	\$ 0.272	\$ -
March-10	51	0.26	\$12.95	\$0.00	\$12.95	\$ 0.254	\$ 0.254	\$ -
April-10	55	0.29	\$13.86	\$0.00	\$13.86	\$ 0.252	\$ 0.252	\$ -
May-10	78	0.32	\$18.66	\$0.00	\$18.66	\$ 0.239	\$ 0.239	\$ -
June-10	264	4.84	\$51.74	\$0.00	\$51.74	\$ 0.196	\$ 0.196	\$ -
July-10	140	1.59	\$29.03	\$0.00	\$29.03	\$ 0.207	\$ 0.207	\$ -
August-10	146	0.42	\$30.73	\$0.00	\$30.73	\$ 0.210	\$ 0.210	\$ -
September-10	339	3.34	\$63.81	\$0.00	\$63.81	\$ 0.188	\$ 0.188	\$ -
October-10	97	3.34	\$22.45	\$0.00	\$22.45	\$ 0.231	\$ 0.231	\$ -
November-10	95	3.34	\$22.79	\$0.00	\$22.79	\$ 0.240	\$ 0.240	\$ -
Total	1,740	4.84	\$358.10	\$0.00	\$358.10	\$ 0.206	\$ 0.206	\$ -

New Jersey BPU Energy Audit Program
CHA Project No.: 22349
Long Beach Municipal Complex
6805 Long Beach Blvd

Electric Service
Delivery - Atlantic City Electric
Supplier - Liberty Power Holdings (Starting Feb-2010 on all accounts)

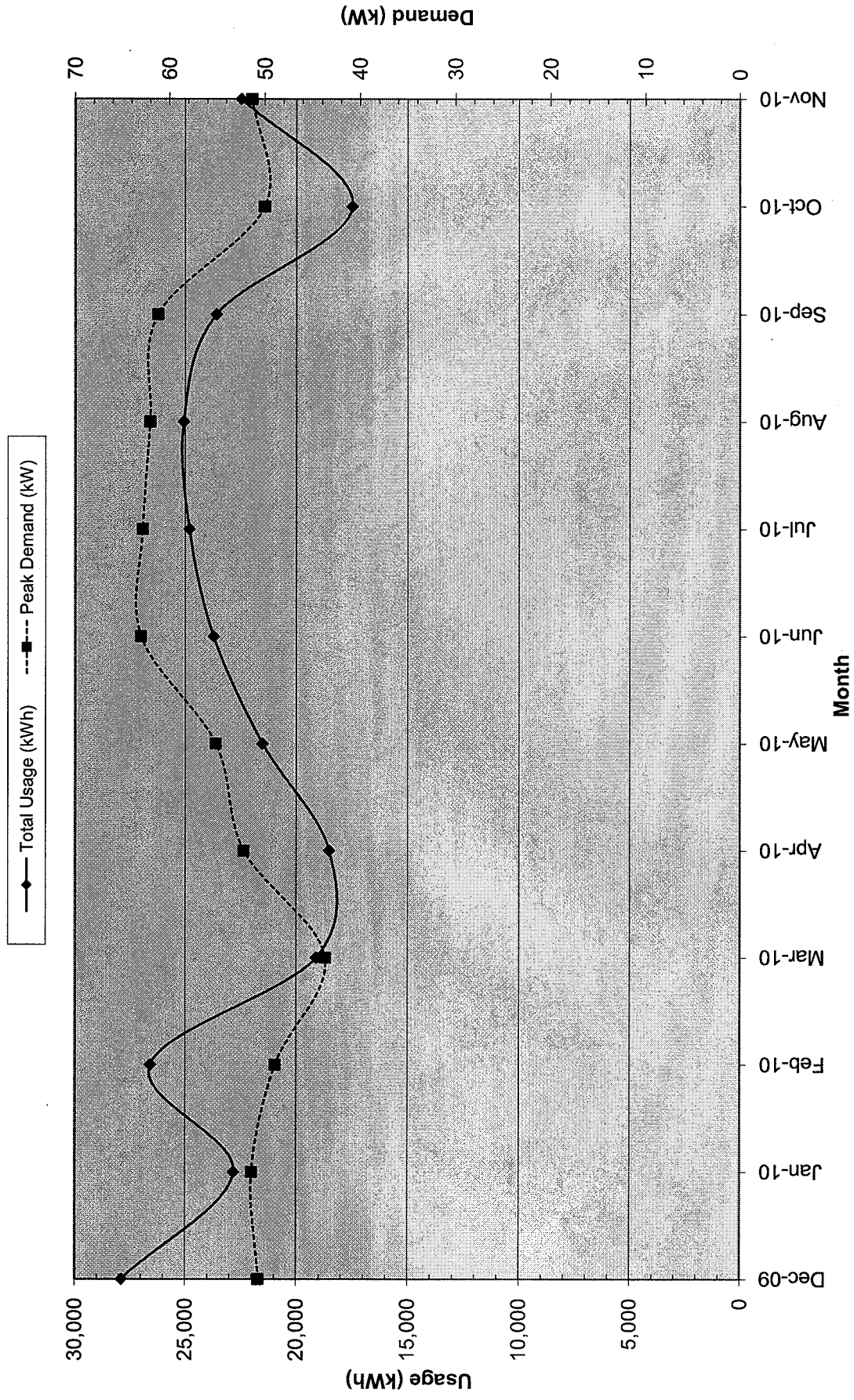
Account No.: 1329 2919 9991
Meter No.: 48487017

Month	Consumption (kWh)	Demand (kW)	Charges			Unit Costs		
			Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-09	493	0.00	\$81.99	\$0.00	\$81.99	\$ 0.166	\$ 0.166	\$ -
January-10	337	0.00	\$57.99	\$0.00	\$57.99	\$ 0.172	\$ 0.172	\$ -
February-10	367	0.00	\$68.67	\$0.00	\$68.67	\$ 0.187	\$ 0.187	\$ -
March-10	315	0.00	\$54.55	\$0.00	\$54.55	\$ 0.173	\$ 0.173	\$ -
April-10	256	0.00	\$47.68	\$0.00	\$47.68	\$ 0.186	\$ 0.186	\$ -
May-10	251	0.00	\$47.61	\$0.00	\$47.61	\$ 0.190	\$ 0.190	\$ -
June-10	216	0.00	\$42.17	\$0.00	\$42.17	\$ 0.195	\$ 0.195	\$ -
July-10	208	0.00	\$40.65	\$0.00	\$40.65	\$ 0.195	\$ 0.195	\$ -
August-10	273	0.00	\$52.50	\$0.00	\$52.50	\$ 0.192	\$ 0.192	\$ -
September-10	341	0.00	\$62.74	\$0.00	\$62.74	\$ 0.184	\$ 0.184	\$ -
October-10	303	0.00	\$57.60	\$0.00	\$57.60	\$ 0.190	\$ 0.190	\$ -
November-10	397	0.00	\$73.47	\$0.00	\$73.47	\$ 0.185	\$ 0.185	\$ -
Total	3,757	0.00	\$687.62	\$0.00	\$687.62	\$ 0.183	\$ 0.183	\$ -

Account No.: All Combined
Meter No.: All Combined

Month	Consumption (kWh)	Demand (kW)	Charges			Unit Costs		
			Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-09	27,893	50.66	\$3,925.76	\$371.62	\$3,554.14	\$ 0.141	\$ 0.127	\$ 7.34
January-10	22,817	51.37	\$3,235.21	\$311.63	\$2,923.58	\$ 0.142	\$ 0.128	\$ 6.07
February-10	26,586	48.93	\$4,021.49	\$281.92	\$3,739.57	\$ 0.151	\$ 0.141	\$ 5.76
March-10	19,122	43.69	\$2,614.25	\$260.88	\$2,353.37	\$ 0.137	\$ 0.123	\$ 5.97
April-10	18,540	52.20	\$2,725.44	\$247.78	\$2,477.66	\$ 0.147	\$ 0.134	\$ 4.75
May-10	21,526	55.16	\$3,267.59	\$302.31	\$2,965.28	\$ 0.152	\$ 0.138	\$ 5.48
June-10	23,729	63.02	\$3,488.13	\$336.82	\$3,151.31	\$ 0.147	\$ 0.133	\$ 5.34
July-10	24,820	62.86	\$3,620.77	\$341.65	\$3,279.12	\$ 0.146	\$ 0.132	\$ 5.44
August-10	25,068	62.06	\$3,716.65	\$381.65	\$3,335.00	\$ 0.148	\$ 0.133	\$ 6.15
September-10	23,588	61.22	\$3,469.20	\$313.73	\$3,155.47	\$ 0.147	\$ 0.134	\$ 5.12
October-10	17,498	50.03	\$2,680.00	\$273.32	\$2,406.68	\$ 0.153	\$ 0.138	\$ 5.46
November-10	22,467	51.31	\$3,401.64	\$319.20	\$3,082.44	\$ 0.151	\$ 0.137	\$ 6.22
Total	273,654	63.02	\$40,166.13	\$3,742.51	\$36,423.62	\$ 0.147	\$ 0.133	\$ 5.74

Electric Usage - Long Beach Municipal Complex



New Jersey BPU Energy Audit Program
CHA Project No.: 22349
Long Beach Municipal Complex
6805 Long Beach Blvd
Natural Gas Service - New Jersey Natural Gas

Account No.: 164966171017
Meter No.: 316677

Month	CCF	Therms	Charges (\$)	(\$/Therm)
July-09	173.90	178.1	\$ 327.09	\$ 1.837
August-09	142.27	145.7	\$ 269.03	\$ 1.847
September-09	109.83	112.5	\$ 232.01	\$ 2.063
October-09	196.48	201.2	\$ 314.90	\$ 1.565
November-09	246.95	252.9	\$ 376.84	\$ 1.490
December-09	497.88	509.8	\$ 643.76	\$ 1.263
January-10	1,041.08	1066.1	\$ 1,328.84	\$ 1.246
February-10	844.27	864.5	\$ 1,098.01	\$ 1.270
March-10	418.52	428.6	\$ 588.29	\$ 1.373
April-10	198.87	203.6	\$ 330.71	\$ 1.624
May-10	98.06	100.4	\$ 231.29	\$ 2.303
June-10	72.69	74.4	\$ 206.57	\$ 2.775
July-10	56.13	57.5	\$ 192.19	\$ 3.344
August-10	52.05	53.3	\$ 189.07	\$ 3.547
September-10	38.57	39.5	\$ 171.87	\$ 4.352
October-10	84.43	86.5	\$ 216.78	\$ 2.507
Total	4,272	4,375	\$ 6,717.25	\$ 1.536
Most Recent Year	3,650	3,737	\$ 5,574.22	\$ 1.492

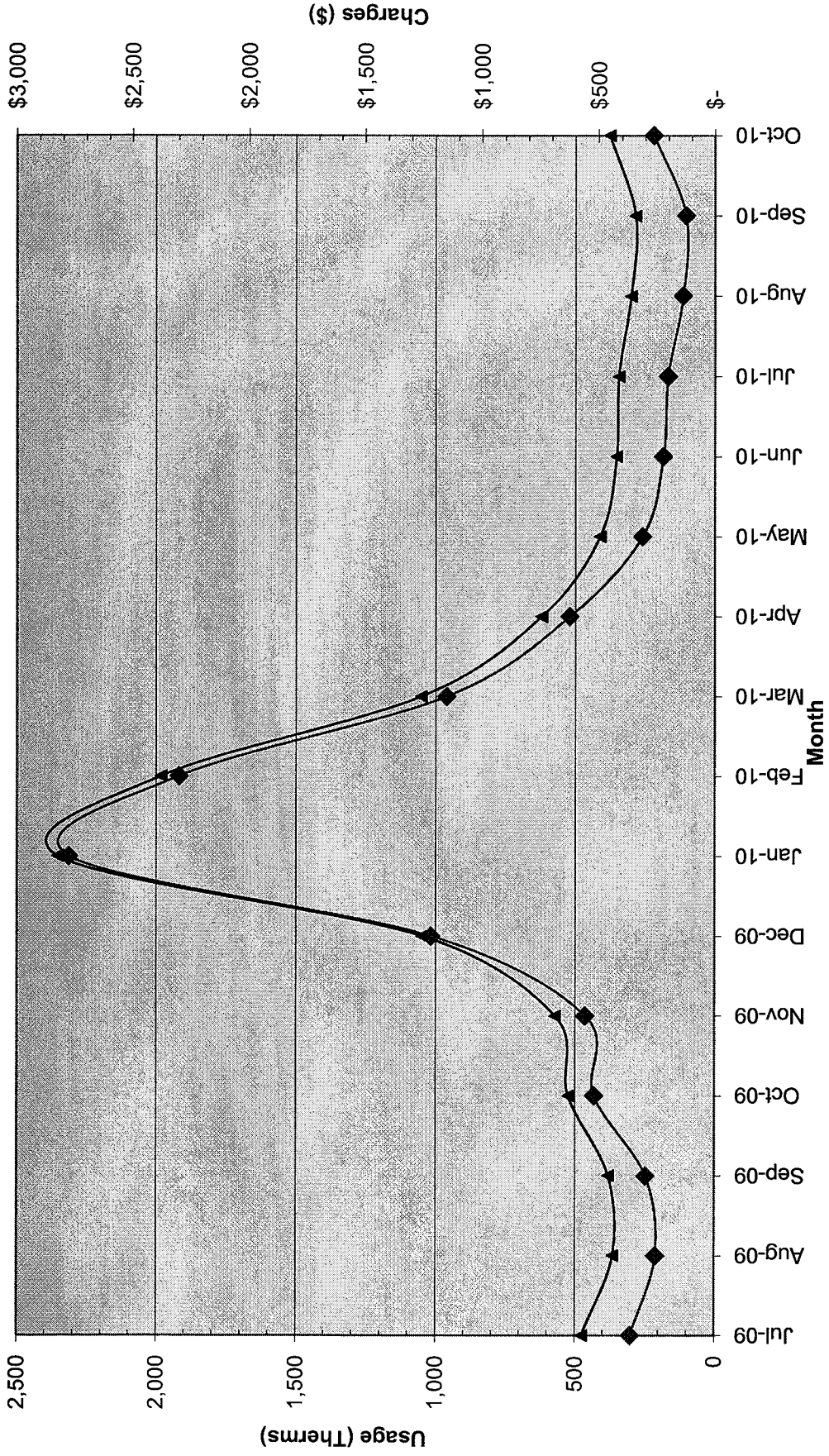
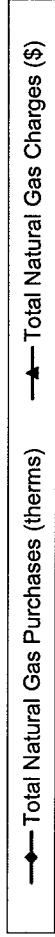
Account No.: 164966040017
Meter No.: 114343

Month	CCF	Therms	Charges (\$)	(\$/Therm)
July-09	120.95	123.9	\$ 244.48	\$ 1.974
August-09	64.56	66.1	\$ 168.77	\$ 2.553
September-09	132.22	135.4	\$ 225.03	\$ 1.662
October-09	225.72	231.1	\$ 314.90	\$ 1.362
November-09	206.40	211.4	\$ 310.22	\$ 1.468
December-09	495.59	507.5	\$ 614.57	\$ 1.211
January-10	1,219.32	1248.6	\$ 1,496.49	\$ 1.199
February-10	1,028.41	1053.1	\$ 1,281.29	\$ 1.217
March-10	520.70	533.2	\$ 673.59	\$ 1.263
April-10	309.41	316.8	\$ 414.57	\$ 1.308
May-10	155.76	159.5	\$ 263.06	\$ 1.649
June-10	108.53	111.1	\$ 216.83	\$ 1.951
July-10	108.63	111.2	\$ 221.30	\$ 1.989
August-10	60.09	61.5	\$ 171.91	\$ 2.794
September-10	63.29	64.8	\$ 169.96	\$ 2.622
October-10	129.69	132.8	\$ 235.65	\$ 1.774
Total	4,949	5,068	\$ 7,022.62	\$ 1.386
Most Recent Year	4,406	4,512	\$ 6,069.44	\$ 1.345

Account No.: All Combined
Meter No.: All Combined

Month	CCF	Therms	Charges (\$)	(\$/Therm)
July-09	294.85	301.9	\$ 571.57	\$ 1.893
August-09	206.83	211.8	\$ 437.80	\$ 2.067
September-09	242.05	247.9	\$ 457.04	\$ 1.844
October-09	422.20	432.3	\$ 629.80	\$ 1.457
November-09	453.35	464.2	\$ 687.06	\$ 1.480
December-09	993.47	1017.3	\$ 1,258.33	\$ 1.237
January-10	2,260.40	2314.6	\$ 2,825.33	\$ 1.221
February-10	1,872.68	1917.6	\$ 2,379.30	\$ 1.241
March-10	939.22	961.8	\$ 1,261.88	\$ 1.312
April-10	508.28	520.5	\$ 745.28	\$ 1.432
May-10	253.82	259.9	\$ 494.35	\$ 1.902
June-10	181.22	185.6	\$ 423.40	\$ 2.282
July-10	164.76	168.7	\$ 413.49	\$ 2.451
August-10	112.14	114.8	\$ 360.98	\$ 3.144
September-10	101.86	104.3	\$ 341.83	\$ 3.277
October-10	214.12	219.3	\$ 452.43	\$ 2.063
Total	9,221	9,443	\$ 13,739.87	\$ 1.455
Most Recent Year	8,055	8,249	\$ 11,643.66	\$ 1.412

Natural Gas Usage - Long Beach Municipal Complex



ATLANTIC CITY ELECTRIC SERVICE TERRITORY

Last Updated: 1/19/11

***CUSTOMER CLASS - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL**

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	C/I ACTIVE
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(888) CLR-VIEW (888) 257- 8439 www.clearviewenergy.com	R/C/I ACTIVE
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	C ACTIVE
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	C/I ACTIVE
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.home.newenergy.com	R ACTIVE

Direct Energy Business, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	C/I ACTIVE
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	C/I ACTIVE
Energy Plus Holdings 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	R/C ACTIVE
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	C/I ACTIVE
Gateway Energy Services Corporation 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	R/C/I ACTIVE
Gexa Energy New Jersey LLC 651 Jernee Mill Road Sayreville, New Jersey 08872	(866) 961-9399 www.gexaenergy.com	C/I ACTIVE
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, New Jersey 08837	(866) 999-8374 www.gdfsuezenergyresources.com	C/I ACTIVE
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	C/I ACTIVE
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	C/I ACTIVE
Liberty Power Delaware, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE

Liberty Power Holdings, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	C/I ACTIVE
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	C/I ACTIVE
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	R/C ACTIVE
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	C/I ACTIVE
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	C/I ACTIVE
Public Power & Utility of New Jersey, LLC 157 Broad St., Suite 304 Red Bank, NJ 07701	(888) 354-4415 www.ppandu.com	R/C/I ACTIVE
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	C/I ACTIVE
UGI Energy Services, Inc. 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	C/I ACTIVE
Verde Energy USA, Inc. 50 East Palisades Avenue Englewood, NJ 07631	(800) 388-3862 www.lowcostpower.com	R/C/I ACTIVE
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	R/C/I ACTIVE

[Back to main supplier information page](#)



My Account :: Energy Choice :: Supplier List

The natural gas suppliers listed below have been licensed by the New Jersey Board of Public Utilities (BPU) to operate in the state of New Jersey. The last column indicates the type of customers being served by the suppliers in the specified utility's service territory: residential (R), commercial (C) or both (R/C). A blank indicates the supplier is not currently operating in the respective utility's area.

Suppliers listed may not always have offers available.

Eligible Natural Gas Supplier List for Residential Customers and Commercial Customers within the NJNG Service Territory

NATURAL GAS SUPPLIER	TELEPHONE	NJNG
Core Energy	877-329-3495	R/C
Dominion Retail, Inc.	866-275-4240	R/C
GASMARK	856-273-9995	C
Gateway Energy Services Corp.	800-805-8586	R/C
Glacial Natural Gas, Inc.	888-452-2425	R/C
Great Eastern Energy	888-651-4121	C
Hess Corporation	800-437-7872	C
Hudson Energy Services LLC	877-HUDSON9	R/C
Infinite Energy d/b/a Intelligent Energy	877-483-4684	R/C
Metro Media Energy	732-542-7575	C
MXenergy	800-785-4373	R/C
NATGASCO (Mitchell Supreme)	800-840-4GAS	C
Palmco Energy NJ, LLC	877-726-5862	R/C
Pepco Energy Services	800-363-7499	C
PPL EnergyPlus, LLC	866-505-8825	C
South Jersey Energy Company	609-561-8385	C
Sprague Energy	603-431-1000	C
Systrum Energy	877-797-8786	R/C
U.S. Gas & Electric Inc. d/b/a New Jersey Gas & Electric	866-568-0290	R/C
Woodruff Energy	800-557-1121	R/C

View residential supplier offers.

Updated February 16, 2010

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APPENDIX B

Project Summary

Township of Long Beach
CHA #22349
Engineer: CAA

Project Summary

Return on Investemet (ROI) = (Gain from Investment - Cost of Investment) / Cost of Investment

Utility Costs	
\$ 0.147	\$/kWh blended
\$ 0.133	\$/kWh supply
\$ 5.740	\$/kW
\$ 1.412	\$/Therm
\$ -	\$/kGals

Municipal Complex

	Item	Annual Savings							Cost	Simple Payback	NJ Smart Start Incentives	Direct Install Eligible (Y/N)*	Direct Install Incentives**	Max Incentives	Payback w/ Incentives***	Expected Life (Years)	Project Life Savings						ROI
		kW demand	kWh supply	Therms blended	kWh cooling	kGals water	\$ Maintenance	\$ Total									kW	kWh	Therms	kgals	Maint	\$	
ECM-1	Install Demand Control Ventilation	0.0	0	490	1,590	0	\$ -	\$ 900	\$ 10,500	11.7	\$ -	Y	\$ 6,300	\$ 6,300	4.7	15	0.0	23,850	7,350	-	\$ -	\$ 13,500	0.3
ECM-2	Temperature Setback - Courtroom	0.0	0	200	790	0	\$ -	\$ 400	\$ 1,200	3.0	\$ -	Y	\$ 700	\$ 700	1.3	15	0.0	11,850	3,000	-	\$ -	\$ 6,000	4.0
ECM-3	Install Gas-Fired Heat in Lab	3.0	5,400	(230)	0	0	\$ -	\$ 500	\$ 3,000	6.0	\$ -	N	\$ -	\$ -	6.0	18	54.0	97,200	(4,140)	-	\$ -	\$ 9,000	2.0
ECM-4	Install Premium Efficiency Motors	0.3	880	0	0	0	\$ -	\$ 100	\$ 1,200	12.0	\$ 120	Y	\$ 700	\$ 700	5.0	18	6.1	15,840	-	-	\$ -	\$ 1,800	0.5
ECM-5	Install Storm Windows	0.0	0	1,270	1,600	0	\$ -	\$ 2,000	\$ 14,200	7.1	\$ -	N	\$ -	\$ -	7.1	30	0.0	48,000	38,100	-	\$ -	\$ 60,000	3.2
ECM-6	Increase Ceiling Insulation - Municipal Office Building	0.0	0	100	40	0	\$ -	\$ 100	\$ 3,100	31.0	\$ -	N	\$ -	\$ -	31.0	24	0.0	960	2,400	-	\$ -	\$ 2,400	(0.2)
ECM-7	Install Wall Insulation and Siding	0.0	0	570	940	0	\$ 1,100	\$ 2,100	\$ 29,600	14.1	\$ -	N	\$ -	\$ -	14.1	50	0.0	47,000	28,500	-	\$ 57,500	\$ 105,000	2.5
ECM-8	Install Door Seals	0.0	0	120	210	0	\$ -	\$ 200	\$ 1,100	5.5	\$ -	N	\$ -	\$ -	5.5	10	0.0	2,100	1,200	-	\$ -	\$ 2,000	0.8
ECM-9	Replace Domestic Hot Water Heater - Police	0.0	0	250	0	0	\$ -	\$ 300	\$ 3,000	10.0	\$ 300	N	\$ -	\$ 300	9.0	13	0.0	-	3,250	-	\$ -	\$ 3,900	0.3
ECM-10	Lighting Replacements	8.0	22,760	0	0	0	\$ -	\$ 3,600	\$ 27,400	7.6	\$ 2,900	Y	\$ 16,400	\$ 16,400	3.1	15	119.4	341,400	-	-	\$ -	\$ 54,000	1.0
ECM-11	Install Occupancy Sensors	0.0	24,400	0	0	0	\$ -	\$ 3,200	\$ 13,700	4.3	\$ 1,000	Y	\$ 8,200	\$ 8,200	1.7	15	0.0	366,000	-	-	\$ -	\$ 48,000	2.5
ECM-12	Lighting Replacements with Occupancy Sensors	8.0	40,990	0	0	0	\$ -	\$ 6,000	\$ 41,100	6.9	\$ 3,900	Y	\$ 24,700	\$ 24,700	2.7	15	119.4	614,850	-	-	\$ -	\$ 90,000	1.2
Total	Does not include ECM-10 and ECM-11	11.3	47,270	2,770	5,170	0	\$ 1,100	\$ 12,600	\$ 108,000	8.6	\$ 4,320		\$ 32,400	\$ 32,700	6.0	21	179.5	861,650	79,660	-	\$ 57,500	\$ 293,600	1.7
Total	Measures w/ Positive ROI only	11.3	47,270	2,670	5,130	0	\$ 1,100	\$ 12,500	\$ 104,900	8.4	\$ 4,320		\$ 32,400	\$ 32,700	5.8	20	179.5	860,690	77,260	0	\$ 57,500	\$ 291,200	1.8

* Eligibility for the Direct Install Program was estimated by the project engineer per the program guidelines. Final eligibility is determined by TRC and the qualified Direct Install participating contractor.
** Value reflects the maximum potential incentive through the NJ Direct Install Program. Amount is subject to change per TRC and the qualified Direct Install participating contractor.
*** Payback calculated using the greatest incentive available through either the NJ Smart Start Program or the Direct Install Program. Other incentives may be available for this measure that are not reflected here. See Section 5.0 of the report.

APPENDIX C

ECM-1 Install Demand Control Ventilation

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-1 Install Demand Control Ventilation Courtroom

Description: Outdoor Air (OA) quantities are currently constant. OA can be significantly reduced during many times of day. Savings will result from the avoided heating and cooling of excessive OA. This ECM proposes the installation of CO2 sensors in return air ductwork to reduce OA rates when conditions allow.

Method: The OA introduced into the spaces is currently constant based on a preset value. Existing OA rate was estimated per building drawings and field data. The 2006 International Mechanical Code mandates the minimum OA in each type of space. Proposed OA rate is based on the estimated space occupancy and schedule. OA can be completely shut off during unoccupied hours to further reduce energy consumption. The DCV system will automatically adjust the OA damper position on each AHU through the building management system to reduce OA flows based on indoor CO2 levels.

Heating Efficiency	86%	Ex Occupied Cing Temp.	72 °F	Ex Occupied Htg Temp.	68 °F
Cooling Efficiency	1.17 kW/ton	Ex Unoccupied Cing Temp.	72 °F	Ex Unoccupied Htg Temp.	68 °F
Heating 'On' Temp	50 °F	Prop Occupied Cing Temp.	72 °F	Prop Occupied Htg Temp.	68 °F
Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Prop Unoccupied Cing Temp.	72 °F	Prop Unoccupied Htg Temp.	68 °F
Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb				

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Occupied Ventilation Load BTUH	Unoccupied Ventilation Load BTUH	Occupied Ventilation Load BTUH	Unoccupied Ventilation Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A	B	C	D	E	F	G	H	I	J	K	L	M
102.5	49.1	0	0	0	-29,160	-29,160	-12,150	0	0	0	0	0
97.5	42.5	9	0	9	-20,250	-20,250	-8,438	0	18	0	0	0
92.5	39.5	69	2	67	-16,200	-16,200	-6,750	0	109	1	0	0
87.5	36.6	132	3	129	-12,285	-12,285	-5,119	0	158	2	0	0
82.5	34	344	8	336	-8,775	-8,775	-3,656	0	294	3	0	0
77.5	31.6	566	13	553	-5,535	-5,535	-2,306	0	305	3	0	0
72.5	29.2	755	18	737	-2,295	-2,295	-956	0	169	2	0	0
67.5	27	780	19	761	0	0	0	0	0	0	0	0
62.5	24.5	889	21	868	0	0	0	0	0	0	0	0
57.5	21.4	742	18	724	0	0	0	0	0	0	0	0
52.5	18.7	627	15	612	0	0	0	0	0	0	0	0
47.5	16.2	725	17	708	6,642	6,642	2,768	0	0	0	41	0
42.5	14.4	795	19	776	8,262	8,262	3,443	0	0	0	56	1
37.5	12.6	784	19	765	9,882	9,882	4,118	0	0	0	67	1
32.5	10.7	682	16	666	11,502	11,502	4,793	0	0	0	67	1
27.5	8.6	345	8	337	13,122	13,122	5,468	0	0	0	39	0
22.5	6.8	229	5	224	14,742	14,742	6,143	0	0	0	29	0
17.5	5.5	189	5	185	16,362	16,362	6,818	0	0	0	27	0
12.5	4.1	70	2	68	17,982	17,982	7,493	0	0	0	11	0
7.5	2.6	20	0	20	19,602	19,602	8,168	0	0	0	3	0
2.5	1	8	0	8	21,222	21,222	8,843	0	0	0	1	0
-2.5	0	0	0	0	22,842	22,842	9,518	0	0	0	0	0
-7.5	-1.5	0	0	0	24,462	24,462	10,193	0	0	0	0	0
TOTALS		8,760	209	8,551					1,054	10	342	

Total Supply Air	2,400 cfm	(AHUs only)
Existing Building Ventilation (occ)	300 cfm	13% (AHUs only) Per Building Personnel
Existing Building Ventilation (unocc)	300 cfm	13% (AHUs only) Per Building Personnel

Number of Full Time Occupants	25
Required CFM / Person	5 2009 International Mechanical Code
Minimum Ventilation Rate	0 0%
Proposed Building Ventilation (occ)	125 cfm 5% (AHUs only)
Proposed Building Ventilation (unocc)	0 cfm 0% (AHUs only)

Heating Energy Savings	339 therms
Cooling Energy Savings	1,043 kWh

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-1 Install Demand Control Ventilation Multi Purpose Room

Description: Outdoor Air (OA) qualities are currently constant. OA can be significantly reduced during many times of day. Savings will result from the avoided heating and cooling of excessive OA. This ECM proposes the installation of CO2 sensors in return air ductwork to reduce OA rates when conditions allow.

Method: The OA introduced into the spaces is currently constant based on a preset value. Existing OA rate was estimated per building drawings and field data. The 2006 International Mechanical Code mandates the minimum OA in each type of space. Proposed OA rate is based on the estimated space occupancy and schedule. OA can be completely shut off during unoccupied hours to further reduce energy consumption. The DCV system will automatically adjust the OA damper position on each AHU through the building management system to reduce OA flows based on indoor CO2 levels.

Heating Efficiency	93%	Ex Occupied Cing Temp.	70 °F	Ex Occupied Htg Temp.	65 °F
Cooling Efficiency	1.09 kW/ton	Ex Unoccupied Cing Temp.	74 °F	Ex Unoccupied Htg Temp.	55 °F
Heating 'On' Temp	55 °F	Prop Occupied Cing Temp.	70 °F	Prop Occupied Htg Temp.	65 °F
Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Prop Unoccupied Cing Temp.	74 °F	Prop Unoccupied Htg Temp.	55 °F
Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb				

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Bin Hours	Occupied Bin Hours	Unoccupied Bin Hours	Occupied Ventilation Load BTUH	Unoccupied Ventilation Load BTUH	Occupied Ventilation Load BTUH	Unoccupied Ventilation Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A	B	C	D	E	F	G	H	I	J	K	L	M
102.5	49.1	0	0	0	-19,440	-19,440	-12,150	0	0	0	0	0
97.5	42.5	9	0	9	-13,500	-13,500	-8,438	0	11	0	0	0
92.5	39.5	69	2	67	-10,800	-10,800	-6,750	0	68	1	0	0
87.5	36.6	132	3	129	-8,190	-8,190	-5,119	0	98	1	0	0
82.5	34	344	8	336	-5,850	-5,850	-3,656	0	183	3	0	0
77.5	31.6	566	13	553	-3,690	-3,690	-2,306	0	190	3	0	0
72.5	29.2	755	18	737	-1,530	0	-956	0	2	2	0	0
67.5	27	780	19	761	0	0	0	0	0	0	0	0
62.5	24.5	889	21	868	0	0	0	0	0	0	0	0
57.5	21.4	742	18	724	0	0	0	0	0	0	0	0
52.5	18.7	627	15	612	2,700	540	1,688	0	0	0	3	0
47.5	16.2	725	17	708	3,780	1,620	2,363	0	0	0	11	0
42.5	14.4	795	19	776	4,860	2,700	3,038	0	0	0	20	1
37.5	12.6	784	19	765	5,940	3,780	3,713	0	0	0	28	1
32.5	10.7	682	16	666	7,020	4,860	4,388	0	0	0	31	1
27.5	8.6	345	8	337	8,100	5,940	5,063	0	0	0	19	0
22.5	6.8	229	5	224	9,180	7,020	5,738	0	0	0	15	0
17.5	5.5	189	5	185	10,260	8,100	6,413	0	0	0	14	0
12.5	4.1	70	2	68	11,340	9,180	7,088	0	0	0	6	0
7.5	2.6	20	0	20	12,420	10,260	7,763	0	0	0	2	0
2.5	1	8	0	8	13,500	11,340	8,438	0	0	0	1	0
-2.5	0	0	0	0	14,580	12,420	9,113	0	0	0	0	0
-7.5	-1.5	0	0	0	15,660	13,500	9,788	0	0	0	0	0
TOTALS		8,760	209	8,551					552	10	152	4

Total Supply Air 2,100 cfm
Existing Building Ventilation (occ) 200 cfm 10% (AHUs only)
Existing Building Ventilation (unocc) 200 cfm 10% (AHUs only) Per Building Drawings

Number of Full Time Occupants 25
Required CFM / Person 5 2009 International Mechanical Code
Minimum Ventilation Rate 0 0%
Proposed Building Ventilation (occ) 125 cfm 6% (AHUs only)
Proposed Building Ventilation (unocc) 0 cfm 0% (AHUs only)

Heating Energy Savings	148 therms
Cooling Energy Savings	542 kWh

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-1 Install Demand Control Ventilation

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

	QTY	UNIT COSTS			SUBTOTAL COSTS				TOTAL COST	REMARKS
		UNIT	MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
CO2 sensor	2	EA	\$ 350	\$ 100	\$ -	\$ 686	\$ 242	\$ -	\$ 928	Mount in return duct
Replace OA damper actuators	2	EA	\$ 300	\$ 50	\$ -	\$ 588	\$ 121	\$ -	\$ 709	
PLC Controller and Programming	2	LS	\$ 1,000	\$ 1,500	\$ -	\$ 1,960	\$ 3,630	\$ -	\$ 5,590	
Electrical/wiring	1	LS	\$ 500	\$ 800	\$ -	\$ 490	\$ 968	\$ -	\$ 1,458	
						\$ -	\$ -	\$ -	\$ -	

\$8,685	Subtotal
\$ 868.50	10% Contingency
\$ 955.35	10% Contractor O&P
\$ -	0% Engineering
\$ 10,509	Total

APPENDIX D

ECM-2 Temperature Setback – Courtroom

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-2 Temperature Setback - Courtroom

Building Footprint	1,580 SF	Ex Occupied Cing Temp.	72 °F	Ex Occupied Htg Temp.	68 °F
Heating Efficiency	86%	Ex Unoccupied Cing Temp.	72 °F	Ex Unoccupied Htg Temp.	68 °F
Cooling Efficiency	1.17 kW/ton	Prop Occupied Cing Temp.	72 °F	Prop Occupied Htg Temp.	68 °F
Building Balance Temp.	60 °F	Prop Unoccupied Cing Temp.	80 °F	Prop Unoccupied Htg Temp.	60 °F
Internal Gains	14,658 btu/h	Occupied Cooling UA	-500 btu/hr/°F	Occupied Heating UA	171 btu/hr/°F
Unoc Internal Gain factor	0.03	Unoccupied Cooling UA	-302 btu/hr/°F	Unoccupied Heating UA	171 btu/hr/°F
Ave Occ Internal Gain Factor	0.8	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb		
		Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb		

Heating Energy Savings	202 therms
	2,654 kWh
Cooling Energy Savings	790 kWh

Heating and cooling energy are unrelated in this model. If the building being analyzed is not cooled, disregard cooling energy calculations

					EXISTING LOADS						PROPOSED LOADS						Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
		Occupied			Unoccupied			Occupied			Unoccupied									
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH				
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P				
102.5	49.1	0	0	0	-15,262	-39,154	-11,726	-9,203	-39,154	-440	-15,262	-39,154	-11,726	-6,789	-39,154	-440	0	0	0	0
97.5	42.5	9	0	9	-12,760	-27,190	-11,726	-7,694	-27,190	-440	-12,760	-27,190	-11,726	-5,280	-27,190	-440	31	29	0	0
92.5	39.5	69	2	67	-10,258	-21,752	-11,726	-6,186	-21,752	-440	-10,258	-21,752	-11,726	-3,772	-21,752	-440	193	178	0	0
87.5	36.6	132	3	129	-7,756	-16,495	-11,726	-4,677	-16,495	-440	-7,756	-16,495	-11,726	-2,263	-16,495	-440	283	252	0	0
82.5	34	344	8	336	-5,254	-11,782	-11,726	-3,168	-11,782	-440	-5,254	-11,782	-11,726	-754	-11,782	-440	527	448	0	0
77.5	31.6	566	13	553	-2,752	-7,432	-11,726	-1,660	-7,432	-440	-2,752	-7,432	-11,726	0	0	-440	542	52	0	0
72.5	29.2	755	18	737	-250	-3,082	-11,726	-151	-3,082	-440	-250	-3,082	-11,726	0	0	-440	290	58	0	0
67.5	27	780	19	761	86	218	-11,726	86	218	-440	86	218	-11,726	0	0	-440	31	53	0	0
62.5	24.5	889	21	868	943	2,393	-11,726	943	2,393	-440	943	2,393	-11,726	0	0	-440	17	55	0	0
57.5	21.4	742	18	724	1,800	4,568	-11,726	1,800	4,568	-440	1,800	4,568	-11,726	429	1,088	-440	9	9	0	0
52.5	18.7	627	15	612	2,658	6,743	-11,726	2,658	6,743	-440	2,658	6,743	-11,726	1,286	3,263	-440	3	3	0	0
47.5	16.2	725	17	708	3,515	8,918	-11,726	3,515	8,918	-440	3,515	8,918	-11,726	2,143	5,438	-440	0	0	99	59
42.5	14.4	795	19	776	4,373	11,094	-11,726	4,373	11,094	-440	4,373	11,094	-11,726	3,001	7,613	-440	0	0	136	93
37.5	12.6	784	19	765	5,230	13,269	-11,726	5,230	13,269	-440	5,230	13,269	-11,726	3,858	9,789	-440	0	0	162	119
32.5	10.7	682	16	666	6,087	15,444	-11,726	6,087	15,444	-440	6,087	15,444	-11,726	4,715	11,964	-440	0	0	165	128
27.5	8.6	345	8	337	6,945	17,619	-11,726	6,945	17,619	-440	6,945	17,619	-11,726	5,573	14,139	-440	0	0	96	77
22.5	6.8	229	5	224	7,802	19,795	-11,726	7,802	19,795	-440	7,802	19,795	-11,726	6,430	16,314	-440	0	0	72	59
17.5	5.5	189	5	185	8,659	21,970	-11,726	8,659	21,970	-440	8,659	21,970	-11,726	7,288	18,489	-440	0	0	66	55
12.5	4.1	70	2	68	9,517	24,145	-11,726	9,517	24,145	-440	9,517	24,145	-11,726	8,145	20,665	-440	0	0	27	23
7.5	2.6	20	0	20	10,374	26,320	-11,726	10,374	26,320	-440	10,374	26,320	-11,726	9,002	22,840	-440	0	0	8	7
2.5	1	8	0	8	11,231	28,495	-11,726	11,231	28,495	-440	11,231	28,495	-11,726	9,860	25,015	-440	0	0	4	3
-2.5	0	0	0	0	12,089	30,671	-11,726	12,089	30,671	-440	12,089	30,671	-11,726	10,717	27,190	-440	0	0	0	0
-7.5	-1.5	0	0	0	12,946	32,846	-11,726	12,946	32,846	-440	12,946	32,846	-11,726	11,574	29,366	-440	0	0	0	0
TOTALS		8,760	209	8,551													1,927	1,138	834	623

Existing Building Ventilation & Infiltration (occ)	403 cfm
Overheat Ventilation Factor	1.00
Additional ventilation to offset overheat	0 cfm
Existing Building Ventilation & Infiltration (unocc)	403 cfm

Electrical Requirements for Baseboard Heating							
	Htg Hrs	W/LF	LF	kW	% Runtime	Annual kWh	Equiv Therms
Existing	3,847	250	30	7.5	50%	14,426	49
Proposed	3,847	250	30	7.5	40%	11,541	39
Heat Trace*	1,543	2.5	100	0.25	60%	231	
Savings						2,654	

* Freezing issue with piping in courtroom ceiling. Install heat trace system on temperature sensor to prevent freezing.

Electric Heat Equivalent	49	39
Total Required Therms	785	583

Building: Municipal Complex

Reconcile Thermal Model

Building Footprint	1,580' SF	Ex Occupied Cing Temp.	72 °F	Ex Occupied Htg Temp.	68 °F
Heating Efficiency	98%	Ex Unoccupied Cing Temp.	70 °F	Ex Unoccupied Htg Temp.	68 °F
Cooling Efficiency	1.17	Occupied Cooling UA	500 btu/hr°F	Occupied Heating UA	171 btu/hr°F
Internal Gains	14,658 btu/h	Unoccupied Cooling UA	(302) btu/hr°F	Unoccupied Heating UA	171 btu/hr°F
Unoc Internal Gain factor	0.03	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb		
Unoc Internal Gain Factor	0.8	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb		
Economizer available (Y/N)	No				

Heating and cooling energy are unrelated in this model. If the building being analyzed is not cooled, disregard cooling energy calculations

EXISTING LOADS												
Occupied				Unoccupied								
Avg Outdoor Air Temp. Bins °F A	Total Bin Hours B	Occupied Equipment Bins Hours C	Unoccupied Equipment Bins Hours D	Occupied		Unoccupied		Internal Gain BTUH G	Unoccupied		Internal Gain BTUH J	Existing Heating Energy therms M
				Envelope Load BTUH E	Ventilation Load BTUH F	Envelope Load BTUH H	Ventilation Load BTUH I					
102.5	49.1	0	0	-15,262	-39,154	-11,726	-9,203	-39,154	-440	0	0	0
97.5	42.5	0	9	-12,760	-27,190	-11,726	-7,694	-27,190	-440	0	31	0
92.5	39.5	2	67	-10,258	-21,752	-11,726	-6,186	-21,752	-440	0	193	0
87.5	36.6	132	3	-7,756	-16,495	-11,726	-4,677	-16,495	-440	0	283	0
82.5	34.0	344	336	-5,254	-11,782	-11,726	-3,168	-11,782	-440	0	527	0
77.5	31.6	13	553	-2,752	-7,432	-11,726	-1,660	-7,432	-440	0	542	0
72.5	29.2	755	737	-250	-3,082	-11,726	-151	-3,082	-440	0	290	0
67.5	27.0	780	761	86	218	-11,726	86	218	-440	0	31	0
62.5	24.5	889	868	943	2,393	-11,726	943	2,393	-440	0	17	0
57.5	21.4	742	724	1,800	4,568	-11,726	1,800	4,568	-440	0	9	0
52.5	18.7	627	612	2,658	6,743	-11,726	2,658	6,743	-440	0	3	0
47.5	16.2	725	708	3,515	8,918	-11,726	3,515	8,918	-440	0	99	0
42.5	14.4	795	776	4,373	11,094	-11,726	4,373	11,094	-440	0	0	136
37.5	12.6	784	765	5,230	13,269	-11,726	5,230	13,269	-440	0	0	162
32.5	10.7	682	666	6,087	15,444	-11,726	6,087	15,444	-440	0	0	165
27.5	8.6	345	337	6,945	17,619	-11,726	6,945	17,619	-440	0	0	96
22.5	6.8	229	224	7,802	19,795	-11,726	7,802	19,795	-440	0	0	72
17.5	5.5	189	185	8,659	21,970	-11,726	8,659	21,970	-440	0	0	66
12.5	4.1	70	68	9,517	24,145	-11,726	9,517	24,145	-440	0	0	27
7.5	2.6	20	20	10,374	26,320	-11,726	10,374	26,320	-440	0	0	8
2.5	1.0	8	8	11,231	28,495	-11,726	11,231	28,495	-440	0	0	4
-2.5	0.0	0	0	12,089	30,671	-11,726	12,089	30,671	-440	0	0	0
-7.5	-1.5	0	0	12,946	32,846	-11,726	12,946	32,846	-440	0	0	0
TOTALS		8,760	209	8,551						1,927	1,927	834
Electric Heat Equivalent												49
Total Required Therms												765

403 cfm

Existing Building Ventilation & Infiltration (occ)

Existing Building Ventilation & Infiltration (occ)

Overheat Ventilation Factor

Additional ventilation to offset overheating

Existing Building Ventilation & Infiltration (unocc)

Economizer Ventilation (from AHU's)

Energy Use Indices (calculated)

Heating	Base Case	785	therms
		14,426	kWh

Electrical Requirements for Baseboard Heating

	Htg Hrs	W/LF	LF	kW	% Runtime	Annual kWh	Equip Therms
Existing	3,847	250	30	7.5	50%	14,426	49
Savings						14,426	

HEAT GAIN/LOSS WORKSHEET

Project Name: Township of Long Beach
 Location: Long Beach, NJ
 Building Name: Municipal Complex
 Engineer: CAA

Project No.: CHA #22349
 Site Elevation: 460 Feet
 Date:
 Specific Volume: 14.00 CF/#

Building/Facility Designation: Courtroom

Outdoor Winter Design DB Temperature	9.9 °F	Indoor Winter Design DB Temperature	68 °F
Outdoor Summer Design DB Temperature	92.3 °F	Indoor Summer Design DB Temperature	72 °F
Outdoor Summer Design WB Temperature	75 °F	Indoor Summer Design WB Temperature	60 °F
Outdoor Summer Humidity Ratio	0.0189 #/lb	Indoor Air (70°F) Humidity Ratio	0.0079 #/lb

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)	R Value	Wall Type
☐ Steel Siding, 4" Insulation, Steel Siding	15.2	1
☐ Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
☐ 4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
☐ Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
☐ 4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
☐ 4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
☐ Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
☐ Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
☐ Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
☐ 4" Block, 1" insulation, 8" Block	19.9	16
☒ U value calculator	20.7	

Roofs (Select One)	R Value	Roof Type
☐ Tectum Deck, 3.3" Insul., BU Roof	13.0	1
☐ Steel Deck, 5" Insul., BU Roof	18.2	1
☐ Attic Roof with 6" Insul	25.0	4
☐ 4" HW Concrete Deck, BU Roof	2.7	2
☐ Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	14.9	4
☐ Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	18.5	13
☐ Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	21.7	14
☐ Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	22.7	10
☐ Wood Deck, 6" Insulation, Felt & Membrane	18.0	
☒ U value calculator	25.3	

Windows (Select One)	U Value
☐ Aluminum Frame, 1/8" SP Glazing	1.05
☐ Aluminum Frame, 1/4" DP Glazing	0.60
☐ Aluminum Frame, 3/16" DP Glazing	0.62
☐ Aluminum Frame, 1/2" DP Glazing	0.50
☐ Skylights	0.90
☒ Wood Frame, DP Glazing	0.60

	No Storm
Flat Glass	1.05
Flat Glass (e=.6)	1.00
Flat Glass (e=.4)	0.90
Flat Glass (e=.2)	0.77
Double Glaze (3/16 in air)	0.63
Double Glaze (1/4 in air)	0.60
Double Glaze (1/2 in air)	0.53
Double Glaze (e=.6)	0.50
Double Glaze (e=.4)	0.42
Double Glaze (e=.2)	0.35
Triple Glaze (1/4 in air)	0.42
Triple Glaze (1/2 in air)	0.35

BUILDING CHARACTERISTICS

Roof Area: 1,580 SF
 Occupied Area: 1,580 SF
 Return Plenum? n

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	14 Ft	10.3 Ft	9.0 Ft	45 SF	0 SF	99 SF
East Exposure	0 Ft	0.0 Ft	9.0 Ft	0 SF	0 SF	0 SF
South Exposure	0 Ft	0.0 Ft	9.0 Ft	0 SF	0 SF	0 SF
West Exposure	23 Ft	10.3 Ft	9.0 Ft	60 SF	0 SF	177 SF
Occupied Forced Ventilation	300 cfm	18.0 AC/hr				
Unoccupied Forced Ventilation	300 cfm	18.0 AC/hr				

HEAT GAIN/LOSS WORKSHEET

Project Name: Township of Long Beach
 Location: Long Beach, NJ
 Building Name: Municipal Complex
 Engineer: CAA

Project No.: CHA #22349
 Site Elevation: 460 Feet
 Date:

Specific Volume 14.00 CF/#

Building/Facility Designation: Courtroom

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF	Shade Coef	Cooling Load Factor	Glass Type	Solar Heat Gain
North Exposure	45	38 btu/h/sf	0.8	0.75	Glass Type C	1,026 Btu/hr
East Exposure	0	216 btu/h/sf	0.8	0.31	Glass Type C	0 Btu/hr
South Exposure	0	109 btu/h/sf	0.8	0.58	Glass Type C	0 Btu/hr
West Exposure	60	216 btu/h/sf	0.8	0.29	Glass Type C	3,007 Btu/hr
						4,033 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	81	0.05	20 °F	1.0	78 Btu/hr
East Exposure	0	0.05	39 °F	1.0	0 Btu/hr
South Exposure	0	0.05	27 °F	1.0	0 Btu/hr
West Exposure	147	0.05	22 °F	1.0	156 Btu/hr
Roof	1,580	0.04	73 °F	1.0	4,563 Btu/hr
Fenestration	105	0.60	20 °F		1,279 Btu/hr
Doors	0	0.14	27 °F		0 Btu/hr
Ceiling	1,580	0.14	0 °F		0 Btu/hr
Partition		0.05	0 °F		0 Btu/hr
Floor	1,580	0.04	0 °F		0 Btu/hr
					6,076 Btu/h

INTERNAL HEAT GAINS (all loads below are based on Occupied Periods)

Lights	1.30 w/sf x	1,580 Occ Area =	2.1 kW x 3.4x	1.0 RAF =	7,010 Btu/h
Plug Load	w/sf x	1,580 Occ Area =	0.0 kW x 3.4x	1.0 RAF =	0 Btu/h
People	20 people x	255 btu/person x	75% time in space =		3,825 Btu/h
Computer Work Stations		1 Units x	120 W/Unit x 3414 =		410 Btu/h
Equipment	1.0 kW x 3.413 =				3,413 Btu/h
Misc.					0 Btu/h
					14,658 Btu/h

VENTILATION AND INFILTRATION

	Infiltration Factor	Perimeter Ratio	Coef	Temp. Diff.	Room Heat Gain
Walls	228 SF 0.20 CFM/SF		1.04	20 °F	1,044 Btu/h
Doors	0 SF 0.25 CFM/LF	0.00 LF/SF	1.04	20 °F	0 Btu/h
Windows	105 SF 0.40 CFM/LF	1.13 LF/SF	1.04	20 °F	1,089 Btu/h
Ventilation	300 cfm		1.04	20 °F	6,865 Btu/h
Infiltration	93 cfm 5.6 AC/hr				8,998 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	18	0.05	20	1.0	18 Btu/hr
East Exposure	0	0.05	39	1.0	0 Btu/hr
South Exposure	0	0.05	27	1.0	0 Btu/hr
West Exposure	30	0.05	22	1.0	32 Btu/hr
Roof	1,580	0.04	73	0.0	0 Btu/hr
					49 Btu/h

INTERNAL HEAT GAINS

Lights	1.30 w/sf x	1,580 Occ Area =	2.1 kW x 3413x	0.00 RAF =	0 Btu/h
Misc.					0 Btu/h
					0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT

Solar	4,033
Conduction to Room	6,076
Conduction to Plenum	49
Ventilation and Infiltration	8,998
Sub Total	19,156

SENSIBLE HEAT GAINS - TEMP. INDEPENDENT

Internal Gains to Room	14,658
Internal Gains to Plenum	0
Sub Total	14,658

HEAT GAIN/LOSS WORKSHEET

Project Name: Township of Long Beach
 Location: Long Beach, NJ
 Building Name: Municipal Complex
 Engineer: CAA

Project No.: CHA #22349
 Site Elevation: 460 Feet
 Date:

Specific Volume 14.00 CF/#

Building/Facility Designation Courtroom

LATENT COOLING LOADS

Infiltration

		Infiltration Factor	Air Density	Humidity Ratio Dif.
Walls	1,628 SF	0.20 CFM/SF	4,629	0.0110 ##
Doors	0 SF	0.25 CFM/LF	4,629	0.0110 ##
Windows	105 SF	0.40 CFM/LF	4,629	0.0110 ##
Ventilation	300 cfm		4,629	0.0110 ##
People	20 people	0.75 time in space		250 Btu/hr/person

Room Heat Gain

16,594 Btu/h
0 Btu/h
2,426 Btu/h
15,288 Btu/h
3,750 Btu/h

38,058 Btu/h

Cooling Load Summary

	Sensible	Latent	Total	SHR=
Temperature Dependent Gains	19,156	38,058	57,214	
Temperature Indep. Gains	14,658		14,658	0.47
Total	33,814	38,058	71,872	

Building Cooling Load 6.0 Tons at 264 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is

2,696 CFM

1.71 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.
North Exposure	99	0.05	58
East Exposure	0	0.05	58
South Exposure	0	0.05	58
West Exposure	177	0.05	58
Fenestration	105	0.60	58
Roof	1,580	0.04	58
Doors	0	0.14	58
Ceiling	1,580	0.14	0
Partition	0	0.05	0
Floor	1,580	0.04	30

Room Heat Gain

278 Btu/h
0 Btu/h
0 Btu/h
497 Btu/h
3,660 Btu/h
3,631 Btu/h
0 Btu/h
0 Btu/h
0 Btu/h
1,896 Btu/h

Ventilation and Infiltration

		Infiltration Factor	Coef	Temp. Difference
Walls	276 SF	0.20 CFM/SF	1.04	58
Doors	0 SF	0.25 CFM/LF	1.04	58
Windows	105 SF	0.40 CFM/LF	1.04	58
Ventilation Load	300 cfm		1.04	58

Air Flow

55 cfm
0 cfm
48 cfm
300 cfm

Room Heat Gain

3,349 Btu/h
0 Btu/h
2,887 Btu/h
19,649 Btu/h
25,885 Btu/h

Total Ventilation & Infiltration Load

403 cfm

Building Heating Load 35,847 btu/h

22.7 btu/sf

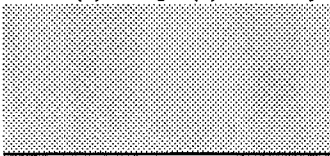
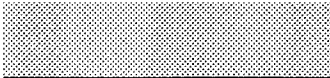
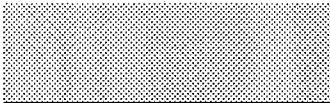
Township of Long Beach

CHA #22349

Building: Municipal Complex

Courtroom

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
East				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
South				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
West				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
			Total	0.0	0.0

LF/SF 0.00

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	14.0	10.3	1	144.2	48.6	All wall quantities must remain equal to 1
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	14.0			144.2	48.6	Ave. height 10.3
						Average height wall automatically linked
East				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	0.0			0.0	0.0	Ave. height 0.0
						Average height wall automatically linked
South				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	0.0			0.0	0.0	Ave. height 0.0
						Average height wall automatically linked
West	23.0	10.3	1	236.9	66.6	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	23.0			236.9	66.6	Ave. height 10.3
						Average height auto linked to block load sheet
Total				381.1	115.2	

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	2.5	6.0	3	45.0	51.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	45.0	51.0	
East				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
South				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
West	2.5	6.0	4	60.0	68.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	60.0	68.0	
Total				105.0	119.0	LF/SF 1.13

ECM-2 Temperature Setback - Courtroom

\$ 1,004	Subtotal
\$ 100.43	10% Contingency Contractor
\$ 110.48	10% O&P
\$ -	0% Engineering
\$ 1,215	Total

APPENDIX E

ECM-3 Install Gas-Fired Heat in Lab

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-3 Install Gas-Fired Heat In Lab

EXISTING CONDITONS	Value	Units	Comments
Electric Cost	\$0.147	/ kWh	
Annual Heating Hours / Year	1,799	Hours/yr	Based on assumed cycling (see table below)
Avg W per Linear foot of existing	250	W / LF	(typical size)
Total Linear Feet in building	12.0	LF	measured from site
Total Electric Demand	3.0	kW	
Total annual electric usage	5,396	kWh/yr	
Total annual electric cost	\$793	\$/yr	

ECM CONDITONS	Value	Units	Comments
Fuel Cost	\$ 1.41	\$/Therm NG	Utility cost used in boiler replacement ECM
Annual Required MBTU Heating	18,417	Mbtu/yr	Annual electric consumption converted to MBH
Equipment Efficiency	80%		Efficiency of new gas-fired heating equipment
Annual heat required (Natural Gas)	23,022	Mbtu/yr	Total Mbtu/yr to produce required Mbtu/yr for heat load
Required Fuel (Natural Gas)	230	Therms/yr	Converts Mbtu/yr to Therms of Natural Gas

ANNUAL SAVINGS			
Annual Electric Usage Savings	5,396	kWh/yr	
Annual Electric Cost Savings	\$793	\$/yr	
Annual Fuel Cost	(\$325)	\$/yr	
Annual Utility Cost Savings	\$468	\$/yr	

Balance Point	55	deg F		
OAT - DB Bin Temp F	Hrs of Occurrence Annually	Heating Hrs at Temp below setpoint	Assumed % time of operation	Assumed hrs of Operation
102.5	0	0	0%	0
97.5	9	0	0%	0
92.5	69	0	0%	0
87.5	132	0	0%	0
82.5	344	0	0%	0
77.5	566	0	0%	0
72.5	755	0	0%	0
67.5	780	0	0%	0
62.5	889	0	0%	0
57.5	742	0	8%	0
52.5	627	627	17%	105
47.5	725	725	25%	181
42.5	795	795	33%	265
37.5	784	784	42%	327
32.5	682	682	50%	341
27.5	345	345	58%	201
22.5	229	229	67%	153
17.5	189	189	75%	142
12.5	70	70	83%	58
7.5	20	20	92%	18
2.5	8	8	100%	8
-2.5	0	0	100%	0
-7.5	0	0	100%	0
Total	8,760	4,474	40%	1799

Township of Long Beach

CHA #22349

Building: Municipal Complex

ECM-2 Temperature Setback - Courtroom

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
20 MBH Gas-fired wall heater	1	EA	\$ 800	\$ 300	\$ -	\$ 784	\$ 363	\$ -	\$ 1,147	
Natural Gas Piping and Valves	1	LS	\$ 650	\$ 550	\$ -	\$ 637	\$ 666	\$ -	\$ 1,303	Extend to lab building
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

Note: 20 MBH heating unit used for cost estimating only. Consult a professional HVAC equipment retailer for exact sizing.

\$ 2,450	Subtotal
\$ 244.95	10% Contingency
\$ 269.45	Contractor
\$ -	10% O&P
\$ -	0% Engineering
\$ 2,964	Total

APPENDIX F

ECM-4 Install Premium Efficiency Motors

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-4 Install Premium Efficiency Motors

Demand
Cost
\$/kW-month
\$ 5.74

Energy
Cost
\$/kWh
\$ 0.13

Multipliers		
Material	Labor	Equipment
0.98	1.21	1.09

Savings Analysis

								New																			
			Existing	Load	Existing	Existing	New	New	New	New	Demand	Demand	Annual	kWh	\$ kWh	Total \$	Estimated	Payback	Unit Costs			Subtotal Costs					
#	Description	Location	HP	Factor	Efficiency _a	kW	HP _b	Factor	Efficiency _a	kW	Savings	Savings \$	Hours	Savings	Savings	Savings	Cost	Years	Materials	Labor	Equipment	Materials	Labor	Equipment	Total Cost	Remarks	
1	HHW Pump	Municipal Office Mech Rm	2	0.9	0.785	1.7	2	0.9	0.871	1.5	0.169	\$ 12	2,608	441	\$ 59	\$ 70	\$ 577	8.2	\$ 342	\$ 200	\$ -	\$ 335	\$ 242	\$ -	\$ 577		
2	HHW Pump	Municipal Office Mech Rm	2	0.9	0.785	1.7	2	0.9	0.871	1.5	0.169	\$ 12	2,608	441	\$ 59	\$ 70	\$ 577	8.2	\$ 342	\$ 200	\$ -	\$ 335	\$ 242	\$ -	\$ 577		
11																											
12																											
		Total	4			3.4	4			3.1	0.34	\$ 23		882	\$ 117	\$ 141	\$ 1,155										

Notes

- a Existing and new efficiencies should be entered if known. If not known, use provided curve fit based on "DOE Survey Installed Average" and NEMA Premium values, respectively.
- b Same as existing HP unless resized to better match load

New Jersey Smart Start Incentive Program	QTY	UNIT	\$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
2 HP Premium Motor	2	EA	\$60	\$120	\$ 1,155	\$ 1,035
				\$120	\$1,155	\$1,035

Total ECM Cost w/ Incentives	\$1,035
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APPENDIX G

ECM-5 Install Storm Windows

Township of Long Beach

CHA #22349

Building: Municipal Complex

ECM-5 Install Storm Windows

Municipal Offices

Existing: Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install storm windows to reduce infiltration and heat transfer through existing windows.

Linear Feet of window Edge	1,642 LF	Cooling System Efficiency	1.13 kW/ton	Heating System Efficiency	93%
Area of window glass	1,415 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.40 cfm/LF	Ex Unoccupied Cing Temp.	77 °F	Ex Occupied Htg Temp.	69 °F
Proposed Infiltration Factor	0.20 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	65 °F
Existing U Value	0.60 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.40 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	B	C	D	EXISTING LOADS				PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY			
						Occupied		Unoccupied		Occupied Window Infiltration & Heat Load BTUH	Unoccupied Window Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms		
						Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	E	F							G	H
A																	
102.5	49.1	0	0	0	0	-88,871	-85,475	-48,611	-46,346	0	0	0	0	0	0	0	0
97.5	42.5	9	2	7	7	-65,125	-61,728	-36,030	-33,765	53	29	0	0	0	0	0	0
92.5	39.5	69	16	53	53	-52,015	-48,618	-28,767	-26,503	321	176	0	0	0	0	0	0
87.5	36.6	132	31	101	101	-39,200	-35,804	-21,652	-19,388	455	248	0	0	0	0	0	0
82.5	34.0	344	82	262	262	-27,272	-23,876	-14,981	-12,716	800	429	0	0	0	0	0	0
77.5	31.6	566	135	431	431	-15,935	-12,539	-8,605	-6,340	711	367	0	0	0	0	0	0
72.5	29.2	755	180	575	575	0	0	0	0	0	0	0	0	0	0	0	0
67.5	27.0	780	186	594	594	0	0	0	0	0	0	0	0	0	0	0	0
62.5	24.5	889	212	677	677	0	0	0	0	0	0	0	0	0	0	0	0
57.5	21.4	742	177	565	565	0	0	0	0	0	0	0	0	0	0	0	0
52.5	18.7	627	149	478	478	25,712	19,478	15,191	11,508	0	0	0	0	141	83	0	0
47.5	16.2	725	173	552	552	33,503	27,270	19,794	16,112	0	0	0	0	224	132	0	0
42.5	14.4	795	189	606	606	41,294	35,061	24,398	20,715	0	0	0	0	312	185	0	0
37.5	12.6	784	187	597	597	49,086	42,853	29,001	25,318	0	0	0	0	374	221	0	0
32.5	10.7	682	162	520	520	56,877	50,644	33,604	29,922	0	0	0	0	382	226	0	0
27.5	8.6	345	82	263	263	64,669	58,435	38,208	34,525	0	0	0	0	222	131	0	0
22.5	6.8	229	55	174	174	72,460	66,227	42,811	39,128	0	0	0	0	167	99	0	0
17.5	5.5	189	45	144	144	80,251	74,018	47,414	43,732	0	0	0	0	153	91	0	0
12.5	4.1	70	17	53	53	88,043	81,810	52,018	48,335	0	0	0	0	63	37	0	0
7.5	2.6	20	5	15	15	95,834	89,601	56,621	52,938	0	0	0	0	20	12	0	0
2.5	1.0	8	2	6	6	103,625	97,392	61,224	57,542	0	0	0	0	9	5	0	0
-2.5	0.0	0	0	0	0	111,417	105,184	65,827	62,145	0	0	0	0	0	0	0	0
-7.5	-1.5	0	0	0	0	119,208	112,975	70,431	66,748	0	0	0	0	0	0	0	0
TOTALS		8,760	2,086	6,674	6,674					2340	1249	2,067	1,221				

Existing Window Infiltration	657 cfm
Existing Window Heat Transfer	849 Btu/h/°F
Proposed Window Infiltration	328 cfm
Proposed Window Heat Transfer	566 Btu/h/°F

Savings	846 therms	\$ 1,194
	1,092 kWh	\$ 160
		\$ 1,355

Township of Long Beach
CHA #22349
Building: Municipal Complex
Municipal Office Building

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	3.0	1.8	1	5.3	9.5
	3.0	7.0	14	294.0	280.0
	3.0	5.0	12	180.0	192.0
	3.0	3.0	8	72.0	96.0
	2.0	2.0	13	52.0	104.0
	2.0	8.0	4	64.0	80.0
	2.0	7.0	1	14.0	18.0
	Sub-total			681.3	779.5
East	2.0	7.0	4	56.0	72.0
	2.0	5.0	4	40.0	56.0
	2.0	2.0	5	20.0	40.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			116.0	168.0
South	2.0	2.0	11	44.0	88.0
	2.0	5.0	2	20.0	28.0
	3.0	5.0	6	90.0	96.0
	3.0	3.0	4	36.0	48.0
	3.0	7.0	13	273.0	260.0
	3.0	1.8	1	5.3	9.5
	Sub-total			468.3	529.5
West	6.0	6.0	1	36.0	24.0
	2.0	7.0	4	56.0	72.0
	3.0	7.0	2	42.0	40.0
	3.0	1.8	3	15.8	28.5
				0.0	0.0
	Sub-total			149.8	164.5
	Total			1415.3	1641.5

LF/SF
1.16

Township of Long Beach

CHA #22349

Building: Municipal Complex

ECM-5 Install Storm Windows

1st Floor Police

Existing: Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install storm windows to reduce infiltration and heat transfer through existing windows.

Linear Feet of window Edge	289 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	86%
Area of window glass	252 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.40 cfm/LF	Ex Unoccupied Cing Temp.	73 °F	Ex Occupied Htg Temp.	71 °F
Proposed Infiltration Factor	0.20 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	71 °F
Existing U Value	0.60 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.40 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	EXISTING LOADS				PROPOSED LOADS				COOLING ENERGY		HEATING ENERGY	
		Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Unoccupied Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
102.5	49.1	0	0	0	-15,691	-15,691	-15,691	-8,590	-8,590	0	0	0	0
97.5	42.5	9	9	0	-11,504	-11,504	-11,504	-6,371	-6,371	10	6	0	0
92.5	39.5	69	69	0	-9,188	-9,188	-9,188	-5,086	-5,086	62	34	0	0
87.5	36.6	132	132	0	-6,924	-6,924	-6,924	-3,828	-3,828	89	49	0	0
82.5	34.0	344	344	0	-4,816	-4,816	-4,816	-2,648	-2,648	162	89	0	0
77.5	31.6	566	566	0	-2,812	-2,812	-2,812	-1,519	-1,519	155	84	0	0
72.5	29.2	755	755	0	0	0	0	0	0	0	0	0	0
67.5	27.0	780	780	0	0	0	0	0	0	0	0	0	0
62.5	24.5	889	889	0	0	0	0	0	0	0	0	0	0
57.5	21.4	742	742	0	0	0	0	0	0	0	0	0	0
52.5	18.7	627	627	0	5,109	5,109	3,021	3,021	3,021	0	0	37	22
47.5	16.2	725	725	0	6,490	6,490	3,838	3,838	3,838	0	0	55	32
42.5	14.4	795	795	0	7,870	7,870	4,655	4,655	4,655	0	0	73	43
37.5	12.6	784	784	0	9,251	9,251	5,471	5,471	5,471	0	0	84	50
32.5	10.7	682	682	0	10,632	10,632	6,288	6,288	6,288	0	0	84	50
27.5	8.6	345	345	0	12,013	12,013	7,104	7,104	7,104	0	0	48	28
22.5	6.8	229	229	0	13,393	13,393	7,921	7,921	7,921	0	0	36	21
17.5	5.5	189	189	0	14,774	14,774	8,737	8,737	8,737	0	0	32	19
12.5	4.1	70	70	0	16,155	16,155	9,554	9,554	9,554	0	0	13	8
7.5	2.6	20	20	0	17,536	17,536	10,371	10,371	10,371	0	0	4	2
2.5	1.0	8	8	0	18,916	18,916	11,187	11,187	11,187	0	0	2	1
-2.5	0.0	0	0	0	20,297	20,297	12,004	12,004	12,004	0	0	0	0
-7.5	-1.5	0	0	0	21,678	21,678	12,820	12,820	12,820	0	0	0	0
TOTALS		8,760	8,760	0						478	262	469	277

Existing Window Infiltration	115 cfm
Existing Window Heat Transfer	151 Btu/h/°F
Proposed Window Infiltration	58 cfm
Proposed Window Heat Transfer	101 Btu/h/°F

Savings		
	191 therms	\$ 270
	216 kWh	\$ 32
		\$ 302

Township of Long Beach

CHA #22349

Building: Municipal Complex

1st Floor Police Station

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0

East	2.7	5.2	7	96.4	109.7
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			96.4	109.7

South	3.0	4.5	3	40.5	45.0
	3.0	6.8	2	40.5	39.0
	2.5	2.0	3	15.0	27.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			96.0	111.0

West	2.5	6.0	4	60.0	68.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			60.0	68.0

Total 252.4 288.7

**LF/SF
1.14**

Township of Long Beach

CHA #22349

Building: Municipal Complex

ECM-5 Install Storm Windows 2nd Floor Police

Existing: Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install storm windows to reduce infiltration and heat transfer through existing windows.

Linear Feet of window Edge	275 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	36%
Area of window glass	238 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.40 cfm/LF	Ex Unoccupied Cing Temp.	77 °F	Ex Occupied Htg Temp.	70 °F
Proposed Infiltration Factor	0.20 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	65 °F
Existing U Value	0.60 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.40 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	EXISTING LOADS				PROPOSED LOADS			COOLING ENERGY			HEATING ENERGY		
		Occupied		Unoccupied		Occupied		Unoccupied		Existing		Proposed		Existing Heating Energy therm
		Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therm	Proposed Heating Energy therm	
A														
102.5	49.1	-14,901	-14,330	-14,901	-14,330	-8,152	-7,772	-8,152	0	0	0	0	0	0
97.5	42.5	-10,921	-10,350	-10,921	-10,350	-6,043	-5,663	-6,043	9	5	0	0	0	0
92.5	39.5	-8,723	-8,152	-8,723	-8,152	-4,825	-4,445	-4,825	56	31	0	0	0	0
87.5	36.6	-6,574	-6,003	-6,574	-6,003	-3,632	-3,251	-3,632	80	43	0	0	0	0
82.5	34.0	-4,573	-4,002	-4,573	-4,002	-2,512	-2,132	-2,512	141	76	0	0	0	0
77.5	31.6	-2,672	-2,101	-2,672	-2,101	-1,443	-1,062	-1,443	126	66	0	0	0	0
72.5	29.2	0	0	0	0	0	0	0	0	0	0	0	0	0
67.5	27.0	0	0	0	0	0	0	0	0	0	0	0	0	0
62.5	24.5	0	0	0	0	0	0	0	0	0	0	0	0	0
57.5	21.4	0	0	0	0	0	0	0	0	0	0	0	0	0
52.5	18.7	4,576	3,269	4,576	3,269	2,704	1,932	2,704	0	0	0	27	16	0
47.5	16.2	5,884	4,576	5,884	4,576	3,477	2,704	3,477	0	0	0	42	25	0
42.5	14.4	7,191	5,884	7,191	5,884	4,250	3,477	4,250	0	0	0	58	35	0
37.5	12.6	8,499	7,191	8,499	7,191	5,023	4,250	5,023	0	0	0	70	41	0
32.5	10.7	9,807	8,499	9,807	8,499	5,795	5,023	5,795	0	0	0	71	42	0
27.5	8.6	11,114	9,807	11,114	9,807	6,568	5,795	6,568	0	0	0	41	24	0
22.5	6.8	12,422	11,114	12,422	11,114	7,341	6,568	7,341	0	0	0	31	18	0
17.5	5.5	13,729	12,422	13,729	12,422	8,113	7,341	8,113	0	0	0	28	17	0
12.5	4.1	15,037	13,729	15,037	13,729	8,886	8,113	8,886	0	0	0	12	7	0
7.5	2.6	16,344	15,037	16,344	15,037	9,659	8,886	9,659	0	0	0	4	2	0
2.5	1.0	17,652	16,344	17,652	16,344	10,431	9,659	10,431	0	0	0	2	1	0
-2.5	0.0	18,959	17,652	18,959	17,652	11,204	10,431	11,204	0	0	0	0	0	0
-7.5	-1.5	20,267	18,959	20,267	18,959	11,977	11,204	11,977	0	0	0	0	0	0
TOTALS		8,760	2,920	5,840	8,760	412	221	385	412	221	385	227	227	0

Existing Window Infiltration	110 cfm
Existing Window Heat Transfer	143 Btu/h/°F
Proposed Window Infiltration	55 cfm
Proposed Window Heat Transfer	95 Btu/h/°F

Savings	157 therms	\$ 222
	191 kWh	\$ 28
		\$ 250

Township of Long Beach

CHA #22349

Building: Municipal Complex

2nd Floor Police Station

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	2.7	5.2	5	68.9	78.3
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			68.9	78.3
East	2.7	5.2	10	137.7	156.7
	2.5	2.0	1	5.0	9.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			142.7	165.7
South	2.5	5.3	2	26.3	31.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			26.3	31.0
West				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			0.0	0.0
Total				237.9	275.0

LF/SF 1.16

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-5 Install Storm Windows Courtroom

Existing: Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install storm windows to reduce infiltration and heat transfer through existing windows.

Linear Feet of window Edge	119 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	86%
Area of window glass	105 SF	Ex Occupied Cing Temp.	72 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.40 cfm/LF	Ex Unoccupied Cing Temp.	72 °F	Ex Occupied Htg Temp.	68 °F
Proposed Infiltration Factor	0.20 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	68 °F
Existing U Value	0.60 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	0.15 \$/kWh
Proposed U Value	0.40 Btu/h/SF/°F			Natural Gas	1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	EXISTING LOADS				PROPOSED LOADS			COOLING ENERGY			HEATING ENERGY		
		Occupied		Unoccupied		Occupied		Unoccupied		Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms	
		Equipment Bin Hours	Hours	Equipment Bin Hours	Hours	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH	Window Infiltration & Heat Load BTUH					
A		B	C	D	E	F	G	H	I	J	K	L		
102.5	49.1	0	0	0	-6,548	-6,548	-3,594	-3,594	0	0	0	0	0	0
97.5	42.5	9	0	9	-4,820	-4,820	-2,678	-2,678	4	4	2	0	0	0
92.5	39.5	69	2	67	-3,862	-3,862	-2,146	-2,146	26	26	14	0	0	0
87.5	36.6	132	3	129	-2,926	-2,926	-1,626	-1,626	38	38	21	0	0	0
82.5	34.0	344	8	336	-2,054	-2,054	-1,137	-1,137	69	69	38	0	0	0
77.5	31.6	566	13	553	-1,225	-1,225	-670	-670	68	68	37	0	0	0
72.5	29.2	755	18	737	-396	-396	-203	-203	29	29	15	0	0	0
67.5	27.0	780	19	761	0	0	0	0	0	0	0	0	0	0
62.5	24.5	889	21	868	0	0	0	0	0	0	0	0	0	0
57.5	21.4	742	18	724	0	0	0	0	0	0	0	0	0	0
52.5	18.7	627	15	612	1,773	1,773	1,049	1,049	0	0	0	13	8	8
47.5	16.2	725	17	708	2,345	2,345	1,388	1,388	0	0	0	20	12	12
42.5	14.4	795	19	776	2,917	2,917	1,726	1,726	0	0	0	27	16	16
37.5	12.6	784	19	765	3,489	3,489	2,065	2,065	0	0	0	32	19	19
32.5	10.7	682	16	666	4,061	4,061	2,403	2,403	0	0	0	32	19	19
27.5	8.6	345	8	337	4,634	4,634	2,742	2,742	0	0	0	19	11	11
22.5	6.8	229	5	224	5,206	5,206	3,081	3,081	0	0	0	14	8	8
17.5	5.5	189	5	185	5,778	5,778	3,419	3,419	0	0	0	13	8	8
12.5	4.1	70	2	68	6,350	6,350	3,758	3,758	0	0	0	5	3	3
7.5	2.6	20	0	20	6,922	6,922	4,096	4,096	0	0	0	2	1	1
2.5	1.0	8	0	8	7,494	7,494	4,435	4,435	0	0	0	1	0	0
-2.5	0.0	0	0	0	8,066	8,066	4,773	4,773	0	0	0	0	0	0
-7.5	-1.5	0	0	0	8,638	8,638	5,112	5,112	0	0	0	0	0	0
TOTALS		8,760	209	8,551			233	128	176	104				

Existing Window Infiltration	48 cfm
Existing Window Heat Transfer	63 Btu/h/°F
Proposed Window Infiltration	24 cfm
Proposed Window Heat Transfer	42 Btu/h/°F

Savings		
	72 therms	\$ 102
	106 kWh	\$ 16
		\$ 117

Township of Long Beach
 CHA #22349
 Building: Municipal Complex
 Courtroom

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	2.5	6.0	3	45.0	51.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total			45.0	51.0	
East				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total			0.0	0.0	
South				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total			0.0	0.0	
West	2.5	6.0	4	60.0	68.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total			60.0	68.0	
Total			105.0	119.0	

LF/SF 1.13

ECM-5 Install Storm Windows

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

[illegible]

Note: Unit cost based on industry average for a basic fixed pane storm window. Cost per each storm window will vary per size.

\$	10,754	Subtotal
\$	2,151	20% Contingency
\$	1,291	Contractor 10% O&P
\$	-	0% Engineering
\$	14,196	Total

APPENDIX H

ECM-6 Install Ceiling Insulation – Municipal Office Building

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-6 Increase Ceiling Insulation - Municipal Office Bldg

Existing Roof Area	6,175 sf
Existing U-value	0.04 Btu/hr(s°F)
Existing R-value	25.3
Proposed R-value	35.8 With additional 3" loose-fill insulation (R 3.5/inch)
Proposed U-value	0.03 Btu/hr(s°F)
Heating System Efficiency	93%
Cooling System Efficiency	1.13 kW/ton
Heating "On" Temp	60 F

Proposed Cooling	73 F
Occupied Cooling Setpoint	77 F
Unoccupied Cooling Setpoint	
Proposed Heating	69 F
Occupied Heating Setpoint	65 F
Unoccupied Heating Setpoint	

Existing Heating Total	31,667,682 Btu/yr
Proposed Heating Total	22,361,541 Btu/yr
Savings	9,306,141 Btu/yr
Input	100 therms
Existing Cooling Total	135 kWh/yr
Proposed Cooling Total	96 kWh/yr
Savings	40 kWh/yr

Avg Outdoor Air Temp, Bins °F	Occupied			Unoccupied			Existing Heating Load (Btu/yr)	Existing Cooling Load (kWh/yr)	Proposed Heating Load (Btu/yr)	Proposed Cooling Load (kWh/yr)	Proposed Heating Load (Btu/yr)
	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Hours	Existing Heat Gain (Btu/hr)	Proposed Heat Gain (Btu/hr)	Existing Heat Loss (Btu/hr)					
102.5	0	0	0	7,206	5,088	-	-	-	-	-	-
97.5	9	2	7	5,985	4,226	-	-	-	-	-	-
92.5	69	16	53	4,763	3,363	-	-	-	-	-	-
87.5	132	31	101	3,542	2,501	-	-	-	-	-	-
82.5	344	82	262	2,321	1,639	-	-	-	-	-	-
77.5	566	135	431	1,099	776	-	-	-	-	-	-
72.5	755	180	575	-	-	-	-	-	-	-	-
67.5	780	186	594	-	-	-	-	-	-	-	-
62.5	889	212	677	-	-	-	-	-	-	-	-
57.5	742	177	565	-	-	-	-	-	-	-	-
52.5	627	149	478	-	-	-	-	-	-	-	-
47.5	725	173	552	-	-	-	-	-	-	-	-
42.5	795	189	606	-	-	-	-	-	-	-	-
37.5	784	187	597	-	-	-	-	-	-	-	-
32.5	682	162	520	-	-	-	-	-	-	-	-
27.5	345	82	263	-	-	-	-	-	-	-	-
22.5	229	55	174	-	-	-	-	-	-	-	-
17.5	189	45	144	-	-	-	-	-	-	-	-
12.5	70	17	53	-	-	-	-	-	-	-	-
7.5	20	5	15	-	-	-	-	-	-	-	-
2.5	8	2	6	-	-	-	-	-	-	-	-
-2.5	0	0	0	-	-	-	-	-	-	-	-
-7.5	0	0	0	-	-	-	-	-	-	-	-
TOTALS	8,760	2,086	6,674	-	-	-	31,667,682	135	22,361,541	96	22,361,541

Building: Municipal Complex

ECM-6 Increase Ceiling Insulation - Municipal Office Bldg

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

[illegible]

\$	2,688	Subtotal
\$	201.60	7.5% Contingency
		Contractor
\$	216.72	7.5% O&P
\$	-	Engineering
\$	3,106	Total

APPENDIX I

ECM-7 Install Wall Insulation and Siding

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-7 Install Wall Insulation and Siding

Municipal Offices

Existing: Walls can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 1" insulation board and vinyl siding over exterior walls to reduce infiltration and heat transfer.

Linear Feet of wall Edge	1,642 LF	Cooling System Efficiency	1.13 kW/ton	Heating System Efficiency	93%
Area of walls	1,415 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.20 cfm/LF	Ex Unoccupied Cing Temp.	77 °F	Ex Occupied Htg Temp.	69 °F
Proposed Infiltration Factor	0.10 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	65 °F
Existing U Value	0.048 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.039 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin				EXISTING LOADS				PROPOSED LOADS				COOLING ENERGY				HEATING ENERGY			
		Hours	Existing Equipment Bin	Occupied Hours	Unoccupied Hours	Equipment Bin	Hours	E	F	G	H	I	J	K	L						
								Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms						
102.5	49.1	0	0	0	0			-33,928	-33,654	-17,593	-17,371	0	0	0	0	0					
97.5	42.5	9	2	16	7			-23,835	-23,562	-12,440	-12,218	20	10	0	0	0					
92.5	39.5	69	16	92	53			-19,061	-18,788	-9,947	-9,725	122	64	0	0	0					
87.5	36.6	132	31	82	101			-14,435	-14,162	-7,527	-7,305	177	91	0	0	0					
82.5	34.0	344	82	135	431			-10,252	-9,979	-5,329	-5,107	325	167	0	0	0					
77.5	31.6	566	180	186	575			-6,365	-6,091	0	0	0	0	0	0	0					
72.5	29.2	755	742	177	677			0	0	0	0	0	0	0	0	0					
67.5	27.0	889	212	186	594			0	0	0	0	0	0	0	0	0					
62.5	24.5	889	177	177	565			0	0	0	0	0	0	0	0	0					
57.5	21.4	742	149	149	478			6,978	5,287	3,841	2,910	0	0	0	0	0					
52.5	18.7	627	725	173	552			9,093	7,401	5,005	4,074	0	0	0	0	0					
47.5	16.2	725	189	189	606			11,208	9,516	6,169	5,238	0	0	0	0	0					
42.5	14.4	795	187	187	597			13,322	11,631	7,333	6,402	0	0	0	0	0					
37.5	12.6	784	162	162	520			15,437	13,745	8,497	7,566	0	0	0	0	0					
32.5	10.7	682	82	82	263			17,552	15,860	9,661	8,730	0	0	0	0	0					
27.5	8.6	345	55	55	174			19,666	17,975	10,825	9,894	0	0	0	0	0					
22.5	6.8	229	45	45	144			21,781	20,089	11,989	11,058	0	0	0	0	0					
17.5	5.5	189	17	17	53			23,896	22,204	14,317	13,153	0	0	0	0	0					
12.5	4.1	70	5	5	15			26,010	24,319	14,317	13,386	0	0	0	0	0					
7.5	2.6	20	8	2	6			28,125	26,433	16,645	15,481	0	0	0	0	0					
2.5	1.0	8	0	0	0			30,240	28,548	17,809	16,878	0	0	0	0	0					
-2.5	0.0	0	0	0	0			32,354	30,663			0	0	0	0	0					
-7.5	-1.5	0	0	0	0							0	0	0	0	0					
TOTALS		8,760	2,086	6,674				973	498	561	309										

Existing Wall Infiltration	328 cfm
Existing Wall Heat Transfer	68 Btu/h/°F
Proposed Wall Infiltration	164 cfm
Proposed Wall Heat Transfer	56 Btu/h/°F

Savings	252 therms	\$ 356
	475 kWh	\$ 70
		\$ 426

Township of Long Beach
CHA #22349
Building: Municipal Complex
Municipal Office Building

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	3.0	7.0	2	42.0	40.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total				42.0	40.0

East	3.0	7.0	3	63.0	60.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	Sub-total			63.0	60.0

South	3.0	7.0	3	63.0	60.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total				63.0	60.0

West	3.0	7.0	2	42.0	40.0
				0.0	0.0
	Sub-total			42.0	40.0

Total 210.0 200.0

LF/SF
0.95

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	89.0	14.0	1	1246.0	206.0
	8.5	13.0	2	221.0	86.0
	10.0	12.0	2	240.0	88.0
	4.5	9.0	1	40.5	27.0
	93.0	24.0	1	2232.0	234.0
	7.0	7.0	1	49.0	28.0
212.0				4028.5	669.0

Ave. height
19.0

Average height wall
automatically linked to

East	26.0	13.0	1	338.0	78.0
	10.0	24.0	2	480.0	136.0
	26.0	6.0	1	156.0	64.0
	19.5	11.0	1	214.5	61.0
	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0
81.5				1188.5	339.0

Ave. height
14.6

Average height wall
automatically linked to

South	18.5	18.0	1	333.0	73.0
	41.0	14.0	1	574.0	110.0
	6.5	13.0	2	221.0	86.0
	4.5	9.0	1	40.5	27.0
	19.0	14.0	1	266.0	66.0
	40.0	24.0	1	960.0	128.0
50.0				1200.0	148.0
181.5				3594.5	638.0

Ave. height
19.8

Average height wall
automatically linked to

West	5.0	24.0	1	120.0	58.0
	14.5	11.0	1	159.5	51.0
	17.3	14.0	2	483.0	125.0
	11.5	13.0	1	149.5	49.0
	11.5	4.5	1	51.8	32.0
59.8				963.8	315.0

Ave. height
16.1

Average height auto linked to block load sheet

Total 9775.3 1961.0

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-7 Install Wall Insulation and Siding

1st Floor Police

Existing: Walls can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 1" insulation board and vinyl siding over exterior walls to reduce infiltration and heat transfer.

Linear Feet of wall Edge	908 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	86%
Area of walls	3,085 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.20 cfm/LF	Ex Unoccupied Cing Temp.	73 °F	Ex Occupied Htg Temp.	71 °F
Proposed Infiltration Factor	0.10 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	71 °F
Existing U Value	0.048 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.039 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	EXISTING LOADS				PROPOSED LOADS			COOLING ENERGY		HEATING ENERGY	
		Occupied		Unoccupied		Occupied		Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
		Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Unoccupied Wall Infiltration & Heat Load BTUH					
A		B	C	D	E	F	G	H	I	J	K	L
102.5	49.1	0	0	0	-22,049	-22,049	-12,396	-12,396	0	0	0	0
97.5	42.5	9	9	0	-15,910	-15,910	-9,094	-9,094	14	8	0	0
92.5	39.5	69	69	0	-12,713	-12,713	-7,263	-7,263	86	49	0	0
87.5	36.6	132	132	0	-9,598	-9,598	-5,473	-5,473	124	70	0	0
82.5	34.0	344	344	0	-6,728	-6,728	-3,806	-3,806	226	128	0	0
77.5	31.6	566	566	0	-4,021	-4,021	-2,220	-2,220	222	123	0	0
72.5	29.2	755	755	0	0	0	0	0	0	0	0	0
67.5	27.0	780	780	0	0	0	0	0	0	0	0	0
62.5	24.5	889	889	0	0	0	0	0	0	0	0	0
57.5	21.4	742	742	0	0	0	0	0	0	0	0	0
52.5	18.7	627	627	0	6,385	6,385	4,053	4,053	0	0	47	30
47.5	16.2	725	725	0	8,111	8,111	5,149	5,149	0	0	68	43
42.5	14.4	795	795	0	9,837	9,837	6,244	6,244	0	0	91	58
37.5	12.6	784	784	0	11,563	11,563	7,340	7,340	0	0	105	67
32.5	10.7	682	682	0	13,289	13,289	8,435	8,435	0	0	105	67
27.5	8.6	345	345	0	15,015	15,015	9,530	9,530	0	0	60	38
22.5	6.8	229	229	0	16,740	16,740	10,626	10,626	0	0	45	28
17.5	5.5	189	189	0	18,466	18,466	11,721	11,721	0	0	41	26
12.5	4.1	70	70	0	20,192	20,192	12,817	12,817	0	0	16	10
7.5	2.6	20	20	0	21,918	21,918	13,912	13,912	0	0	5	3
2.5	1.0	8	8	0	23,644	23,644	15,008	15,008	0	0	2	1
-2.5	0.0	0	0	0	25,369	25,369	16,103	16,103	0	0	0	0
-7.5	-1.5	0	0	0	27,095	27,095	17,199	17,199	0	0	0	0
TOTALS		8,760	8,760	0			671	377			586	372

Existing Wall Infiltration	182 cfm
Existing Wall Heat Transfer	149 Btu/h/°F
Proposed Wall Infiltration	91 cfm
Proposed Wall Heat Transfer	121 Btu/h/°F

Savings		214 therms	\$ 302
		293 kWh	\$ 43
			\$ 345

Township of Long Beach
CHA #22349
Building: Municipal Complex
1st Floor Police Station

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	3.0	7.0	2	42.0	40.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total				42.0	40.0
East	3.0	7.0	2	42.0	40.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
Sub-total				42.0	40.0
South	9.0	8.0	1	72.0	34.0
	3.0	7.0	3	63.0	60.0
				0.0	0.0
				0.0	0.0
	Sub-total				135.0
West	3.0	7.0	2	42.0	40.0
				0.0	0.0
				Sub-total	
Total				261.0	214.0

LF/SF
0.82

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	30.0	10.3	1	310.0	80.7
	20.0	10.3	1	206.7	60.7
	7.0	10.3	1	72.3	34.7
				0.0	0.0
				0.0	0.0
	57.0			589.0	176.0
East	30.0	10.3	1	310.0	80.7
	23.0	10.3	1	236.9	66.6
	30.0	9.0	1	270.0	78.0
	30.0	1.3	1	39.0	62.6
				0.0	0.0
				0.0	0.0
	113.0			855.9	287.9
South	24.0	10.3	1	248.0	68.7
	43.0	10.3	1	444.3	106.7
	7.5	10.3	1	77.5	35.7
	20.0	9.0	1	180.0	58.0
				0.0	0.0
	94.5			949.8	269.0
West	44.0	10.3	1	453.2	108.6
	23.0	10.3	1	236.9	66.6
				0.0	0.0
				0.0	0.0
				0.0	0.0
	67.0			690.1	175.2

Ave. height
10.3

Average height wall
automatically linked

Ave. height
7.6

Average height wall
automatically linked

Ave. height
10.1

Average height wall
automatically linked

Ave. height
10.3

Average height auto linked to block load sheet

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-7 Install Wall Insulation and Siding 2nd Floor Police

Existing: Walls can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 1" insulation board and vinyl siding over exterior walls to reduce infiltration and heat transfer.

Linear Feet of wall Edge	396 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	86%
Area of walls	1,480 SF	Ex Occupied Cing Temp.	73 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.20 cfm/LF	Ex Unoccupied Cing Temp.	77 °F	Ex Occupied Htg Temp.	70 °F
Proposed Infiltration Factor	0.10 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	65 °F
Existing U Value	0.048 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	0.15 \$/kWh
Proposed U Value	0.039 Btu/h/SF/°F			Natural Gas	1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	EXISTING LOADS				PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied		Unoccupied		Occupied	Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
					Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	Unoccupied Wall Infiltration & Heat Load BTUH						
A		B	C	D	E	F	G	H	I	J	K	L		
102.5	49.1	0	0	0	-9,807	-9,521	-5,562	-5,330	0	0	0	0		
97.5	42.5	9	3	6	-7,098	-6,812	-4,096	-3,863	6	3	0	0		
92.5	39.5	69	23	46	-5,671	-5,385	-3,271	-3,038	37	21	0	0		
87.5	36.6	132	44	88	-4,280	-3,994	-2,464	-2,231	53	30	0	0		
82.5	34.0	229	344	115	-2,996	-2,710	-1,710	-1,478	94	52	0	0		
77.5	31.6	566	189	377	-1,783	-1,497	-992	-760	88	46	0	0		
72.5	29.2	755	252	503	0	0	0	0	0	0	0	0		
67.5	27.0	780	260	520	0	0	0	0	0	0	0	0		
62.5	24.5	889	296	593	0	0	0	0	0	0	0	0		
57.5	21.4	742	247	495	0	0	0	0	0	0	0	0		
52.5	18.7	627	209	418	2,748	1,963	1,765	1,260	0	0	16	10		
47.5	16.2	725	242	483	3,533	2,748	2,269	1,765	0	0	25	16		
42.5	14.4	795	265	530	4,318	3,533	2,773	2,269	0	0	35	23		
37.5	12.6	784	261	523	5,104	4,318	3,277	2,773	0	0	42	27		
32.5	10.7	682	227	455	5,889	5,104	3,781	3,277	0	0	43	27		
27.5	8.6	345	115	230	6,674	5,889	4,285	3,781	0	0	25	16		
22.5	6.8	229	76	153	7,459	6,674	4,789	4,285	0	0	18	12		
17.5	5.5	189	63	126	8,244	7,459	5,294	4,789	0	0	17	11		
12.5	4.1	70	23	47	9,029	8,244	5,798	5,294	0	0	7	4		
7.5	2.6	20	7	13	9,814	9,029	6,302	5,798	0	0	2	1		
2.5	1.0	8	3	5	10,600	9,814	6,806	6,302	0	0	1	1		
-2.5	0.0	0	0	0	11,385	10,600	7,310	6,806	0	0	0	0		
-7.5	-1.5	0	0	0	12,170	11,385	7,814	7,310	0	0	0	0		
TOTALS		8,760	2,920	5,840					278		231	148		

Existing Wall Infiltration	79 cfm
Existing Wall Heat Transfer	71 Btu/h/°F
Proposed Wall Infiltration	40 cfm
Proposed Wall Heat Transfer	58 Btu/h/°F

Savings		
	83 therms	\$ 117
	125 kWh	\$ 18
		\$ 135

Township of Long Beach

CHA #22349

Building: Municipal Complex

2nd Floor Police Station

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	0.0	0.0	

East		0.0	0.0
		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

South		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

West		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

Total **0.0** **0.0**

LF/SF
0.00

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	30.0	10.0	1	300.0	80.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
30.0				300.0	80.0

Ave. height
10.0

Average height wall
automatically linked

East	77.0	10.0	1	770.0	174.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	77.0		770.0	174.0	

Ave. height
10.0

Average height wall
automatically linked

South	30.0	10.0	1	300.0	80.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	30.0			300.0	80.0

Ave. height
10.0

Average height wall
automatically linked

West	10.0	7.0	1	70.0	34.0
	10.0	4.0	1	40.0	28.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	20.0			110.0	62.0

Ave. height
5.5

Average height auto linked to block load sheet

Total **1480.0** **396.0**

ECM-7 Install Wall Insulation and Siding

Existing: Walls can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss.
Proposed: Install 1" insulation board and vinyl siding over exterior walls to reduce infiltration and heat transfer.

Linear Feet of wall Edge	115 LF	Cooling System Efficiency	1.17 kW/ton	Heating System Efficiency	86%
Area of walls	381 SF	Ex Occupied Cing Temp.	72 °F	Heating On Point	55 °F
Existing Infiltration Factor	0.20 cfm/LF	Ex Unoccupied Cing Temp.	72 °F	Ex Occupied Htg Temp.	68 °F
Proposed Infiltration Factor	0.10 cfm/LF	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Ex Unoccupied Htg Temp.	68 °F
Existing U Value	0.048 Btu/h/SF/°F	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.15 \$/kWh
Proposed U Value	0.039 Btu/h/SF/°F			Natural Gas	\$ 1.41 \$/therm

Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours		Unoccupied Equipment Bin Hours	EXISTING LOADS				PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
		B	C		D	Occupied	Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms			
						Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH					Wall Infiltration & Heat Load BTUH	Wall Infiltration & Heat Load BTUH	
A					E	F	G	H	I	J	K	L		
102.5	49.1	0	0	0	-2,801	-2,801	-1,576	-1,576	0	0	0	0		
97.5	42.5	9	3	6	-2,025	-2,025	-1,159	-1,159	2	1	0	0		
92.5	39.5	69	23	46	-1,622	-1,622	-929	-929	11	6	0	0		
87.5	36.6	132	44	88	-1,229	-1,229	-703	-703	16	9	0	0		
82.5	34.0	344	115	229	-867	-867	-494	-494	29	17	0	0		
77.5	31.6	566	189	377	-526	-526	-295	-295	29	16	0	0		
72.5	29.2	755	252	503	-185	-185	-96	-96	14	7	0	0		
67.5	27.0	780	260	520	0	0	0	0	0	0	0	0		
62.5	24.5	889	296	593	0	0	0	0	0	0	0	0		
57.5	21.4	742	247	495	0	0	0	0	0	0	0	0		
52.5	18.7	627	209	418	671	671	425	425	0	0	5	3		
47.5	16.2	725	242	483	888	888	562	562	0	0	7	5		
42.5	14.4	795	265	530	1,104	1,104	699	699	0	0	10	6		
37.5	12.6	784	261	523	1,320	1,320	835	835	0	0	12	8		
32.5	10.7	682	227	455	1,537	1,537	972	972	0	0	12	8		
27.5	8.6	345	115	230	1,753	1,753	1,109	1,109	0	0	7	4		
22.5	6.8	229	76	153	1,970	1,970	1,246	1,246	0	0	5	3		
17.5	5.5	189	63	126	2,186	2,186	1,383	1,383	0	0	5	3		
12.5	4.1	70	23	47	2,403	2,403	1,520	1,520	0	0	2	1		
7.5	2.6	20	7	13	2,619	2,619	1,657	1,657	0	0	1	0		
2.5	1.0	8	3	5	2,836	2,836	1,794	1,794	0	0	0	0		
-2.5	0.0	0	0	0	3,052	3,052	1,931	1,931	0	0	0	0		
-7.5	-1.5	0	0	0	3,269	3,269	2,068	2,068	0	0	0	0		
TOTALS		6,760	2,920	5,940			100	56			67	42		

Existing Wall Infiltration	23 cfm
Existing Wall Heat Transfer	18 Btuh/°F
Proposed Wall Infiltration	12 cfm
Proposed Wall Heat Transfer	15 Btuh/°F

Savings	25 therms	\$ 35
	44 kWh	\$ 6
		\$ 41

Township of Long Beach

CHA #22349

Building: Municipal Complex

Courtroom

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	0.0	0.0	

East		0.0	0.0
		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

South		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

West		0.0	0.0
		0.0	0.0
		0.0	0.0
	Sub-total	0.0	0.0

Total 0.0 0.0

LF/SF
0.00

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	14.0	10.3	1	144.2	48.6
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	14.0			144.2	48.6

All wall quantities must remain equal to 1

Ave. height
10.3

Average height wall automatically linked

East		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
0.0		0.0	0.0

Ave. height
0.0

Average height wall automatically linked

South		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
		0.0	0.0
0.0		0.0	0.0

Ave. height
0.0

Average height wall automatically linked

West	23.0	10.3	1	236.9	66.6
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
	23.0		236.9	66.6	

Ave. height
10.3

Average height auto linked to block load sheet

Total 381.1 115.2

Township of Long Beach
CHA #22349
Building: Municipal Complex

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

ECM-7 Install Wall Insulation and Siding

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Vinyl Siding System	6,361	SQFT	\$ 0.92	\$ 1.34		\$ 5,735	\$ 10,314	\$ -	\$ 16,049	
1" Rigid Board Insulation	6,361	SQFT	\$ 0.52	\$ 0.41		\$ 3,242	\$ 3,156	\$ -	\$ 6,397	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 22,447	Subtotal
\$ 4,489	20% Contingency
\$ 2,694	10% Contractor O&P
\$ -	Engineering
\$ 29,629	Total

Maintenance Savings

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Painting Cedar Shake Siding	6,361	SQFT	\$ 0.33	\$ 0.35		\$ 2,057	\$ 2,694	\$ -	\$ 4,751	Primer, paint, water sealant
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 4,751	Subtotal
\$ 475	10% Contingency
\$ 523	10% Contractor O&P
\$ -	Engineering
\$ 5,749	Total

Description of costs over life of vinyl siding	Initial Cost	Maint Cost	Approx Life (yrs)	Avg Annual Cost per Life	# Times Applied	Lifetime Cost
Vinyl Siding and Insulation	\$ 29,629	\$ -	50	\$ 593	1	\$ 29,629
Painting Cedar Shake Siding	\$ -	\$ 5,749	5	\$ 1,150	10	\$ 57,489

APPENDIX J

ECM-8 Install Door Seals

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-8 Install Door Seals

Existing: Lack of door seals result in excessive heat loss and infiltration
Proposed: Install door seals and/or weather-stripping to reduce air infiltration

Heating System Efficiency	88%	Ex Occupied Cing Temp.	73 °F	Ex Occupied Htg Temp.	69 °F
Cooling System Efficiency	1.17 kW/ton	Ex Unoccupied Cing Temp.	77 °F	Ex Unoccupied Htg Temp.	66 °F
Linear Feet of Door Edge	220	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb	Electricity	\$ 0.13 \$/kWh
Existing Infiltration Factor*	0.53 cfm/LF	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb	Natural Gas	\$ 1.41 \$/therm
Proposed Infiltration Factor*	0.20 cfm/LF				

*Infiltration Factor per Carrier Handbook of Air Conditioning System Design
based on average door seal gap calculated below.

Avg Outdoor Air Temp. Bins °F	A	EXISTING LOADS			PROPOSED LOADS			COOLING ENERGY			HEATING ENERGY								
		Existing Equipment Bin		Unoccupied Equipment Bin Hours	Occupied		Unoccupied	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms								
		B	C		E	F						G	H	I	J	K	L		
Avg Outdoor Air Enthalpy																			
102.5	49.1	0	0	0	-11,340	-11,340	-4,277	-4,277	0	0	0	0	0	0	0	0	0	0	0
97.5	42.5	9	2	7	-7,875	-7,875	-2,970	-2,970	7	7	3	3	0	0	0	0	0	0	0
92.5	39.5	69	16	53	-6,300	-6,300	-2,376	-2,376	42	42	16	16	0	0	0	0	0	0	0
87.5	36.6	132	31	101	-4,778	-4,778	-1,802	-1,802	61	61	23	23	0	0	0	0	0	0	0
82.5	34.0	344	82	262	-3,413	-3,413	-1,287	-1,287	114	114	43	43	0	0	0	0	0	0	0
77.5	31.6	566	135	431	-2,153	-2,153	-812	-812	119	119	45	45	0	0	0	0	0	0	0
72.5	29.2	755	180	575	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67.5	27.0	780	186	594	189	0	71	0	0	0	0	0	0	0	0	0	0	0	0
62.5	24.5	889	212	677	819	315	309	119	0	0	0	0	0	0	0	0	0	0	0
57.5	21.4	742	177	565	1,449	945	546	356	0	0	0	0	0	0	0	0	0	0	0
52.5	18.7	627	149	478	2,079	1,575	784	594	0	0	0	0	0	0	0	0	0	0	0
47.5	16.2	725	173	552	2,709	2,205	1,022	832	0	0	0	0	0	0	0	0	0	0	0
42.5	14.4	795	189	606	3,339	2,835	1,259	1,069	0	0	0	0	0	0	0	0	0	0	0
37.5	12.6	784	187	597	3,969	3,465	1,497	1,307	0	0	0	0	0	0	0	0	0	0	0
32.5	10.7	682	162	520	4,599	4,095	1,734	1,544	0	0	0	0	0	0	0	0	0	0	0
27.5	8.6	345	82	263	5,229	4,725	1,972	1,782	0	0	0	0	0	0	0	0	0	0	0
22.5	6.8	229	55	174	5,859	5,355	2,210	2,020	0	0	0	0	0	0	0	0	0	0	0
17.5	5.5	189	45	144	6,489	5,985	2,447	2,257	0	0	0	0	0	0	0	0	0	0	0
12.5	4.1	70	17	53	7,119	6,615	2,685	2,495	0	0	0	0	0	0	0	0	0	0	0
7.5	2.6	20	5	15	7,749	7,245	2,922	2,732	0	0	0	0	0	0	0	0	0	0	0
2.5	1.0	8	2	6	8,379	7,875	3,160	2,970	0	0	0	0	0	0	0	0	0	0	0
-2.5	0.0	0	0	0	9,009	8,505	3,398	3,208	0	0	0	0	0	0	0	0	0	0	0
-7.5	-1.5	0	0	0	9,639	9,135	3,635	3,445	0	0	0	0	0	0	0	0	0	0	0
TOTALS		8,760	2,086	5,674			344	130	195		73								

Existing Door Infiltration	117 cfm	Savings	121 therms	\$ 171
Existing Unoccupied Door Infiltration	117 cfm		214 kWh	\$ 31
Proposed Door Infiltration	44 cfm			\$ 203
Proposed Unoccupied Door Infiltration	44 cfm			

Door	Width (ft)	Height (ft)	Linear Feet (LF)	gap location	LF of gap	% door w/ gap	Average gap for door (in)	Location
1a	3	7	20	bottom/seam	10	50%	0.25	Courtroom
1b	3	7	20	bottom/seam	10	50%	0.25	Courtroom
2a	3	7	20	all sides	20	100%	0.25	Main municipal
2b	3	7	20	all sides	20	100%	0.25	Main municipal
3	3	7	20	all sides	20	100%	0.125	Main municipal
4	3	7	20	all sides	20	100%	0.125	Main municipal
5	3	7	20	all sides	20	100%	0.125	Municipal front
6	3	7	20	all sides	20	100%	0.125	Municipal front
7	3	7	20	all sides	20	100%	0.125	Breezway
8	3	7	20	all sides	20	100%	0.125	Municipal rear
9	3	7	20	all sides	20	100%	0.125	Police Sliding
Total	33	77	220		200	91%	0.182	

Note: Doors labeled 'a', 'b', etc. are a part of the same door assembly.

\$	1,033	Subtotal
\$	52	5% Contingency
		Contractor
\$	54	5% O&P
\$	-	0% Engineering
\$	1,139	Total

APPENDIX K

ECM-9 Replace Domestic Hot Water Heater – Police

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-9: Replace DHW Heater - Police

Summary

* Replace 100 Gal Gas-Fired DHW Heater w/ Tankless, Condensing, Gas-Fired DHW Heater

Item	Value	Units	Formula/Comments
Avg. Monthly Utility Demand by Water Heater	96	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	115,555	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	92,444	MBTU/yr	
Existing Tank Size	100	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	15	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	120	°F	Per building personnel
Room Temperature	70	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,494	MBTU/yr	
New Tank Size	0	Gallons	
Hot Water Piping System Capacity	15	Gallons	Based on Takagi Flash T-H1 tankless, condensing DHW Heater
Hot Water Temperature	120	°F	Estimated Per existing system (includes HWR piping)
Room Temperature	70	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.2	MBH	
Annual Standby Hot Water Load	1,369	MBTU/yr	
Total Annual Hot Water Demand	83,319	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		
Proposed Fuel Use	909	Therms	Based on Takagi Flash T-H1 tankless, condensing DHW Heater Standby Losses and inefficient DHW heater eliminated
Utility Cost	\$1.41	\$/Therm	
Existing Operating Cost of DHW	\$1,632	\$/yr	
Proposed Operating Cost of DHW	\$1,283	\$/yr	

Savings Summary:

Utility	Energy Savings	Cost Savings
Therms/yr	247	\$349

Township of Long Beach
CHA #22349
Building: Municipal Complex

ECM-9: Replace DHW Heater - Police

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Electric DHW Heater Removal	1	LS		\$ 50		\$ -	\$ 61	\$ -	\$ 61	
Tankless Gas-Fired DHW Heater	1	EA	\$ 1,200	\$ 280		\$ 1,176	\$ 339	\$ -	\$ 1,515	
Miscellaneous Electrical	1	LS	\$ 50	\$ 100		\$ 49	\$ 121	\$ -	\$ 170	
Venting	10	LF	\$ 5.50	\$ 6.70		\$ 54	\$ 81	\$ -	\$ 135	PVC Piping
Miscellaneous Piping and Valves	1	LS	\$ 250	\$ 300		\$ 245	\$ 363	\$ -	\$ 608	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 2,488	Subtotal
\$ 249	10% Contingency
\$ 274	10% Contractor O&P
\$ -	0% Engineering
\$ 3,011	Total

New Jersey Smart Start Incentive Program	QTY	UNIT	\$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
Tankless Water Heater	1	EA	\$300	\$300	\$ 1,515	\$ 1,215
				\$300	\$1,515	\$1,215

Total ECM Cost w/ Incentives	\$2,711
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APPENDIX L

ECM-10 Lighting Replacements

Cost of Electricity: \$0.133 \$/kWh
\$5.74 \$/kW

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
Area Description		No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback				
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered				
1	Municipal - Court Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2,500	310	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Breezeway	8	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	SW	2500	1,200	8	2T 17 R F 2 (ELE)	F22ILL	33	0.3	SW	2,500	660	540	0.2	\$ 86.74	\$ 810.00	\$0	9.3	9.3				
1	Municipal - Main Vestibule	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2500	465	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2,500	465	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Construction/Inspections & Zoning Dept.	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2,125	2,618	- 0.0	\$ -	\$ -	\$0							
1	Municipal - Construction/Inspections & Zoning Dept.	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2125	66	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2,125	66	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Construction/Inspections & Zoning Dept.	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	383	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	SW	2,125	210	172	0.1	\$ 28.48	\$ 303.75	\$0	10.7	10.7				
7	Municipal - Main Hallway	32	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	1.9	SW	2500	4,800	32	2T 17 R F 2 (ELE)	F22ILL	33	1.1	SW	2,500	2,640	2,160	0.9	\$ 346.96	\$ 3,240.00	\$0	9.3	9.3				
18	Municipal - Building Maintenance	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2,125	714	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Storage/Office	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	383	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	SW	2,125	210	172	0.1	\$ 28.48	\$ 303.75	\$0	10.7	10.7				
18	Municipal - Assessor	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,125	1,428	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Men's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,250	504	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Women's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,250	504	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Break Room	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2,125	952	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Payments Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2,125	1,904	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Single Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,125	476	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Meeting Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2000	224	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2,000	224	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Revenue & Finance	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,125	1,428	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Single Office	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,125	1,428	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Clerk	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2,125	1,428	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,125	476	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Large Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2,125	952	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Large Office	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2125	128	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,125	70	57	0.0	\$ 9.49	\$ 101.25	\$0	10.7	10.7				
18	Municipal - Land Use Board Office 1	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2,125	952	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Land Use Board	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,125	476	- 0.0	\$ -	\$ -	\$0							
1	Municipal - Back Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2,500	310	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Secretary	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,125	476	- 0.0	\$ -	\$ -	\$0							
18	Municipal - Copy Room	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2,125	476	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Janitors Closet	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	500	30	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	500	17	14	0.0	\$ 3.66	\$ 101.25	\$0	27.7	27.7				
18	Municipal - Mayor	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2,125	952	- 0.0	\$ -	\$ -	\$0							
13	Municipal - Stairwell Back	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2500	300	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2,500	300	- 0.0	\$ -	\$ -	\$0							
7	Municipal - Stairwell Back	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2500	150	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,500	83	68	0.0	\$ 10.84	\$ 101.25	\$0	9.3	9.3				
7	Municipal - Hallway	6	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.4	SW	2500	900	6	2T 17 R F 2 (ELE)	F22ILL	33	0.2	SW	2,500	495	405	0.2	\$ 65.06	\$ 607.50	\$0	9.3	9.3				
13	Municipal - Commissioner Public Works	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	255	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2,125	255	- 0.0	\$ -	\$ -	\$0							
1	Municipal - Commissioner Public Works	3	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	1062.5	99	3	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	1,063	99	- 0.0	\$ -	\$ -	\$0							
13	Municipal - Public Works Administration	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2125	383	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2,125	383	- 0.0	\$ -	\$ -	\$0							
1	Municipal - Public Works Administration	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	1062.5	66	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	1,063	66	- 0.0	\$ -	\$ -	\$							

Cost of Electricity: \$0.133 \$/kWh
\$5.74 \$/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Area Description		No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name; Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
11	Police - Womens Restroom	2	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	2250	324	2	C 28 P F 2	F42SSILL	48	0.1	SW	2,250	216	108	0.0	\$ 17.68	\$ 212.50	\$30	12.0	10.3
1	Police - Womens Restroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2250	70	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2,250	70	-	0.0	\$ -	\$ -	\$0		
11	Police - Stairwell	3	S 34 P F 2 (MAG)	F42EE	72	0.2	SW	2500	540	3	C 28 P F 2	F42SSILL	48	0.1	SW	2,500	360	180	0.1	\$ 28.91	\$ 318.75	\$45	11.0	9.5
11	Police - Detectives Office	6	S 34 P F 2 (MAG)	F42EE	72	0.4	SW	3285	1,419	6	C 28 P F 2	F42SSILL	48	0.3	SW	3,285	946	473	0.1	\$ 72.87	\$ 637.50	\$90	8.7	7.5
246	Police - Lieutenants Office	4	T 40 R F 3 (MAG)	F43SE	136	0.5	SW	3285	1,787	4	T 28 R F 3	F43SSILL	72	0.3	SW	3,285	946	841	0.3	\$ 129.55	\$ 513.00	\$60	4.0	3.5
4	Police - Womens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2250	162	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,250	74	88	0.0	\$ 14.36	\$ 101.25	\$15	7.0	6.0
4	Police - Mens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2250	162	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	SW	2,250	74	88	0.0	\$ 14.36	\$ 101.25	\$15	7.0	6.0
11	Police - Captains Office	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946	4	C 28 P F 2	F42SSILL	48	0.2	SW	3,285	631	315	0.1	\$ 48.58	\$ 425.00	\$60	8.7	7.5
11	Police - Storage Room	1	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	36	1	C 28 P F 2	F42SSILL	48	0.0	SW	500	24	12	0.0	\$ 3.25	\$ 106.25	\$15	32.7	28.1
11	Police - Server/Copy Room	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2125	612	4	C 28 P F 2	F42SSILL	48	0.2	SW	2,125	408	204	0.1	\$ 33.76	\$ 425.00	\$60	12.6	10.8
11	Police - Officers Office	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946	4	C 28 P F 2	F42SSILL	48	0.2	SW	3,285	631	315	0.1	\$ 48.58	\$ 425.00	\$60	8.7	7.5
11	Police - Hallway	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2500	720	4	C 28 P F 2	F42SSILL	48	0.2	SW	2,500	480	240	0.1	\$ 38.55	\$ 425.00	\$60	11.0	9.5
11	Police - Storage	1	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	36	1	C 28 P F 2	F42SSILL	48	0.0	SW	500	24	12	0.0	\$ 3.25	\$ 106.25	\$15	32.7	28.1
11	Police - Deputy Chief	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946	4	C 28 P F 2	F42SSILL	48	0.2	SW	3,285	631	315	0.1	\$ 48.58	\$ 425.00	\$60	8.7	7.5
11	Police - Interview Room	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2000	576	4	C 28 P F 2	F42SSILL	48	0.2	SW	2,000	384	192	0.1	\$ 32.16	\$ 425.00	\$60	13.2	11.3
246	Police - Chief's Office	4	T 40 R F 3 (MAG)	F43SE	136	0.5	SW	3285	1,787	4	T 28 R F 3	F43SSILL	72	0.3	SW	3,285	946	841	0.3	\$ 129.55	\$ 513.00	\$60	4.0	3.5
11	Police - Stairwell 2	3	S 34 P F 2 (MAG)	F42EE	72	0.2	SW	2500	540	3	C 28 P F 2	F42SSILL	48	0.1	SW	2,500	360	180	0.1	\$ 28.91	\$ 318.75	\$45	11.0	9.5
78	Police - Exterior	2	EP 1 100	1100/1	100	0.2	Timer	4380	876	2	CF 26	CFQ26/1-L	27	0.1	Timer	4,380	237	639	0.1	\$ 95.16	\$ 40.50	\$14	0.4	0.3
143	Police - Exterior	7	HPS 100 POLE	HPS100/1	138	1.0	Timer	4380	4,231	7	HPS 100 POLE	HPS100/1	138	1.0	Timer	4,380	4,231	-	0.0	\$ -	\$ -	\$0		
144	Police - Exterior	2	HPS 150	HPS150/1	188	0.4	Timer	4380	1,647	2	HPS 150	HPS150/1	188	0.4	Timer	4,380	1,647	-	0.0	\$ -	\$ -	\$0		
142	Police - Exterior	1	MH 100	MH100/1	128	0.1	Timer	4380	561	1	MH 100	MH100/1	128	0.1	Timer	4,380	561	-	0.0	\$ -	\$ -	\$0		
162	Police - Lab Outbuilding	6	S 34 C F 4 (MAG)	F44EE	144	0.9	SW	1040	899	6	S 28 C F 4	F44SSILL	96	0.6	SW	1,040	599	300	0.3	\$ 59.69	\$ 850.50	\$0	14.2	14.2
11	Police - Electric Room	2	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	72	2	C 28 P F 2	F42SSILL	48	0.1	SW	500	48	24	0.0	\$ 6.50	\$ 212.50	\$30	32.7	28.1
237	Complex - Parking lot / Site Lighting	23	WP 400 Po HPS	hps400/1	465	10.7	Photocell	4380	46,844	23	WP 400 Po HPS	hps400/1	465	10.7	Photocell	4,380	46,844	-	0.0	\$ -	\$ -	\$0		
27	Complex - EXIT Signs	12	XX 7 CF 2	ECF7/2	21	0.3	Breaker	8760	2,208	12	X 1.5C LED	ELED1.5/2	3	0.0	Breaker	8,760	315	1,892		\$ 266.71	\$ 1,539.00	\$240	5.8	4.9
Total		467				45.7			136,641	467			7,575	37.7			113,885	22,756	7.7	\$3,577	\$27,400	\$2,885		
																				8.0	\$548			
																				22,756	\$3,029			
																					\$3,577		7.7	6.9

APPENDIX M

ECM-11 Install Occupancy Sensors

Cost of Electricity: \$0.133 \$/kWh
\$5.74 \$/kWh

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kWh Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback				
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kWh) - (Retrofit Annual kWh)	(kW Saved) * (\$/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered				
1	Municipal - Court Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310.0	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	None	2500	310.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
7	Municipal - Breezeway	8	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	SW	2500	1,200.0	8	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	None	2500	1,200.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
1	Municipal - Main Vestibule	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2500	465.0	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	None	2500	465.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
18	Municipal - Construction/Inspections & Zoning Dept.	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618.0	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	C-CCC	1200	1,478.4	1,139.6	0.0	\$151.68								
1	Municipal - Construction/Inspections & Zoning Dept.	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2125	65.9	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	C-CCC	1200	37.2	28.7	0.0	\$3.82	\$405.00	\$35.00	2.3	2.1				
7	Municipal - Construction/Inspections & Zoning Dept.	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	382.5	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	C-CCC	1200	216.0	166.5	0.0	\$22.16								
7	Municipal - Main Hallway	32	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	1.9	SW	2500	4,800.0	32	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	1.9	None	2500	4,800.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
18	Municipal - Building Maintenance	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714.0	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	CCC	1200	403.2	310.8	0.0	\$41.37	\$237.50	\$20.00	5.7	5.3				
7	Municipal - Storage/Office	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	382.5	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	CCC	1200	216.0	166.5	0.0	\$22.16	\$237.50	\$20.00	10.7	9.8				
18	Municipal - Assessor	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428.0	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1200	806.4	621.6	0.0	\$82.74	\$237.50	\$20.00	2.9	2.6				
18	Municipal - Men's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	C-CCC	1000	224.0	280.0	0.0	\$37.27	\$405.00	\$35.00	10.9	9.9				
18	Municipal - Women's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	C-CCC	1000	224.0	280.0	0.0	\$37.27	\$405.00	\$35.00	10.9	9.9				
18	Municipal - Break Room	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1200	537.6	414.4	0.0	\$55.16	\$237.50	\$20.00	4.3	3.9				
18	Municipal - Payments Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904.0	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	CCC	1200	1,075.2	828.8	0.0	\$110.31	\$237.50	\$20.00	2.2	2.0				
18	Municipal - Single Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1200	268.8	207.2	0.0	\$27.58	\$237.50	\$20.00	8.6	7.9				
18	Municipal - Meeting Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2000	224.0	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	CCC	1000	112.0	112.0	0.0	\$14.91	\$237.50	\$20.00	15.9	15.9				
18	Municipal - Revenue & Finance	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428.0	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1200	806.4	621.6	0.0	\$82.74	\$237.50	\$20.00	2.9	2.6				
18	Municipal - Single Office	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428.0	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1200	806.4	621.6	0.0	\$82.74	\$237.50	\$20.00	2.9	2.6				
18	Municipal - Clerk	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428.0	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1200	806.4	621.6	0.0	\$82.74	\$237.50	\$20.00	2.9	2.6				
18	Municipal - Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1200	268.8	207.2	0.0	\$27.58	\$237.50	\$20.00	8.6	7.9				
18	Municipal - Large Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1200	537.6	414.4	0.0	\$55.16	\$237.50	\$20.00	4.3	3.9				
7	Municipal - Large Office	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2125	127.5	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	CCC	1200	72.0	55.5	0.0	\$7.39	\$237.50	\$20.00	3.8	3.5				
18	Municipal - Land Use Board Office 1	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1200	537.6	414.4	0.0	\$55.16	\$237.50	\$20.00	4.3	3.9				
18	Municipal - Land Use Board	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1200	268.8	207.2	0.0	\$27.58	\$237.50	\$20.00	8.6	7.9				
1	Municipal - Back Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310.0	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	None	2500	310.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
18	Municipal - Secretary	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1200	268.8	207.2	0.0	\$27.58	\$237.50	\$20.00	8.6	7.9				
18	Municipal - Copy Room	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476.0	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1000	224.0	252.0	0.0	\$33.54	\$237.50	\$20.00	7.1	6.5				
7	Municipal - Janitors Closet	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	500	30.0	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	500	30.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
18	Municipal - Mayor	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	952.0	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1200	537.6	414.4	0.0	\$55.16	\$237.50	\$20.00	4.3	3.9				
13	Municipal - Stairwell Back	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2500	300.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	None	2500	300.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
7	Municipal - Stairwell Back	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2500	150.0	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	None	2500	150.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
7	Municipal - Hallway	6	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.4	SW	2500	900.0	6	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.4	None	2500	900.0	0.0	0.0	\$0.00	\$0.00	\$0.00						
13	Municipal - Commissioner Public Works	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	255.0	2	S 32 P F 2 (ELE)	F42LL	60	0.1	CCC	1200	144.0	111.0	0.0	\$14.77	\$237.50							

Cost of Electricity: \$0.133 \$/kWh
\$5.74 \$/kW

		EXISTING CONDITIONS										RETROFIT CONDITIONS							COST & SAVINGS ANALYSIS						
Area Description		No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fix) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fix) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * (\$/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered	
11	Police - Mens Restroom	2	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	2250	324.0	2	S 34 P F 2 (MAG)	F42EE	72	0.1	C-CCC	1000	144.0	180.0	0.0	\$23.96	\$405.00	\$35.00	13.9	12.7	
1	Police - Mens Restroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2250	69.8	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	C-CCC	1000	31.0	38.8	0.0	\$5.16					
11	Police - Womens Restroom	2	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	2250	324.0	2	S 34 P F 2 (MAG)	F42EE	72	0.1	C-CCC	1000	144.0	180.0	0.0	\$23.96	\$405.00	\$35.00	13.9	12.7	
1	Police - Womens Restroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2250	69.8	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	C-CCC	1000	31.0	38.8	0.0	\$5.16					
11	Police - Stairwell	3	S 34 P F 2 (MAG)	F42EE	72	0.2	SW	2500	540.0	3	S 34 P F 2 (MAG)	F42EE	72	0.2	None	2500	540.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
11	Police - Detectives Office	6	S 34 P F 2 (MAG)	F42EE	72	0.4	SW	3285	1,419.1	6	S 34 P F 2 (MAG)	F42EE	72	0.4	CCC	1825	788.4	630.7	0.0	\$83.95	\$237.50	\$20.00	2.8	2.6	
246	Police - Lieutenants Office	4	T 40 R F 3 (MAG)	F43SE	136	0.5	SW	3285	1,787.0	4	T 40 R F 3 (MAG)	F43SE	136	0.5	CCC	1825	992.8	794.2	0.0	\$105.71	\$237.50	\$20.00	2.2	2.1	
4	Police - Womens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2250	162.0	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	None	2250	162.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
4	Police - Mens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2250	162.0	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	None	2250	162.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
11	Police - Captains Office	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946.1	4	S 34 P F 2 (MAG)	F42EE	72	0.3	CCC	1825	525.6	420.5	0.0	\$55.97	\$237.50	\$20.00	4.2	3.9	
11	Police - Storage Room	1	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	36.0	1	S 34 P F 2 (MAG)	F42EE	72	0.1	None	500	36.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
11	Police - Server/Copy Room	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2125	612.0	4	S 34 P F 2 (MAG)	F42EE	72	0.3	CCC	1825	525.6	86.4	0.0	\$11.50	\$237.50	\$20.00	20.7	18.9	
11	Police - Officers Office	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946.1	4	S 34 P F 2 (MAG)	F42EE	72	0.3	CCC	1000	288.0	658.1	0.0	\$87.58	\$237.50	\$20.00	2.7	2.5	
11	Police - Hallway	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2500	720.0	4	S 34 P F 2 (MAG)	F42EE	72	0.3	None	2500	720.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
11	Police - Storage	1	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	36.0	1	S 34 P F 2 (MAG)	F42EE	72	0.1	None	500	36.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
11	Police - Deputy Chief	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	3285	946.1	4	S 34 P F 2 (MAG)	F42EE	72	0.3	CCC	1825	525.6	420.5	0.0	\$55.97	\$237.50	\$20.00	4.2	3.9	
11	Police - Interview Room	4	S 34 P F 2 (MAG)	F42EE	72	0.3	SW	2000	576.0	4	S 34 P F 2 (MAG)	F42EE	72	0.3	CCC	1000	288.0	288.0	0.0	\$38.33	\$237.50	\$20.00	6.2	5.7	
246	Police - Chief's Office	4	T 40 R F 3 (MAG)	F43SE	136	0.5	SW	3285	1,787.0	4	T 40 R F 3 (MAG)	F43SE	136	0.5	CCC	1825	992.8	794.2	0.0	\$105.71	\$237.50	\$20.00	2.2	2.1	
11	Police - Stairwell 2	3	S 34 P F 2 (MAG)	F42EE	72	0.2	SW	2500	540.0	3	S 34 P F 2 (MAG)	F42EE	72	0.2	None	2500	540.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
78	Police - Exterior	2	EP 1 100	I100/1	100	0.2	Timer	4380	876.0	2	EP 1 100	I100/1	100	0.2	None	4380	876.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
143	Police - Exterior	7	HPS 100 POLE	HPS100/1	138	1.0	Timer	4380	4,231.1	7	HPS 100 POLE	HPS100/1	138	1.0	None	4380	4,231.1	0.0	0.0	\$0.00	\$0.00	\$0.00			
144	Police - Exterior	2	HPS 150	HPS150/1	188	0.4	Timer	4380	1,646.9	2	HPS 150	HPS150/1	188	0.4	None	4380	1,646.9	0.0	0.0	\$0.00	\$0.00	\$0.00			
142	Police - Exterior	1	MH 100	MH100/1	128	0.1	Timer	4380	560.6	1	MH 100	MH100/1	128	0.1	None	4380	560.6	0.0	0.0	\$0.00	\$0.00	\$0.00			
162	Police - Lab Outbuilding	6	S 34 C F 4 (MAG)	F44EE	144	0.9	SW	1040	898.8	6	S 34 C F 4 (MAG)	F44EE	144	0.9	CCC	780	673.9	224.6	0.0	\$29.90	\$237.50	\$20.00	7.9	7.3	
11	Police - Electric Room	2	S 34 P F 2 (MAG)	F42EE	72	0.1	SW	500	72.0	2	S 34 P F 2 (MAG)	F42EE	72	0.1	None	500	72.0	0.0	0.0	\$0.00	\$0.00	\$0.00			
237	Complex - Parking lot / Site Lighting	23	WP 400 Po HPS	hps400/1	465	10.7	Photocell	4380	46,844.1	23	WP 400 Po HPS	hps400/1	465	10.7	None	4380	46,844.1	0.0	0.0	\$0.00	\$0.00	\$0.00			
27	Complex - EXIT Signs	12	XX 7 CF 2	ECF7/2	21	0.3	Breaker	8760	2,207.5	12	XX 7 CF 2	ECF7/2	21	0.3	None	8760	2,207.5	0.0	0.0	\$0.00	\$0.00	\$0.00			
Total		467				45.7			136,641	467				46			112,244	24,397	0	\$3,247	\$13,690	1,020			
																				0.0	\$0				
																				24,397	\$3,247				
																				\$3,247			4.2	3.9	

APPENDIX N

ECM-12 Lighting Replacements with Occupancy Sensors

Field Code	Area Description	EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS									
		No. of Fixtures before retrofit	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kWh Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback							
Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fix) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fix) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	Original Annual kWh - (Retrofit Annual kWh)	Original Annual kWh - (Retrofit Annual kWh)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered								
1	Municipal - Court Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	None	2,500	310	- 0.0	\$ -	\$ -	\$ -	-	-	-							
7	Municipal - Breezeway	8	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	SW	2500	1,200	8	2T 17 R F 2 (ELE)	F22ILL	33	0.3	None	2,500	660	540 0.2	\$ 86.74	\$ 810.00	\$ -	-	9.3	9.3							
1	Municipal - Main Vestibule	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2500	465	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	None	2,500	465	- 0.0	\$ -	\$ -	\$ -	-	-	-							
18	Municipal - Construction/Inspections & Zoning Dept.	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	SW	2125	2,618	11	T 32 R F 4 (ELE)	F44ILL	112	1.2	C-CCC	1,200	1,478	1,140 0.0	\$ 151.68	\$ 405.00	\$ -	35	2.7	2.4							
1	Municipal - Construction/Inspections & Zoning Dept.	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2125	66	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	C-CCC	1,200	37	29 0.0	\$ 3.82	\$ -	\$ -	-	0.0	0.0							
7	Municipal - Construction/Inspections & Zoning Dept.	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	363	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	C-CCC	1,200	119	264 0.1	\$ 40.67	\$ 303.75	\$ -	-	7.5	7.5							
7	Municipal - Main Hallway	32	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	1.9	SW	2500	4,800	32	2T 17 R F 2 (ELE)	F22ILL	33	1.1	None	2,500	2,640	2,160 0.9	\$ 346.96	\$ 3,240.00	\$ -	-	9.3	9.3							
18	Municipal - Building Maintenance	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	SW	2125	714	3	T 32 R F 4 (ELE)	F44ILL	112	0.3	CCC	1,200	403	311 0.0	\$ 41.37	\$ 237.50	\$ 20	5.7	5.3								
7	Municipal - Storage Office	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2125	363	3	2T 17 R F 2 (ELE)	F22ILL	33	0.1	CCC	1,200	119	264 0.1	\$ 40.67	\$ 541.25	\$ 20	13.3	12.8								
18	Municipal - Assessor	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1,200	806	622 0.0	\$ 82.74	\$ 237.50	\$ 20	2.9	2.6								
18	Municipal - Men's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	C-CCC	1,000	224	280 0.0	\$ 37.27	\$ 405.00	\$ 35	10.9	9.9								
18	Municipal - Women's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2250	504	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	C-CCC	1,000	224	280 0.0	\$ 37.27	\$ 405.00	\$ 35	10.9	9.9								
18	Municipal - Break Room	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	962	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1,200	538	414 0.0	\$ 55.16	\$ 237.50	\$ 20	4.3	3.9								
18	Municipal - Payments Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	SW	2125	1,904	8	T 32 R F 4 (ELE)	F44ILL	112	0.9	CCC	1,200	1,075	829 0.0	\$ 110.31	\$ 237.50	\$ 20	2.2	2.0								
18	Municipal - Single Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1,200	269	207 0.0	\$ 27.58	\$ 237.50	\$ 20	8.6	7.9								
18	Municipal - Meeting Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	SW	2000	224	1	T 32 R F 4 (ELE)	F44ILL	112	0.1	CCC	1,000	112	112 0.0	\$ 14.91	\$ 237.50	\$ -	-	15.9	15.9							
18	Municipal - Revenue & Finance	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1,200	806	622 0.0	\$ 82.74	\$ 237.50	\$ 20	2.9	2.6								
18	Municipal - Single Office	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1,200	806	622 0.0	\$ 82.74	\$ 237.50	\$ 20	2.9	2.6								
18	Municipal - Clerk	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	SW	2125	1,428	6	T 32 R F 4 (ELE)	F44ILL	112	0.7	CCC	1,200	806	622 0.0	\$ 82.74	\$ 237.50	\$ 20	2.9	2.6								
18	Municipal - Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1,200	269	207 0.0	\$ 27.58	\$ 237.50	\$ 20	8.6	7.9								
18	Municipal - Large Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	962	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1,200	538	414 0.0	\$ 55.16	\$ 237.50	\$ 20	4.3	3.9								
7	Municipal - Large Office	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2125	128	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	CCC	1,200	40	88 0.0	\$ 13.56	\$ 101.25	\$ -	-	7.5	7.5							
18	Municipal - Land Use Board Office 1	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	962	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1,200	538	414 0.0	\$ 55.16	\$ 237.50	\$ 20	4.3	3.9								
18	Municipal - Land Use Board	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1,200	269	207 0.0	\$ 27.58	\$ 237.50	\$ 20	8.6	7.9								
1	Municipal - Back Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2500	310	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	None	2,500	310	- 0.0	\$ -	\$ -	\$ -	-	-	-							
18	Municipal - Secretary	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1,200	269	207 0.0	\$ 27.58	\$ 237.50	\$ 20	8.6	7.9								
18	Municipal - Copy Room	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	SW	2125	476	2	T 32 R F 4 (ELE)	F44ILL	112	0.2	CCC	1,000	224	252 0.0	\$ 33.54	\$ 237.50	\$ 20	7.1	6.5								
7	Municipal - Janitors Closet	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	500	30	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	None	500	17	14 0.0	\$ 3.66	\$ 101.25	\$ -	-	27.7	27.7							
18	Municipal - Mayor	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	SW	2125	962	4	T 32 R F 4 (ELE)	F44ILL	112	0.4	CCC	1,200	538	414 0.0	\$ 55.16	\$ 237.50	\$ 20	4.3	3.9								
13	Municipal - Stairwell Back	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2500	300	2	S 32 P F 2 (ELE)	F42LL	60	0.1	None	2,500	300	- 0.0	\$ -	\$ -	\$ -	-	-	-							
7	Municipal - Stairwell Back	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.1	SW	2500	150	1	2T 17 R F 2 (ELE)	F22ILL	33	0.0	None	2,500	83	68 0.0	\$ 10.84	\$ 101.25	\$ -	-	9.3	9.3							
7	Municipal - Hallway	6	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.4	SW	2500	900	6	2T 17 R F 2 (ELE)	F22ILL	33	0.2	None	2,500	495	405 0.2	\$ 65.06	\$ 607.50	\$ -	-	9.3	9.3							
13	Municipal - Commissioner Public Works	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2125	255	2	S 32 P F 2 (ELE)	F42LL	60	0.1	CCC	1,200	144	111 0.0	\$ 14.77	\$ 237.50	\$ -	-	16.1	16.1							
1	Municipal - Commissioner Public Works	3</																													

1/21/2011

APPENDIX O

New Jersey Pay For Performance Incentive Program

Township of Long Beach
CHA #22349
Building: Municipal Complex

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2010. Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governments or non-profit organizations. Values used in this calculation are for measures with a positive return on investment (ROI) only.

Total Building Area (Square Feet)	27,275
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

Incentive #1		
Audit not funded by NJ BPU	\$0.10	\$/sqft
Audit is funded by NJ BPU	\$0.05	\$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$40,166	\$11,644
Existing Usage (from utility)	273,654	8,249
Proposed Savings	52,400	2,670
Existing Total MMBtus	1,759	
Proposed Savings MMBtus	446	
% Energy Reduction	25.3%	
Proposed Annual Savings	\$12,500	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	\$/kWh	\$/therm	\$/kWh	\$/therm	\$/kWh	\$/therm	\$/kWh	\$/therm
Incentive #2	\$0.11	\$1.10	\$0.005	\$0.05	\$0.13	\$1.45	\$0.13	\$1.45
Incentive #3	\$0.07	\$0.70	\$0.005	\$0.05	\$0.09	\$1.05	\$0.09	\$1.05

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$1,364
Incentive #2	\$6,812	\$3,872	\$10,684
Incentive #3	\$4,716	\$2,804	\$7,520
Total All Incentives	\$11,528	\$6,675	\$19,567

Total Project Cost	\$104,900
--------------------	-----------

		Allowable Incentive
% Incentives #1 of Utility Cost*	2.6%	\$1,364
% Incentives #2 of Project Cost**	10.2%	\$10,684
% Incentives #3 of Project Cost**	7.2%	\$7,520
Total Eligible Incentives***		\$19,567
Project Cost w/ Incentives		\$85,333

Project Payback (years)	
w/o Incentives	w/ Incentives
8.4	6.8

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 30% of total project cost.

Maximum allowable amount of Incentive #3 is 20% of total project cost.

*** Maximum allowable amount of Incentive #1 is \$50,000 if not funded by NJ BPU, and \$25,000 if it is.

Maximum allowable amount of Incentive #2 & #3 is \$1 million per gas account and \$1 million per electric account

APPENDIX P

Photovoltaic (PV) Rooftop Solar Power Generation

**Township of Long Beach
Municipal Complex**

Cost of Electricity \$0.147 /kWh
System Capacity 50.0 kW
System Unit Cost \$5,000 /kW

Photovoltaic (PV) Rooftop Solar Power Generation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	New Jersey Renewable * Energy Incentive	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
	kW	kWh	therms	\$						
\$250,000	0.0	62,520	0	\$9,200	0	\$9,200	\$22,500	\$30,400	27.2	5.7

*Incentive based on New Jersey renewable energy program for non-residential applications(PV)= \$0.75/W of installed PV system

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= \$487/1000kwh

Estimated Solar Renewable Energy Certificate Program (SREC) payments for 15 Years from RR Renewable Energy Consultants

Year	SREC
1	600
2	600
3	600
4	500
5	500
6	500
7	500
8	500
9	500
10	500
11	400
12	400
13	400
14	400
15	400
AVG	487



AC Energy & Cost Savings



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	50.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	38.5 kW
Array Type:	Fixed Tilt
Array Tilt:	39.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.7 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	3.61	4473	657.53
2	4.20	4659	684.87
3	4.78	5621	826.29
4	5.23	5773	848.63
5	5.44	6056	890.23
6	5.48	5664	832.61
7	5.55	5857	860.98
8	5.41	5775	848.93
9	5.23	5530	812.91
10	4.60	5171	760.14
11	3.59	4105	603.44
12	3.17	3832	563.30
Year	4.69	62516	9189.85

Output Hourly Performance Data

Output Results as Text

About the Hourly Performance Data

Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

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Cautions for Interpreting the Results

The monthly and yearly energy production are modeled using the PV system parameters you selected and weather data that are typical or representative of long-term averages. For reference, or comparison with local information, the solar radiation values modeled for the PV array are included in the performance results.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by $\pm 30\%$ for monthly values and $\pm 10\%$ for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors* (http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/).

For these variations and the uncertainties associated with the weather data and the model used to model the PV performance, future months and years may be encountered where the actual PV performance is less than or greater than the values shown in the table. The variations may be as much as 40% for individual months and up to 20% for individual years. Compared to long-term performance over many years, the values in the table are accurate to within 10% to 12%.

If the default overall DC to AC derate factor is used, the energy values in the table will overestimate the actual energy production if nearby buildings, objects, or other PV modules and array structure shade the PV modules; if tracking mechanisms for one- and two-axis tracking systems do not keep the PV arrays at the optimum orientation with respect to the sun's position; if soiling or snow cover related losses exceed 5%; or if the system performance has degraded from new. (PV performance typically degrades 1% per year.) If any of these situations exist, an overall DC to AC derate factor should be used with PVWATTS that was calculated using system specific component derate factors for *shading, sun-tracking, soiling, and age*.

The PV system size is the nameplate DC power rating. The energy production values in the table are valid only for crystalline silicon PV systems.

The cost savings are determined as the product of the number of kilowatt hours (kWh) and the cost of electricity per kWh. These cost savings occur if the owner uses all the electricity produced by the PV system, or if the owner has a net-metering agreement with the utility. With net-metering, the utility bills the owner for the net electricity consumed. When electricity flows from the utility to the owner, the meter spins forward. When electricity flows from the PV system to the utility, the meter spins backwards.

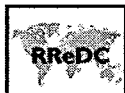
If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

Besides the cost savings shown in the table, other benefits of PV systems include greater energy independence and a reduction in fossil fuel usage and air pollution. For commercial customers, additional cost savings may come from reducing demand charges. Homeowners can often include the cost of the PV system in their home mortgage as a way of accommodating the PV system's initial cost.

To accelerate the use of PV systems, many state and local governments offer financial incentives and programs. Go to <http://www.nrel.gov/stateandlocal> for more information.

Please send questions and comments to Webmaster

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APPENDIX Q

Solar Thermal Domestic Hot Water Plant


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RENEWABLE ENERGY
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Solar Water Heating Calculator

Water heating is a major energy consumer. Although the energy consumed daily is often less than for air conditioning or heating, it is required year round, making it a good application of solar energy. Use this calculator to explore the energy usage of your water heater, and to estimate whether a solar water heater could save you money.

Water Heater Characteristics			
Physical		Thermal	
1.5 Diameter (feet)	1.5	50 Water Inlet Temperature (Degrees F)	50
40 Capacity (gallons)	40	70 Ambient Temperature (Degrees F)	70
17.79 Surface Area (calculated - sq ft)	17.79	120 Hot Water Temperature (Degrees F)	120
NaN Effective R-value	NaN	40 Hot Water Usage (Gallons per Day)	40
Energy Use			
957.8		Heat Delivered in Hot Water (BTU/hr)	
0		Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		Electric
0.8	Overall Efficiency	0.98
0.8	Conversion Efficiency	0.98
1197 BTU/hr	Power Into Water Heater	977.3 BTU/hr
Cost		
\$ 1.412 /Therm	Utility Rates	\$ 0.147 /kWh
\$ 148.058	Yearly Water Heating Cost	\$ 368.579
How Does Solar Compare?		
Solar Water Heater Cost: \$ 12200		Percentage Solar: 70
117.714 years for gas	Payback Time for Solar System	47.2857 years for electric

NJBPU Energy Audits
CHA #22349
Township of Long Beach
Municipal Offices

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Synergy Solar Thermal System	1	EA	\$ 2,400	\$ 1,200		\$ 2,352	\$ 1,452	\$ -	\$ 3,804	
Piping modifications	1	LS	\$ 1,500	\$ 2,000		\$ 1,470	\$ 2,420	\$ -	\$ 3,890	
Electrical modifications	1	LS	\$ 400	\$ 500		\$ 392	\$ 605	\$ -	\$ 997	
65 Gallon Storage Tank	1	EA	\$ 300	\$ 200		\$ 300	\$ 200	\$ -	\$ 500	
10 Gallon Drip Tank	1	EA	\$ 100	\$ 80		\$ 100	\$ 80	\$ -	\$ 180	
			\$ -	\$ -		\$ -	\$ -	\$ -	\$ -	

\$ 9,371	Subtotal
\$ 937	10% Contingency
\$ 937	10% Contractor O&P
\$ 937	10% Engineering
\$12,182	Total


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[Electric Power Pollution Calculator](#)
[PV System Economics](#)
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Solar Water Heating Calculator

Water heating is a major energy consumer. Although the energy consumed daily is often less than for air conditioning or heating, it is required year round, making it a good application of solar energy. Use this calculator to explore the energy usage of your water heater, and to estimate whether a solar water heater could save you money.

Water Heater Characteristics			
Physical		Thermal	
1.5 Diameter (feet)	1.5	50 Water Inlet Temperature (Degrees F)	50
100 Capacity (gallons)	100	70 Ambient Temperature (Degrees F)	70
39.18 Surface Area (calculated - sq ft)	39.18	120 Hot Water Temperature (Degrees F)	120
NaN Effective R-value	NaN	100 Hot Water Usage (Gallons per Day)	100
Energy Use			
2395		0 Heat Delivered in Hot Water (BTU/hr)	
0		0 Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		Electric
0.8	0.98 Overall Efficiency	0.98
0.8	0.98 Conversion Efficiency	0.98
2994 BTU/hr	2444 Power Into Water Heater	2444 BTU/hr
Cost		
\$ 1.412 /Therm	0.147 Utility Rates	\$ 0.147 /kWh
\$ 370.331	921.732 Yearly Water Heating Cost	\$ 921.732
How Does Solar Compare?		
12200 Solar Water Heater Cost: \$ 12200		70 Percentage Solar: 70
47.0620 years for gas	18.9084 Payback Time for Solar System	18.9084 years for electric

NJBPU Energy Audits
CHA #22349
Township of Long Beach
Police Department / Courthouse

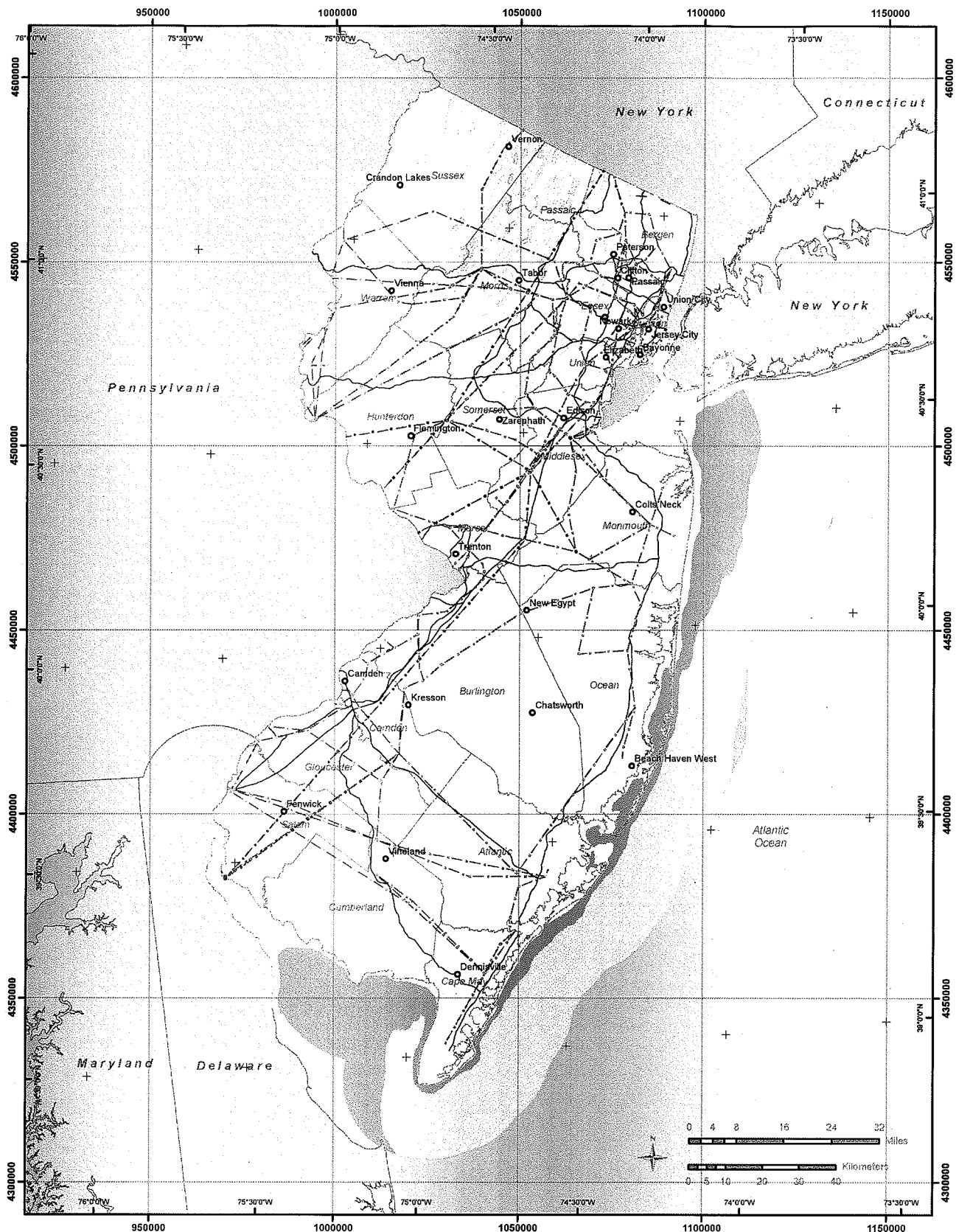
Multipliers		
	Material:	0.98
	Labor:	1.21
	Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Synergy Solar Thermal System	1	EA	\$ 2,400	\$ 1,200		\$ 2,352	\$ 1,452	\$ -	\$ 3,804	
Piping modifications	1	LS	\$ 1,500	\$ 2,000		\$ 1,470	\$ 2,420	\$ -	\$ 3,890	
Electrical modifications	1	LS	\$ 400	\$ 500		\$ 392	\$ 605	\$ -	\$ 997	
65 Gallon Storage Tank	1	EA	\$ 300	\$ 200		\$ 300	\$ 200	\$ -	\$ 500	
10 Gallon Drip Tank	1	EA	\$ 100	\$ 80		\$ 100	\$ 80	\$ -	\$ 180	
			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	

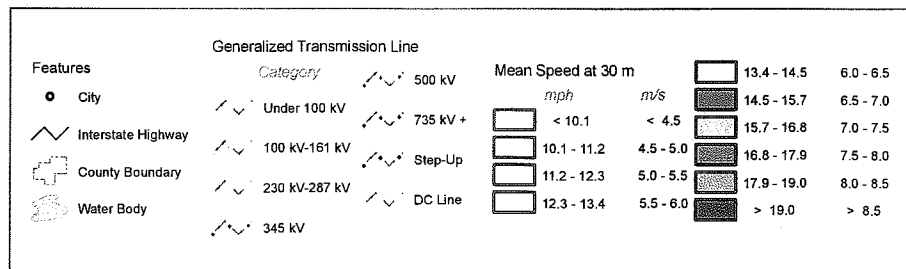
\$ 9,371	Subtotal
\$ 937	10% Contingency
\$ 937	10% Contractor O&P
\$ 937	10% Engineering
\$12,182	Total

APPENDIX R

Wind



Wind Resource of New Jersey Mean Annual Wind Speed at 30 Meters



AWS Truewind

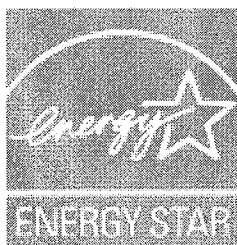
Projection: Transverse Mercator,
UTM Zone 17 WGS84

Spatial Resolution of Wind Resource Data: 200m
This map was created by AWS Truewind using the MesoMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.

The transmission line information was obtained by AWS Truewind from the Global Energy Decisions Velocity Suite. AWS does not warrant the accuracy of the transmission line information.

APPENDIX S

EPA Portfolio Manager



STATEMENT OF ENERGY PERFORMANCE

Long Beach Municipal Complex

Building ID: 2558215
 For 12-month Period Ending: October 31, 2010¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: January 20, 2011

Facility
 Long Beach Municipal Complex
 6805 Long Beach Blvd
 Brant Beach, NJ 08008

Facility Owner
 Township of Long Beach
 6805 Long Beach Blvd.
 Brant Beach, NJ 08008

Primary Contact for this Facility
 Angela Andersen
 6805 Long Beach Blvd.
 Brant Beach, NJ 08008

Year Built: 1992
Gross Floor Area (ft²): 27,275

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	933,801
Natural Gas (kBtu) ⁴	828,064
Total Energy (kBtu)	1,761,865

Energy Intensity⁵

Site (kBtu/ft ² /yr)	65
Source (kBtu/ft ² /yr)	146

Emissions (based on site energy use)
 Greenhouse Gas Emissions (MtCO₂e/year)

186

Electric Distribution Utility
 Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	-20%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards⁶ for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Certifying Professional
 N/A

Notes:

1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.

NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☒
Building Name	Long Beach Municipal Complex	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	6805 Long Beach Blvd, Brant Beach, NJ 08008	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Municipal Offices (Office)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☒
Gross Floor Area	16,680 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	40	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	40	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Police Department / Courthouse (Other)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☒

Gross Floor Area	10,595 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.	☐
Number of PCs	20(Optional)	Is this the number of personal computers in the space?	☐
Weekly operating hours	168Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.	☐
Workers on Main Shift	22(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.	☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: AC Electric 9566762 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/01/2010	10/31/2010	16,840.00
09/01/2010	09/30/2010	22,440.00
08/01/2010	08/31/2010	24,000.00
07/01/2010	07/31/2010	23,920.00
06/01/2010	06/30/2010	22,720.00
05/01/2010	05/31/2010	20,840.00
04/01/2010	04/30/2010	18,000.00
03/01/2010	03/31/2010	18,320.00
02/01/2010	02/28/2010	25,000.00
01/01/2010	01/31/2010	20,960.00
12/01/2009	12/31/2009	26,000.00
AC Electric 9566762 Consumption (kWh (thousand Watt-hours))		239,040.00
AC Electric 9566762 Consumption (kBtu (thousand Btu))		815,604.48
Meter: AC Electric 105727232 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/01/2010	10/31/2010	258.00
09/01/2010	09/30/2010	468.00
08/01/2010	08/31/2010	649.00
07/01/2010	07/31/2010	552.00
06/01/2010	06/30/2010	529.00
05/01/2010	05/31/2010	357.00
04/01/2010	04/30/2010	229.00
03/01/2010	03/31/2010	436.00
02/01/2010	02/28/2010	1,166.00
01/01/2010	01/31/2010	1,211.00
12/01/2009	12/31/2009	1,287.00
AC Electric 105727232 Consumption (kWh (thousand Watt-hours))		7,142.00
AC Electric 105727232 Consumption (kBtu (thousand Btu))		24,368.50

Meter: AC Electric 105728185 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/01/2010	10/31/2010	97.00
09/01/2010	09/30/2010	339.00
08/01/2010	08/31/2010	146.00
07/01/2010	07/31/2010	140.00
06/01/2010	06/30/2010	264.00
05/01/2010	05/31/2010	78.00
04/01/2010	04/30/2010	55.00
03/01/2010	03/31/2010	51.00
02/01/2010	02/28/2010	53.00
01/01/2010	01/31/2010	309.00
12/01/2009	12/31/2009	113.00
AC Electric 105728185 Consumption (kWh (thousand Watt-hours))		1,645.00
AC Electric 105728185 Consumption (kBtu (thousand Btu))		5,612.74
Meter: AC Electric 48487017 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/01/2010	10/31/2010	303.00
09/01/2010	09/30/2010	341.00
08/01/2010	08/31/2010	273.00
07/01/2010	07/31/2010	208.00
06/01/2010	06/30/2010	216.00
05/01/2010	05/31/2010	251.00
04/01/2010	04/30/2010	256.00
03/01/2010	03/31/2010	315.00
02/01/2010	02/28/2010	367.00
01/01/2010	01/31/2010	337.00
12/01/2009	12/31/2009	493.00
AC Electric 48487017 Consumption (kWh (thousand Watt-hours))		3,360.00
AC Electric 48487017 Consumption (kBtu (thousand Btu))		11,464.32
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		857,050.04
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐
Fuel Type: Natural Gas		
Meter: NJNG 316677 (ccf (hundred cubic feet)) Space(s): Entire Facility		
Start Date	End Date	Energy Use (ccf (hundred cubic feet))
10/01/2010	10/31/2010	84.43
09/01/2010	09/30/2010	38.57
08/01/2010	08/31/2010	52.05
07/01/2010	07/31/2010	56.13

06/01/2010	06/30/2010	72.69
05/01/2010	05/31/2010	98.06
04/01/2010	04/30/2010	198.87
03/01/2010	03/31/2010	418.52
02/01/2010	02/28/2010	844.27
01/01/2010	01/31/2010	1,041.08
12/01/2009	12/31/2009	497.88
11/01/2009	11/30/2009	246.95
NJNG 316677 Consumption (ccf (hundred cubic feet))		3,649.50
NJNG 316677 Consumption (kBtu (thousand Btu))		375,533.55
Meter: NJNG 114343 (ccf (hundred cubic feet)) Space(s): Entire Facility		
Start Date	End Date	Energy Use (ccf (hundred cubic feet))
10/01/2010	10/31/2010	129.69
09/01/2010	09/30/2010	63.29
08/01/2010	08/31/2010	60.09
07/01/2010	07/31/2010	108.63
06/01/2010	06/30/2010	108.53
05/01/2010	05/31/2010	155.76
04/01/2010	04/30/2010	309.41
03/01/2010	03/31/2010	520.70
02/01/2010	02/28/2010	1,028.41
01/01/2010	01/31/2010	1,219.32
12/01/2009	12/31/2009	495.59
11/01/2009	11/30/2009	206.40
NJNG 114343 Consumption (ccf (hundred cubic feet))		4,405.82
NJNG 114343 Consumption (kBtu (thousand Btu))		453,358.88
Total Natural Gas Consumption (kBtu (thousand Btu))		828,892.43
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility

Long Beach Municipal Complex
6805 Long Beach Blvd
Brant Beach, NJ 08008

Facility Owner

Township of Long Beach
6805 Long Beach Blvd.
Brant Beach, NJ 08008

Primary Contact for this Facility

Angela Andersen
6805 Long Beach Blvd.
Brant Beach, NJ 08008

General Information

Long Beach Municipal Complex	
Gross Floor Area Excluding Parking: (ft ²)	27,275
Year Built	1992
For 12-month Evaluation Period Ending Date:	October 31, 2010

Facility Space Use Summary

Municipal Offices		Police Department / Courthouse	
Space Type	Office	Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft ²)	16,680	Gross Floor Area(ft ²)	10,595
Weekly operating hours	40	Number of PCs*	20
Workers on Main Shift	40	Weekly operating hours*	168
Number of PCs	40	Workers on Main Shift*	22
Percent Cooled	50% or more		
Percent Heated	50% or more		

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 10/31/2010)	Baseline (Ending Date 10/31/2010)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft ²)	65	65	58	N/A	77
Source (kBtu/ft ²)	146	146	132	N/A	182
Energy Cost					
\$/year	\$ 48,408.15	\$ 48,408.15	\$ 43,649.76	N/A	\$ 57,700.12
\$/ft ² /year	\$ 1.77	\$ 1.77	\$ 1.60	N/A	\$ 2.11
Greenhouse Gas Emissions					
MtCO ₂ e/year	186	186	168	N/A	222
kgCO ₂ e/ft ² /year	7	7	6	N/A	8

More than 50% of your building is defined as Office. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Office. This building uses X% less energy per square foot than the CBECS national average for Office.

Notes:

- o - This attribute is optional.
- d - A default value has been supplied by Portfolio Manager.

APPENDIX T

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #22349
Township of Long Beach - Municipal Complex
Municipal Office Building

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
Hot Water Boiler	2	Weill McLain	Ultra-310	-	Heating / Natural Gas	310,000 Btuh input 289,000 Btuh output	Mech Room	Building	2005	19	Cast-Aluminum; Good Condition
Heating Hot Water Pump	2	Taco	0014-F1	-	Primary Loop Pump / Electric	1/8 HP; 3250 RPM	Mech Room	HHW boiler loop	2005	5	Good Condition
Heating Hot Water Pump	2	Bell & Gossett	80 Model 1.5x9.5 3.25	-	Secondary Loop Pump / Electric	2 HP; 1725 RPM; 78.5% EFF	Mech Room	HHW distribution loop	-	-	Fair Condition
AHU-1	1	Carrier	40RM-008--B611HC	3105X11655	HVAC / HHW & DX	2.4 HP supply fan	Mech Room	1st Flr NW	2005	15	Good Condition
AHU-2	1	Carrier	40RM-008--B611HC	3105X11636	HVAC / HHW & DX	2.4 HP supply fan	Mech Room	1st Flr NE	2005	15	Good Condition
AHU-3	1	Carrier	40RM-008--B611HC	3105X11646	HVAC / HHW & DX	2.4 HP supply fan	Mech Room	1st Flr SE	2005	15	Good Condition
AHU-4	1	Carrier	40RM-012--B611HC	2205X08510	HVAC / HHW & DX	2.4 HP supply fan	Mech Room	2nd Flr Offices	2005	15	Good Condition
AHU-6	1	Carrier	40RM-007--B611HC	1005X05375	HVAC / HHW & DX	2.4 HP supply fan	Mech Room	Multi-Purpose Rm	2005	15	Good Condition
Condenser-1	1	Carrier	38ARZ008--E501--	3805G30139	Cooling / Electric DX	7.5 Tons; 10.6 EER	Outside	AHU-1	2005	15	Good Condition
Condenser-2	1	Carrier	38ARZ008--E501--	3805G30141	Cooling / Electric DX	7.5 Tons; 10.6 EER	Outside	AHU-2	2005	15	Good Condition
Condenser-3	1	Carrier	38ARZ008--E501--	3805G30140	Cooling / Electric DX	7.5 Tons; 10.6 EER	Outside	AHU-3	2005	15	Good Condition
Condenser-4	1	Carrier	38ARZ012--E501--	3805G30112	Cooling / Electric DX	9.83 Tons; 10.3 EER	Outside	AHU-4	2005	15	Good Condition
Condenser-6	1	Carrier	38ARZ007--E501--	3805G30146	Cooling / Electric DX	5.75 Tons; 11.0 EER	Outside	AHU-6	2005	15	Good Condition
Mini-Split AC Indoor Unit	1	Fujitsu	ASU24CL	-	Cooling / Electric DX	2 Tons	-	-	-	-	Good Condition
Mini-Split AC Outdoor Unit	1	Fujitsu	AOU24CL	DDN 008192	Cooling / Electric DX	2 Tons	Outside	-	-	-	Good Condition
Air Compressor	1	General Air	LT29050A	LT290-09 16 07	Comp Air / Electric	1/2 HP; 1725 RPM; 50 PSI	Riser Room	Sprinkler Riser	2009	-	Good Condition
Domestic Hot Water Heater	1	A.O. Smith	GCVL 40 100	H07A109966	DHW / Natural Gas	40 Gallon; 40,000 Btuh	Mech Room	Building	2007	10	Good Condition
Elevator Motor	1	Dover	EP802C	EF4L25	Motor / Electric	20 HP; 69 Amps	Elevator Room	Elevator	1996	-	Good Condition
Exhaust Fan	1	Dayton	S55KZMPT-6804	-	Fan / Electric	1/4 HP; 1725 RPM	Mech Room	Mech Room	1996	6	Fair Condition

New Jersey BPU Energy Audit Program
CHA #22349
Township of Long Beach - Municipal Complex
Police Station and Courthouse

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
Hot Water Boiler	3	Well McLain	GV-6	-	Heating / Natural Gas	175,000 Btuh input 153,000 Btuh output	Mech Rooms	Building	2005	19	Cast-Iron; Good Condition
Heating Hot Water Pump	1	Armstrong Marathon Electric	HV B56B117D2011E K	-	Loop Pump / Electric	3/4 HP; 1725 RPM	Police Station Mech Room	Police Station HHW boiler loop	-	-	Fair Condition
Heating Hot Water Pump	1	Taco	007-F5	-	Loop Pump / Electric	1/25 HP; 3250 RPM	Courthouse Mech Room	Courthouse HHW boiler loop	-	-	Fair Condition
AHU PD-1	1	York	K3EU120A33B	NKHS007777	HVAC / HHW & DX	2 HP supply fan	2nd Flr Mech Room	2nd Flr	2005	15	Good Condition
AHU-PD-2	1	Carrier	40RM-008--B611HC	3105X11657	HVAC / HHW & DX	2.4 HP supply fan	Courtroom Mech Closet	Courtroom	2005	15	Good Condition
AHU PD-3	1	Carrier	40RM-008--B611HC	3105X11651	HVAC / HHW & DX	2.4 HP supply fan	Police Station Mech Room	1st Flr Police Station	2005	15	Good Condition
AHU PD-4	1	Carrier	FB4BNB060	1005A73891	HVAC / HHW & DX	3/4 HP supply fan	Courthouse Mech Closet	Courthouse	2005	15	Good Condition
Furnace-5	1	Rheem	RGPN-10EBRJ	FU5D307F12060814 3	HVAC / Natural Gas & DX	100,000 Btuh input	Womens Locker Closet	Locker Rooms	2006	16	Good Condition
Condenser-1	1	Carrier	38ARZ012--E501--	3805G30110	Cooling / Electric DX	9.83 Tons; 10.3 EER	Outside	AHU PD-1	2005	15	Good Condition
Condenser-2	1	Carrier	38ARZ012--E501--	3805G30109	Cooling / Electric DX	9.83 Tons; 10.3 EER	Outside	AHU PD-2	2005	15	Good Condition
Condenser-3	1	Carrier	CAE091HBA	G094410101	Cooling / Electric DX	7.5 Tons; 10.6 EER	Outside	AHU PD-3	2009	19	Good Condition
Condenser-4	1	York	H3RA060S06B	W0MM024187	Cooling / Electric DX	5.0 Tons; 10.0 EER	Outside	AHU PD-4	-	-	Fair Condition
Condenser-5	1	Carrier	N2A348AKA300	E084506505	Cooling / Electric DX	4.0 Tons; 10.0 EER	Outside	AHU PD-5	2008	18	Good Condition
Mini-Split AC Indoor Unit	1	Fujitsu	ASU24CL	DDA 008726	Cooling / Electric DX	2 Tons	Dispatch Server Room	Dispatch Server Room	-	-	Good Condition
Mini-Split AC Outdoor Unit	1	Fujitsu	AOU24CL	DDN 008727	Cooling / Electric DX	2 Tons	Outside	Dispatch Server Room	-	-	Fair Condition
Mini-Split AC Indoor Unit	1	Thermal Zone	MS218A13240EA	-	Cooling / Electric DX	1.5 Tons	2nd Flr Server Room	2nd Flr Server Room	-	-	Good Condition
Mini-Split AC Outdoor Unit	1	Thermal Zone	MS218A13240CA	-	Cooling / Electric DX	1.5 Tons	2nd Flr Server Room	2nd Flr Server Room	-	-	Good Condition
Domestic Hot Water Heater	1	State Industries	SBT100 75 NE7 F	J92978527	DHW / Natural Gas	100 Gallon; 75,100 Btuh	1st Flr Mech Room	Building	1992	-5	Fair Condition
DHW Circ Pump	1	Armstrong	S-25 AB	-	Circ Pump / Electric	1/12 HP; 1725 RPM	1st Flr Mech Room	DHW	-	-	Fair Condition
Generator	1	Stamford	JCT274G13	478789	Generator / Natural Gas	150 kW; 187 kVA; 208 V / 3 Phase	Outside	Police Station	-	-	Fair Condition
Window Air Conditioner	1	General Electric	AEM14AMM1	-	Cooling / Electric	14,000 Btuh; 1,310	Lab	Lab	-	-	Fair Condition
Domestic Hot Water Heater	1	A.O. Smith	ELJF--6-F261161000	-	DHW / Electric	6 Gallon; 1,500 Watts	Lab	Lab	-	-	Good Condition

Energy Audit of Long Beach Municipal Complex
CHA Project No. 22349
Existing Lighting

Cost of Electricity: \$0.133 \$/kWh
\$5.74 \$/kW

		EXISTING CONDITIONS									
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Retrofit Control	Annual kWh	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
1	Municipal - Court Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	2500	None	310	
7	Municipal - Breezeway	8	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.48	SW	2500	None	1,200	
1	Municipal - Main Vestibule	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.19	SW	2500	None	465	
18	Municipal - Construction/Inspections & Zoning Dept.	11	T 32 R F 4 (ELE)	F44ILL	112	1.23	SW	2125	C-OCC	2,618	
1	Municipal - Construction/Inspections & Zoning Dept.	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.03	SW	2125	C-OCC	66	
7	Municipal - Construction/Inspections & Zoning Dept.	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.18	SW	2125	C-OCC	383	
7	Municipal - Main Hallway	32	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	1.92	SW	2500	None	4,800	
18	Municipal - Building Maintenance	3	T 32 R F 4 (ELE)	F44ILL	112	0.34	SW	2125	OCC	714	
7	Municipal - Storage/Office	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.18	SW	2125	OCC	383	
18	Municipal - Assessor	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2125	OCC	1,428	
18	Municipal - Men's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2250	C-OCC	504	
18	Municipal - Women's Restroom	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2250	C-OCC	504	
18	Municipal - Break Room	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2125	OCC	952	
18	Municipal - Payments Office	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	SW	2125	OCC	1,904	
18	Municipal - Single Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2125	OCC	476	
18	Municipal - Meeting Room	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	2000	OCC	224	
18	Municipal - Revenue & Finance	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2125	OCC	1,428	
18	Municipal - Single Office	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2125	OCC	1,428	
18	Municipal - Clerk	6	T 32 R F 4 (ELE)	F44ILL	112	0.67	SW	2125	OCC	1,428	
18	Municipal - Office 1	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2125	OCC	476	
18	Municipal - Large Office	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2125	OCC	952	
7	Municipal - Large Office	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.06	SW	2125	OCC	128	
18	Municipal - Land Use Board Office 1	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2125	OCC	952	
18	Municipal - Land Use Board	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2125	OCC	476	
1	Municipal - Back Vestibule	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	2500	None	310	
18	Municipal - Secretary	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2125	OCC	476	
18	Municipal - Copy Room	2	T 32 R F 4 (ELE)	F44ILL	112	0.22	SW	2125	OCC	476	
7	Municipal - Janitors Closet	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.06	SW	500	None	30	
18	Municipal - Mayor	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2125	OCC	952	
13	Municipal - Stairwell Back	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	2500	None	300	
7	Municipal - Stairwell Back	1	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.06	SW	2500	None	150	
7	Municipal - Hallway	6	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.36	SW	2500	None	900	
13	Municipal - Commisioner Public Works	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	2125	OCC	255	
1	Municipal - Commisioner Public Works	3	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.09	SW	1063	None	99	
13	Municipal - Public Works Administration	3	S 32 P F 2 (ELE)	F42LL	60	0.18	SW	2125	OCC	383	
1	Municipal - Public Works Administration	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.06	SW	1063	None	66	
1	Municipal - Water Sewer	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	1063	None	132	
13	Municipal - Water Sewer	3	S 32 P F 2 (ELE)	F42LL	60	0.18	SW	2125	OCC	383	
13	Municipal - Water Sewer (in closet)	1	S 32 P F 2 (ELE)	F42LL	60	0.06	SW	500	None	30	
1	Municipal - File Storage	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	500	None	62	
1	Municipal - Storage 2	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	500	None	62	
13	Municipal - Commisioner Revenue & Finance	4	S 32 P F 2 (ELE)	F42LL	60	0.24	SW	2125	OCC	510	
1	Municipal - Commisioner Revenue & Finance	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.19	SW	1063	None	198	
1	Municipal - Office	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	2125	OCC	264	
129	Municipal - Office	3	SP 75 I	I75/1	75	0.23	SW	1063	None	239	

Energy Audit of Long Beach Municipal Complex
CHA Project No. 22349
Existing Lighting

Cost of Electricity: \$0.133 \$/kWh
 \$5.74 \$/kW

		EXISTING CONDITIONS									
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Retrofit Control	Annual kWh	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
13	Municipal - Men's Restroom	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	2250	None	270	
13	Municipal - Women's Restroom	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	2250	None	270	
1	Municipal - File Storage 3	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.12	SW	500	None	62	
13	Municipal - Multipurpose Room	2	S 32 P F 2 (ELE)	F42LL	60	0.12	SW	520	None	62	
18	Municipal - Multipurpose Room	10	T 32 R F 4 (ELE)	F44ILL	112	1.12	SW	520	C-OCC	582	
7	Municipal - Multipurpose Room	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.18	SW	520	None	94	
18	Municipal - Mechanical Room	5	T 32 R F 4 (ELE)	F44ILL	112	0.56	SW	500	None	280	
144	Municipal - Exterior	2	HPS 150	HPS150/1	188	0.38	Timer	4380	None	1,647	
142	Municipal - Exterior	2	MH 100	MH100/1	128	0.26	Timer	4380	None	1,121	
1	Police - Entry Vestibule	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.06	SW	8760	None	543	
1	Police - Reception	7	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.22	SW	8760	None	1,901	
11	Police - Records Room	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	2125	OCC	153	
246	Police - Records Room	4	T 40 R F 3 (MAG)	F43SE	136	0.54	SW	2125	OCC	1,156	
11	Police - Records Rm (Storage Closet)	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
11	Police - Cement Records Room	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
11	Police - Hallway	8	S 34 P F 2 (MAG)	F42EE	72	0.58	SW	8760	None	5,046	
11	Police - Evidence	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
246	Police - Lieutenants Office	2	T 40 R F 3 (MAG)	F43SE	136	0.27	SW	3285	OCC	894	
246	Police - Sergeants Office	2	T 40 R F 3 (MAG)	F43SE	136	0.27	SW	3285	OCC	894	
11	Police - Radio Room	5	S 34 P F 2 (MAG)	F42EE	72	0.36	SW	8760	None	3,154	
248	Police - Radio Room	1	F 48 R F 2 (ELE)	F41GL	32	0.03	SW	8760	None	280	
11	Police - Server Room	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
11	Police - Booking	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2125	OCC	306	
11	Police - Furnace Room	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
11	Police - Emergency Management Office	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2000	OCC	288	
11	Police - Juvenile Holding Cell	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	2000	None	144	
11	Police - Evidence Locker	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	500	None	36	
246	Police - Roll Call Room	4	T 40 R F 3 (MAG)	F43SE	136	0.54	SW	8760	OCC	4,765	
11	Police - File Room	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	500	None	36	
11	Police - Arms Room	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	500	None	36	
11	Police - Breakroom	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	8760	OCC	631	
11	Police - Cell	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2000	None	288	
11	Police - Hallway	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	8760	None	631	
11	Police - Sally Port	6	S 34 P F 2 (MAG)	F42EE	72	0.43	SW	2000	OCC	864	
11	Police - Class 1 Locker	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	4380	OCC	1,261	
11	Police - Mens Locker room	6	S 34 P F 2 (MAG)	F42EE	72	0.43	SW	4380	C-OCC	1,892	
11	Police - Womens Locker	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	4380	OCC	1,261	
11	Police - Courtroom	28	S 34 P F 2 (MAG)	F42EE	72	2.02	SW	520	C-OCC	1,048	
4	Police - Conference Room	6	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.43	SW	520	OCC	225	
1	Police - Vestibule	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.06	SW	2500	None	155	
246	Police - Court Office Front	8	T 40 R F 3 (MAG)	F43SE	136	1.09	SW	2125	OCC	2,312	
11	Police - Back Judges Office	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2125	OCC	306	
71	Police - Private Single Restroom	2	I 60	I60/1	60	0.12	SW	1125	None	135	
4	Police - Foyer	8	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.58	SW	2500	None	1,440	
11	Police - Mens Restroom	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2250	C-OCC	324	

Energy Audit of Long Beach Municipal Complex
CHA Project No. 22349
Existing Lighting

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\$5.74 \$/kW

EXISTING CONDITIONS											
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Retrofit Control	Annual kWh	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
1	Police - Mens Restroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.03	SW	2250	C-OCC	70	
11	Police - Womens Restroom	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	2250	C-OCC	324	
1	Police - Womens Restroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.03	SW	2250	C-OCC	70	
11	Police - Stairwell	3	S 34 P F 2 (MAG)	F42EE	72	0.22	SW	2500	None	540	
11	Police - Detectives Office	6	S 34 P F 2 (MAG)	F42EE	72	0.43	SW	3285	OCC	1,419	
246	Police - Lieutenants Office	4	T 40 R F 3 (MAG)	F43SE	136	0.54	SW	3285	OCC	1,787	
4	Police - Womens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	2250	None	162	
4	Police - Mens Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	2250	None	162	
11	Police - Captains Office	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	3285	OCC	946	
11	Police - Storage Room	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	500	None	36	
11	Police - Server/Copy Room	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	2125	OCC	612	
11	Police - Officers Office	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	3285	OCC	946	
11	Police - Hallway	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	2500	None	720	
11	Police - Storage	1	S 34 P F 2 (MAG)	F42EE	72	0.07	SW	500	None	36	
11	Police - Deputy Chief	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	3285	OCC	946	
11	Police - Interview Room	4	S 34 P F 2 (MAG)	F42EE	72	0.29	SW	2000	OCC	576	
246	Police - Chief's Office	4	T 40 R F 3 (MAG)	F43SE	136	0.54	SW	3285	OCC	1,787	
11	Police - Stairwell 2	3	S 34 P F 2 (MAG)	F42EE	72	0.22	SW	2500	None	540	
78	Police - Exterior	2	EP I 100	I100/1	100	0.20	Timer	4380	None	876	
143	Police - Exterior	7	HPS 100 POLE	HPS100/1	138	0.97	Timer	4380	None	4,231	
144	Police - Exterior	2	HPS 150	HPS150/1	188	0.38	Timer	4380	None	1,647	
142	Police - Exterior	1	MH 100	MH100/1	128	0.13	Timer	4380	None	561	
162	Police - Lab Outbuilding	6	S 34 C F 4 (MAG)	F44EE	144	0.86	SW	1040	OCC	899	
11	Police - Electric Room	2	S 34 P F 2 (MAG)	F42EE	72	0.14	SW	500	None	72	
237	Complex - Parking lot / Site Lighting	23	WP 400 Po HPS	hps400/1	465	10.70	Photocell	4380	None	46,844	
27	Complex - EXIT Signs	12	XX 7 CF 2	ECF7/2	21	0.25	Breaker	8760	None	2,208	
	Total	467				45.68				136,641	