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Local Government Energy Program
Energy Audit Final Report

City of Elizabeth

City Hall
50 Winfield Scott Plaza
Elizabeth, NJ 07201

Project Number: LGEA57

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EXECUTIVE SUMMARY

The City of Elizabeth City Hall is a four-story, partial basement building comprising a total conditioned floor area of 78,168 square feet. The original structure was built in 1934, and there have been several renovations or additions since then. The following chart provides an overview of current energy usage in the building based on the analysis period of February 2009 through February 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	866,940	53,673	222,676	107.0	8,325
Proposed	837,300	53,673	203,467	105.7	8,224
Savings	29,640	-	19,209	1.3	101
% Savings	3	-	9	1	1

*The Solar Photovoltaic system recommendation is excluded from this table

**Total Annual Cost savings are equal to energy cost savings plus incurred operations and maintenance savings

Table 2: Proposed Photovoltaic System

Initial Investment, $	Total Recommended System Capacity (kW)	Electricity Generated, (kWh/year)	Demand Reduction (kW)	SRECs earned (SRECs/year)	Total Revenue ($/year)
14,950	2.99	3,564	2.99	3	2,417

*Revenue generated from producing electricity and collecting Solar Renewable Energy Credits (SRECs) has been factored into the total revenue

There may be energy procurement opportunities for the City of Elizabeth City Hall to reduce annual utility costs, which are $19,940 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the City Hall in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. The City Hall building is comprised of office space type. The building scores in the 81/100 percentile and may be eligible for Energy Star certification. Compared to a typical office building that uses 160.0 kBtu/sqft-yr, the City of Elizabeth City Hall used 107.0 kBtu/sqft-yr.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1 and Table 2. The measures are categorized by payback period in Table 3 below:

Table 3: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	5,188	0.7	3,412	53,070
5-10 Year	14,021	5.2	73,200	0
>10 year	-	-	-	-
Solar PV	2,417	6.2	14,950	6,381
Total	21,625	4.2	91,562	59,452

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 4 cars from the roads each year or avoiding the need of 144 trees to absorb the annual CO_2 generated.

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for City of Elizabeth. Based on the requirements of the LGEA program, City of Elizabeth must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $2,574.75.

Financial Incentives and Other Program Opportunities

There are various incentive programs that the City of Elizabeth could apply for that could help lower the cost of installing the ECMs. Please refer to Appendix F for details.

SWA recommends that the City of Elizabeth implement all recommended Energy Conservation Measures at the City Hall building. The scope of work recommended does not include any major HVAC recommendations due to the remaining lifetime on all mechanical equipment. If the City of Elizabeth wishes to precede with the Solar PV system, SWA recommends that the roof is considered to be replaced as a capital improvement measure first. The City Hall building currently does not qualify for the NJ Office of Clean Energy's Direct Install program; however, the building does qualify for prescriptive incentives available through the SmartStart program.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

For this project, PMK Group, Inc., a business unit of Birdsall Services Group (BSG-PMK), worked as a sub-contractor in conjunction with Steven Winter Associates, Inc. (SWA).

SWA and PMK Group, Inc., performed an energy audit and assessment for the City Hall at 50 Winfield Scott Plaza, Elizabeth, NJ. The process of the audit included facility visits on 3/17 and 3/18, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the City of Elizabeth to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the City Hall.

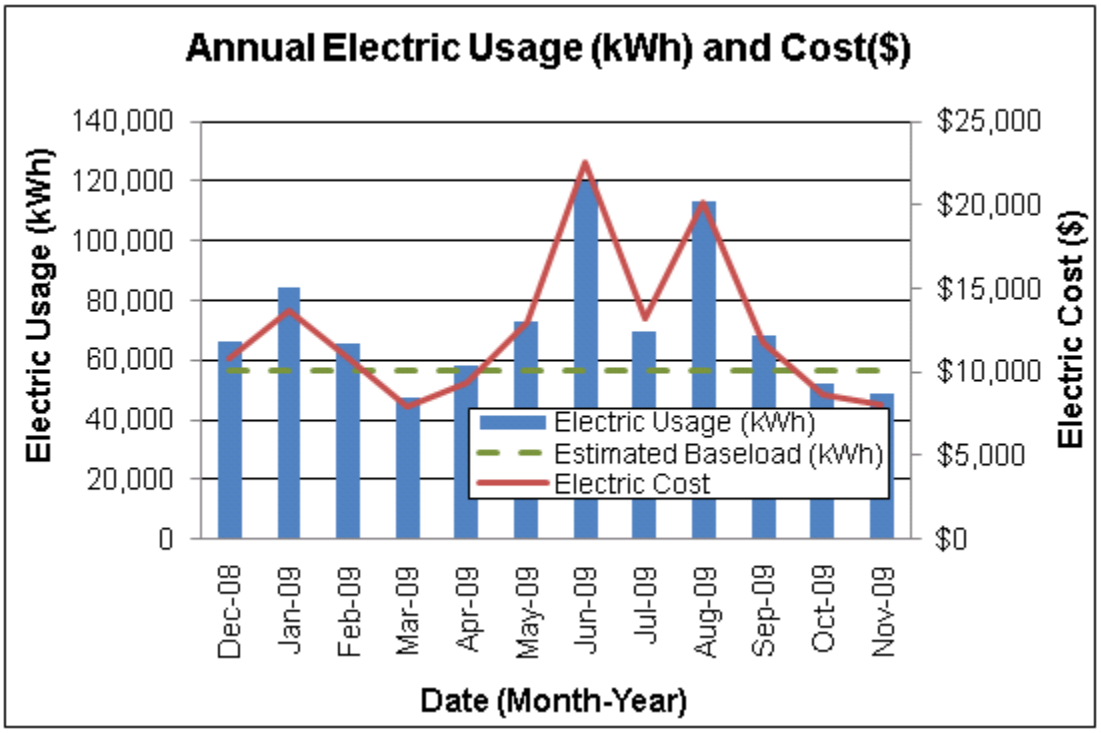
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from February 2008 through February 2010 that were received from the utility companies supplying the City Hall with electric and natural gas. A 12 month period of analysis from December 2008 through November 2009 was used for all calculations and for purposes of benchmarking the building.

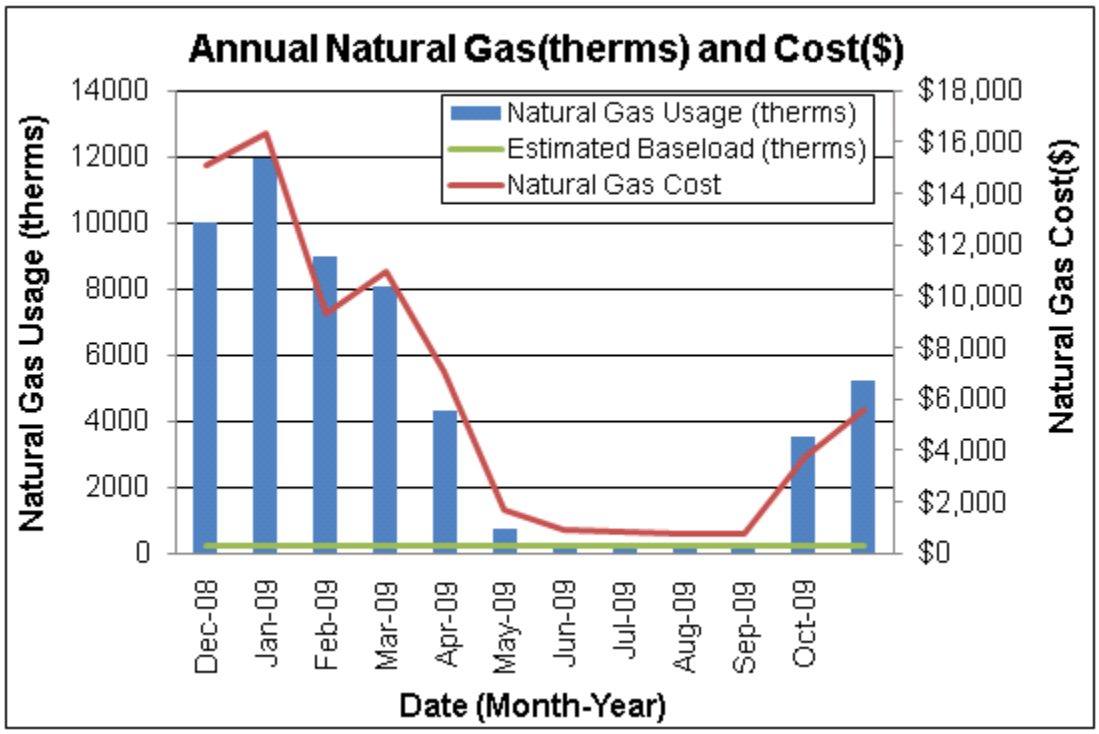
Electricity - The City Hall is currently served by one electric meter. The building currently buys electricity from PSE&G at **an average aggregated rate of $0.173/kWh**. The City Hall purchased **approximately 866,940 kWh, or $72,774 worth of electricity,** in the previous year. The average monthly demand was 184.3 kW and the annual peak demand was 268.8 kW.

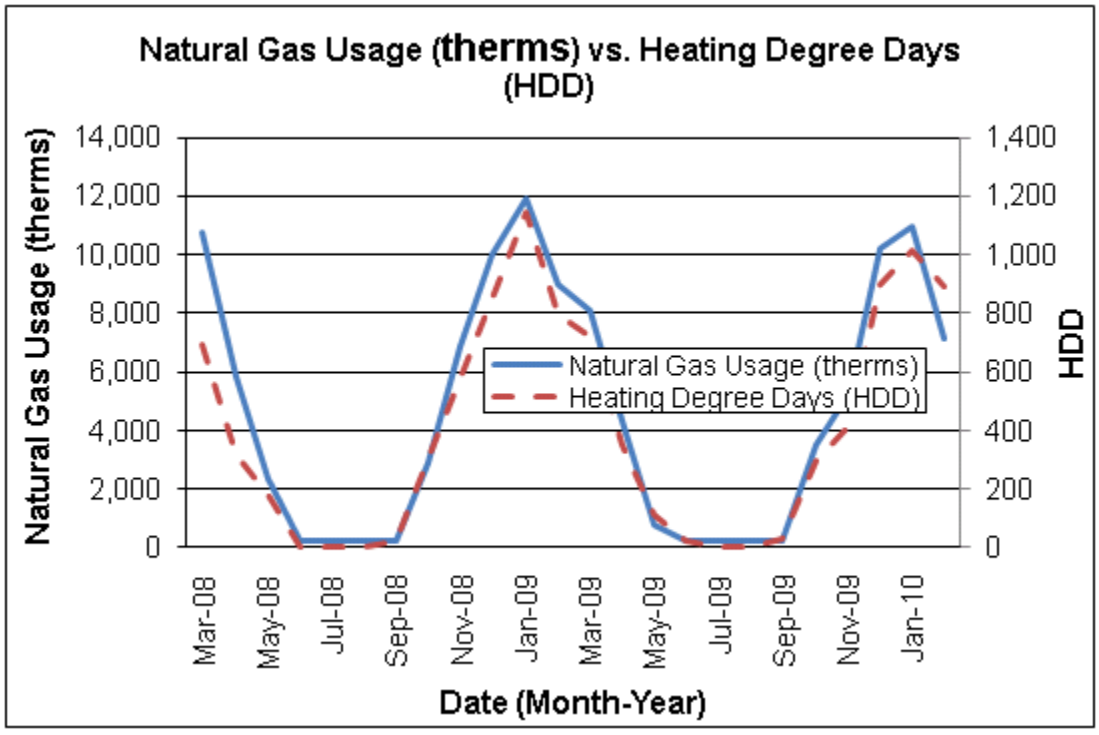
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the City Hall.



Natural gas - The City Hall is currently served by one meter for natural gas. The building currently buys natural gas from Elizabethtown Gas at **an average aggregated rate of $1.356/therm**. The City Hall purchased **approximately 53,673 therms, or $72,774worth of natural gas,** in the previous year.

The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the City Hall.

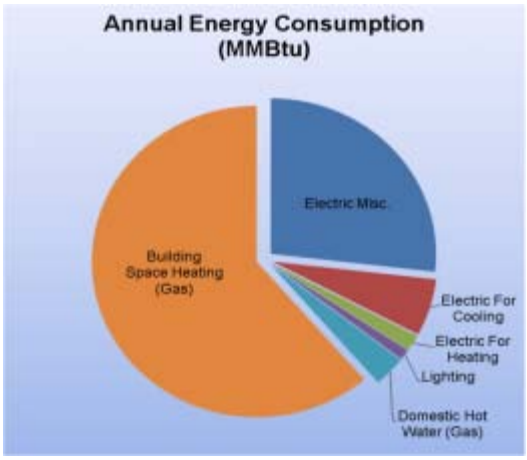


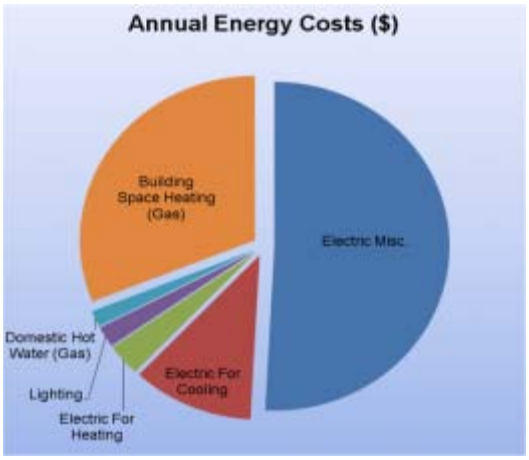


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following graphs, pie charts, and table show energy use for the City Hall based on utility bills for the 12 month period. Note: electrical cost at $51/MMBtu of energy is over 3.5 times as expensive as natural gas at $14/MMBtu.

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	2,234	27%	$113,212	51%	51
Electric For Cooling	494	6%	$25,034	11%	51
Electric For Heating	139	2%	$7,044	3%	51
Lighting	91	1%	$4,612	2%	51
Domestic Hot Water (Gas)	264	3%	$3,580	2%	14
Building Space Heating	5,103	61%	$69,194	31%	14
Totals	8,325	100%	$222,676	100%	
Total Electric Usage	2,958	36%	$149,902	67%	51
Total Gas Usage	5,367	64%	$72,774	33%	14
Totals	8,325	100%	$222,676	100%	



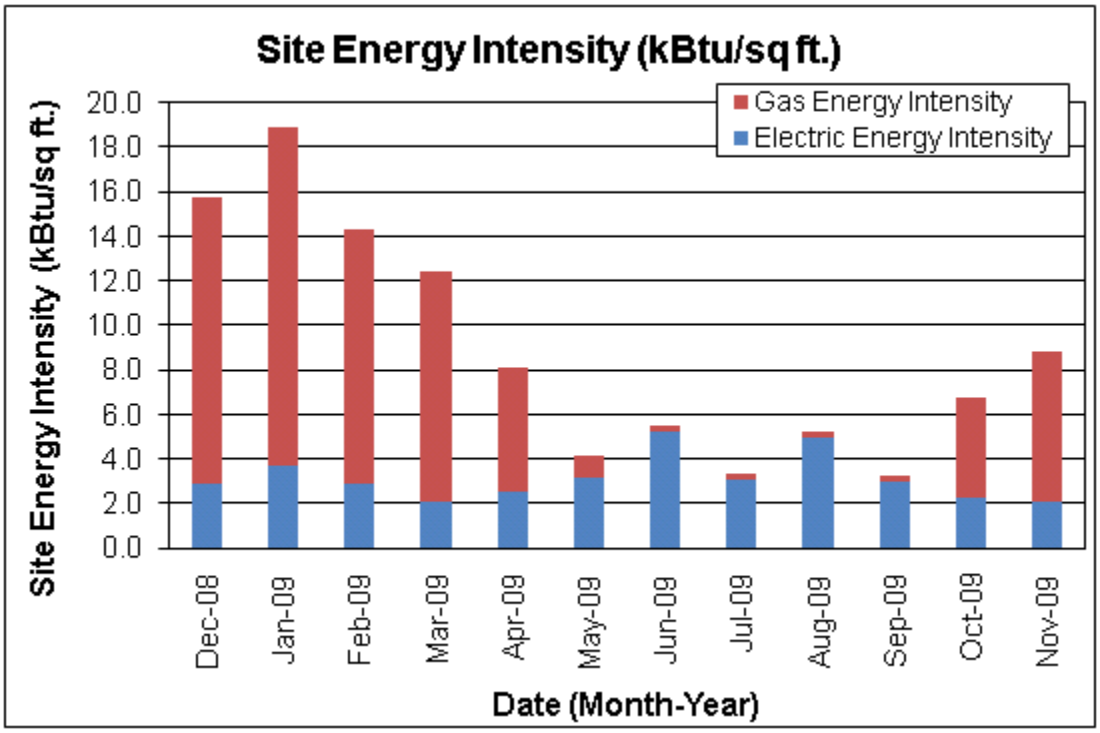


Energy benchmarking

SWA has entered energy information about the City Hall in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This facility is categorized as an office space type. Based on the Portfolio Manager rating system, the building was rated in the 81/100 percentile. The Site Energy Use Intensity is 107.0 kBtu/ft^2-yr compared to the national average of a typically office building consuming 160.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "Office" space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the City of Elizabeth desire to reach this average there are other large scale and financially less advantageous improvements that

can be made, such as envelope window, door and insulation upgrades that would help the building reach this goal.



Per the LGEA program requirements, SWA has assisted the City of Elizabeth to create an *ENERGY STAR® Portfolio Manager* account and share the City Hall facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager account information with the City of Elizabeth ([redacted]) and TRC Energy Services ([redacted]).

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. Some high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Typically, electricity prices also increase during the cooling months when electricity is used by the chillers.

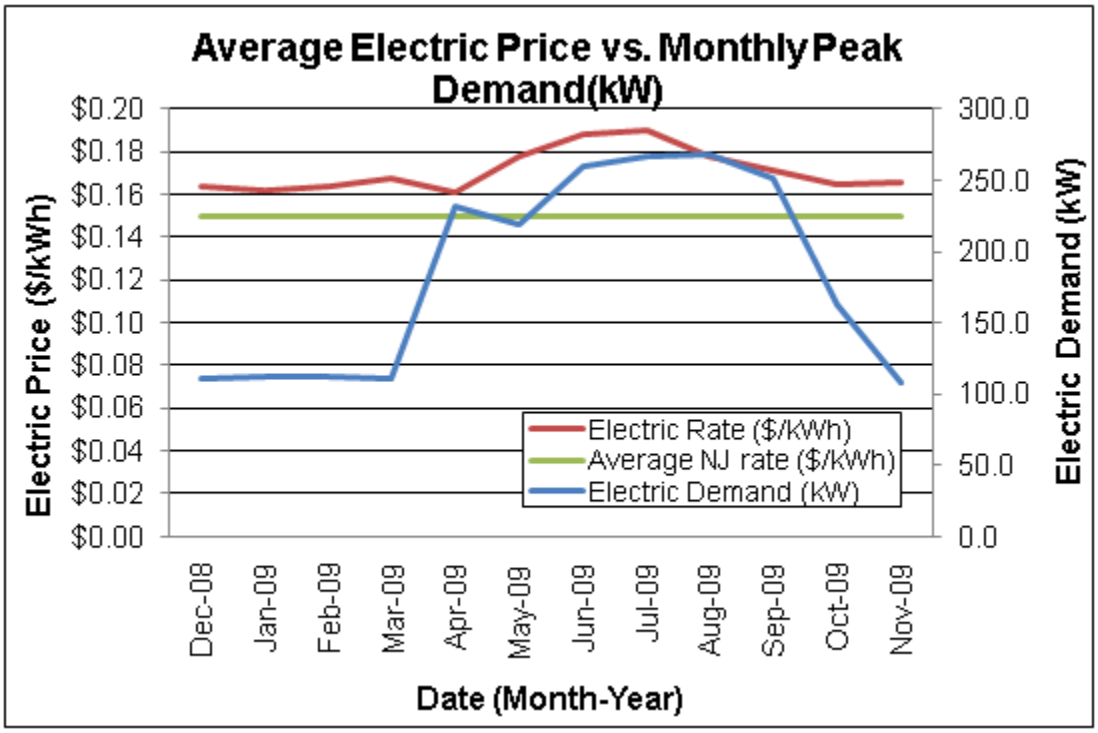
The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the City of Elizabeth is paying a general service rate for natural gas. Demand is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. The building is direct metered and currently purchases electricity at a general

service rate for usage with an additional charge for electrical demand factored into each monthly bill. The general service rate for electric charges is market-rate based on usage and demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

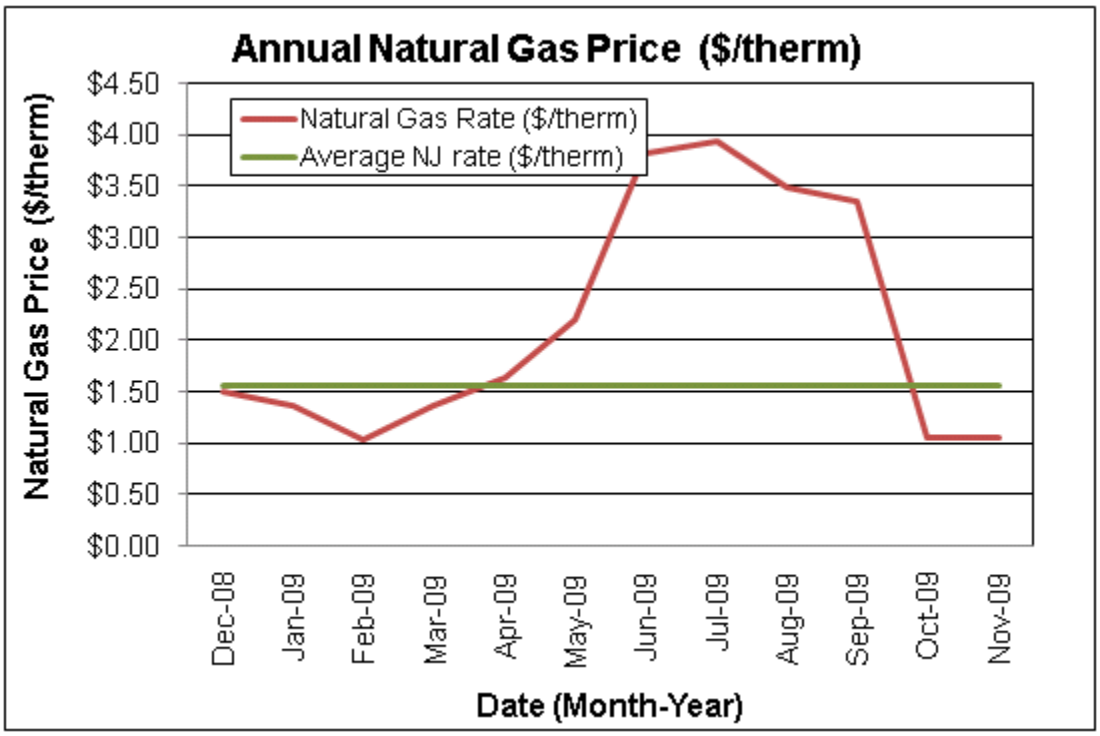
Energy Procurement strategies

Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rates for electric are $0.150/kWh, while the City Hall pays a rate of $0.173/kWh. The City Hall annual electric utility costs are $19,940 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 15% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while the City Hall pays a rate of $1.356/therm. Natural gas bill analysis shows fluctuations up to 76% over the most recent 12 month period.



Utility rate fluctuations may have been caused by adjustments between estimated and actual meter readings; others may be due to unusual high and recent escalating energy costs.

SWA recommends that the City Hall further explore opportunities of purchasing both natural gas and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the City of Elizabeth. Appendix C contains a complete list of third-party energy suppliers for the City of Elizabeth service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on visits from SWA on Tuesday, March 16, 2010 and Wednesday, March 17, 2010 the following data was collected and analyzed.

Building Characteristics

The four-story, (including a partial basement), 78,168 square feet City Hall Building was originally constructed in 1934 and 1940. It houses municipal offices and a courtroom with associated offices,


Front Façade


Partial Left Side Façade (typ.)


Partial Rear Façade (typ.)


Partial Left Side Façade (typ.)

Building Occupancy Profiles

Its occupancy is approximately 250 people throughout each day, Monday to Friday from 9am until 4pm.

Building Envelope

Due to unfavorable weather conditions (min. 18 deg. F delta-T in/outside and no/low wind), no exterior envelope infrared (IR) images were taken during the field audit.

General Note: All findings and recommendations on the exterior envelope (base, walls, roofs, doors and windows) are based on the energy auditors' experience and expertise, on construction document reviews (if available) and on detailed visual analysis, as far as accessibility and weather conditions allowed at the time of the field audit.

Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer with a lime stone base over concrete block with no detectable wall cavity insulation. The interior is mostly painted gypsum wallboard or marble tile.

Note: Wall insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall good condition with only a few minor signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

The following specific exterior wall problem spots and areas were identified:

Efflorescence on brick and masonry walls indicate moisture presence within the wall cavity.

Signs of uncontrolled roof water runoff on walls due to missing/defective roof flashing

Roof

The building's roof is predominantly a low-pitch gable type over a wood structure, with a copper finish. It is original and has never been replaced. Zero inches of detectable attic/ceiling insulation, and six inches of fiberglass batt roof insulation were recorded. Other parts of the building are also covered by a flat and parapet type roof over steel decking with a dark colored EPDM single membrane finish.

Note: Roof insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall good condition, with no current signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

The following specific roof problem spot was identified:

Signs of water damage on interior finishes. According to building maintenance personnel this leak has been fixed.

Base

The building's base is composed of a partially below-grade basement with a slab floor with a perimeter foundation and no detectable slab edge/perimeter insulation.

Slab/perimeter insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

Windows

The building contains basically one type of window:

1. Double-hung type windows with a vinyl clad frame, clear double glazing and some interior but no exterior shading devices. The windows are located throughout the building and were replaced approximately 10 years ago.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

Exterior doors

The building contains only one type of exterior door:

1. Glass or solid metal with aluminum/steel frame type exterior doors. They are located on the main floor and were replaced semi recently.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in acceptable condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:



Missing and worn weather-stripping found

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, as described in more detail earlier in this chapter.

The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating

Heating is provided by two HB Smith natural gas fired steam boilers, which feed perimeter radiators throughout the building. The Boilers were installed in 2003, and are each 79% efficient rated at 3,447 MBH output. They are equipped with Power Flame burners, each with capacities of 3,447 MBH and rated at 1½ HP; the burners have Marathon Electric 3-phase motors, rated at 1½ HP and 3,450 RPM. Steam condensate is pumped by two alternating Marathon Electric condensate pumps with 3-phase motors; each rated at ¾ HP and 3,450 RPM. The boilers are controlled by a Heat Timer automatic heating controls.

Cooling

Cooling is supplied by two chillers. Chiller #1 is a 135-ton Trane water-cooled screw chiller, installed in 2001. It is paired with a Baltimore Air Coil cooling tower with a variable-frequency drive. The chiller has two Taco condenser water pumps with Baldor motors; the motors are rated at 15 HP, 1,755 RPM, and 89.5% efficiency. It also has an AO Smith chilled water pump rated at 10 HP and 1,750 RPM. This chiller serves seventeen (17) air-handlers throughout the building. Chiller #2 is a 30-ton Trane air-cooled chiller, located on the 3rd-floor roof. It serves an air-handler, which serves the council chambers.

Ventilation

There are six exhaust fans in the building. Five Buffalo Forge exhaust fans are located in the elevator room on the top floor, and were installed in 1940. EF-1 has a Diehl 3-phase pump motor, rated at 1½ HP and 1,725 RPM; EF-2 also has a Diehl 3-phase pump motor, rated at 3 HP and 1,740 RPM; EF-3 and EF-5 have Baldor 3-phase motors, rated at 3 HP, 1,725 RPM, and 80% efficiency; and EF-4 has a Leland-Faraday 3-phase motor, rated at 3 HP, 1,725 RPM and 84% efficiency. The exhaust fans EF-1 through -5 act as exhaust for;

the lab (original building use) exhaust, general exhaust, restroom exhaust, council chambers exhaust, and general exhaust, respectively. Currently only one fan is needed in service for the restrooms. One fractional Hp Greenheck exhaust fan is located in the exterior chiller enclosure and operates based on thermostat control.

Buffalo Forge exhaust fan

Domestic Hot Water

Domestic hot water is provided by an AO Smith natural gas water heater, located in the boiler room. The unit, installed in 2006, has a 100 gallon tank and has a heating capacity of 199 MBH. The unit was found to be in good operating condition.

AO Smith water heater

Electrical systems

Lighting

A complete inventory of all interior, exterior, and exit sign light fixtures were examined and documented in Appendix B of this report including an estimated total lighting power consumption. The lighting consists primarily of 2x4 T8 fluorescent fixtures with electronic ballasts. Common fixtures include 2x2 fixtures with U Tube T8 lamps, compact fluorescents, and incandescent lamps. A detailed list of the recommended upgrades is provided in Appendix B.

As of **July 1, 2010** magnetic ballasts most commonly used for the operation of T12 lamps will no longer be produced for commercial and industrial applications. Also, many T12 lamps will be phased out of production starting July 2012.

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as "plug-load" equipment, since they are not inherent to the building's systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building that is hard to separate out from the rest of the building's energy usage based on utility analysis. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc.

More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov. The building is currently equipped with energy vending miser devices for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

Appliances - In this facility, there are twenty (20) refrigerators, eighteen (18) microwaves, ten (10) coffee makers, one-hundred ninety-six (196) computers, and thirty-three (33) copiers. Most appliances were found to be over the 10 years suggested threshold as noted in the attached equipment list. Each should be considered for the Energy Start Replacement Program.

Process equipment - There are two Challenge Air air-compressors that support the pneumatic controls system throughout the building as well as two sump pumps in the boiler room. All were found to be in good operating condition.

Elevators

There are two cable-driven Otis elevators in this facility that were found to be well maintained and in good operating condition.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the City Hall building.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Based on utility analysis and a study of roof conditions, the City Hall is a good candidate for a 2.99 kW Solar Panel installation. See ECM #5 for details.

Solar Thermal Collectors

Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Wind

Wind power production is not appropriate for this location because the available wind energy resource is very low. Also, the positioning of high tension wires and other obstructions would require a wind turbine to be taller than the high tension towers.

Geothermal

The City Hall building is not a good candidate for geothermal installation since it would require replacement and re-design of the entire existing HVAC system.

Combined Heat and Power

The building is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical baseload to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Lighting Upgrades
2	Premium efficiency exhaust fan motor
3	Install 6 occupancy sensors
	Description of Recommended 5-10 Year Payback ECMs
4	Upgrade plumbing fixtures
5	Install roof-mounted 2.99 Solar PV system

ECM#1: *Lighting Upgrades*

On the days of the site visits, SWA/BSG-PMK completed a lighting inventory of the City of Elizabeth City Hall building (see Appendix B). The existing lighting consists primarily of standard-efficiency fixtures with T12 lamps and magnetic ballasts, high-efficiency fixtures with T8 lamps with electronic ballasts, and incandescent lamps. SWA/BSG-PMK recommends retrofitting the T12 fixtures with T8 lamps and electronic ballasts as well as incandescent fixtures with compact fluorescent lamps. The labor in all these installations was evaluated using prevailing electrical contractor wages. The City of Elizabeth may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings.

Installation cost:

Estimated installed cost: $1,551 (Estimated labor of $500)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	1,416	24,129	5.1	0	1.1	60	4,234	15	63,515	0.3	4386%	292%	299%	48,409	43,203

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix B.

Rebates/financial incentives:

- *NJ Clean Energy – T8 fluorescent fixture ($15 per fixture)*

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Premium efficiency exhaust fan motor*

There are five (5) exhaust fans in the elevator room on the top floor; of these five pumps, only one (1) fan, EF-3, which vents restroom exhaust, is currently operational. Due to advancement in motor efficiency, we recommend the replacement of the motor for this exhaust fan. This three-phase motor, rated at 3 HP and 1,725 RPM, was manufactured by Baldor and installed in 1985. The efficiency of this motor, at the time of installation, was 80%, but can be assumed to decrease by 3.5% due to re-winding. Premium efficient motors are available, having efficiencies of 90.2%.

Installation cost:

Estimated installed cost: $796 (Estimated labor of $120)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
2	796	3,891	0.8	0	0.2	0	673	10	6,731	1.2	746%	75%	84%	4,888	6,967

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The cost of electricity at City Hall, taken from twelve months of electricity bills, is currently $0.17/kWh. The horsepower rating of the motor was converted to kW by multiplying by a factor of 0.746. The fan operates every hour of every day throughout the year. The savings were calculated using the following equations:

$$\text{Electric consumption(kWh)} = \frac{\text{HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Diversity Factor} \times \frac{\text{Hours}}{\text{Year}}}{\text{Efficiency}}$$

Savings (kWh)=Current Electric Consumption (kWh)-Proposed Electric Consumption (kWh)

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart program – Custom Motor incentive ($54 per 3 HP motor)*

Please see Appendix F for more information on Incentive Programs.

ECM#3: *Install 6 occupancy sensors*

Lighting at the City Hall primarily consists of standard-efficiency fixtures with T12 lamps and magnetic ballasts. There were 6 areas that were identified that contain lighting that is left on for long periods of time with no occupancy. SWA/BSG-PMK recommends that occupancy sensors are installed in these areas in order to limit the time that lights are left on unnecessarily.

Installation cost:

Estimated installed cost: $1,200 (Includes $275 in labor costs)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
3	1,200	1,620	0.1	0	0.1	0	280	10	2,803	4.3	134%	13%	19%	1,166	2,901

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix B.

Rebates/financial incentives:

- *NJ Clean Energy – SmartStart – Wall-mounted occupancy sensors ($20 per sensor)*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Upgrade plumbing fixtures*

Note: Upgrading plumbing fixtures such as toilets and urinals will not show an energy savings but will ultimately reduce operation costs based on reduced water consumption. Upgrading plumbing fixtures such as sinks will have minimal energy savings based on reduced domestic hot water flow but will primarily reduce operating costs based on water consumption.

In the City Hall restrooms, there are approximately 30 toilets, 10 urinals, and 27 sinks that should be upgraded to units that use less water per use. The current toilets are rated at 3.5 gal/flush, the current urinals are rated at 3 gal/flush, and the current sinks are rated at 2.5 gal/min. Low-flow sinks and toilets are available at 1.5 gal/min for sinks and 1.6 gal/flush for toilets, and waterless urinals are also available.

Installation cost:

Estimated installed cost: $73,200 (Estimated labor of $24,000)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
4	73,200	0	0.0	0	0.0	14,021	14,021	20	280,420	5.2	283%	14%	19%	131,592	0

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. The cost per gallon of water is approximately $0.0075/gal. All toilets and urinals are estimated to be used twice per hour of operation; City Hall operates 168 hours per week. It was assumed that there is one 30-second use of a sink for each use of a toilet or urinal.

Rebates/financial incentives:

- *None*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Install roof-mounted 2.99 kW Solar PV system*

Currently, the City Hall building does not use any renewable energy systems. Renewable energy systems, such as photovoltaic panels, can be mounted on the roof of the facility and can offset a significant portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc. being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA/BSG-PMK presents below the economics of installing a 2.99-kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building. A system of 13 commercial multi-crystalline 230 watt panels would generate 3,564 kWh of electricity per year, or 0.4% of the City Hall's annual electric consumption.

Installation cost:

Estimated installed cost: $14,950; (Includes $8,970 in labor)
Source of cost estimate: Similar Projects

ECM	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
5	14,950	3,564	0.8	0	0.2	0	2,417	25	60,414	6.2	304%	12%	14%	16,732	6,381

*SREC revenue included in "Total 1st Year Savings"

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Cost of installation was estimated using data from similar projects, at approximately $7,000 per kW. Annual energy savings were calculated using PV WATTS, an online tool administered by the National Renewable Energy Laboratory (NREL).

Rebates/financial incentives:

- *NJ Clean Energy – Renewable Energy Incentive Program (REIP) ($1/Watt installed)*

This ECM is eligible for New Jersey's Solar Renewable Energy Certificates (SREC). SRECs are marketable certificates issued to the owner of a PV system for each 1,000 kWh (1MWh) of electricity

generated. SRECs are sold or traded separately from the power generated; the income from the sale of the SREC can be used to offset the cost of the system by applying the revenue to a loan payment or debt service. The value of the SREC is market driven, and is controlled by the amount of the Solar Alternative Compliance Payment (SACP) which is set by the NJBPU. The SREC market is derived from New Jersey's Renewable Portfolio Standard (RPS), which requires that all licensed energy suppliers in the state invest in energy generated from renewable sources, with specific requirements for solar power. If a supplier does not invest by purchasing SRECs, the supplier must pay the SACP for a percentage of the total annual power produced. Since SRECs typically trade just below the SACP, there is an incentive for the supplier to buy SRECs. The SREC Program provides a market for SRECs to be created and verified on the owner's behalf. The New Jersey Clean Energy program facilitates the sale of SRECs to New Jersey electric suppliers. PV system owners in New Jersey with a grid-connected PV system are eligible to participate in New Jersey's SREC Program.

The NJBPU has stated its intention to continue to operate a program of rebates and SRECs, On September 12, 2007, the NJBPU approved an SREC only pilot incentive program. The program set the SACP at an initial value of $711, decreasing annually for an eight (8) year period. SRECs would be generated for fifteen (15) years (referred to as the Qualification Life), and have a two (2) year trading life. The NJBPU believes that to achieve an internal rate of return of twelve (12) percent, the target SREC price would be $611, reducing by three (3) percent per year for the same eight (8) year period that the SACP is set.

Please see Appendix F for more information on Incentive Programs.

PROPOSED FURTHER RECOMMENDATIONS

Capital Improvements

Capital Improvements are recommendations for the building that may not be cost-effective at the current time, but that could yield a significant long-term payback. These recommendations should typically be considered as part of a long-term capital improvement plan. Capital improvements should be considered if additional funds are made available, or if the installed costs can be shared with other improvements, such as major building renovations. SWA recommends the following capital improvements for the City Hall building:

- Replace roof and increase level of insulations – SWA observed that the roof is in deteriorating condition and has reached the end of its useful lifetime. The roof was observed to be leaky and allows water to damage interior areas such as walls. Replacing the roof can also provide an opportunity to increase insulation to a minimum value of R-30, which would prevent heat losses through the building envelope as well as provide a steeper drainage plane on the roof to promote water run-off. If the City of Elizabeth decides to install a roof-mounted Solar PV panel system, the roof should be addressed first.

- Replace the restroom exhaust fan motor in elevator room – SWA observed that the elevator room contained the exhaust fan motor for the restrooms. This fan is beyond its useful lifetime, however it is still operating. At this time it would not be cost effective to be replaced; however, SWA recommends replacing this fan motor with a premium efficiency unit when it fails.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Replace fan motors on air handlers as necessary – SWA observed that the existing fan motors on the air handling units were standard efficiency. At this time it would not be cost-effective to upgrade these motors to premium efficiency; however, SWA recommends that these motors are upgraded to premium efficiency as they fail.

- Repair flashing on roof – SWA observed that there were several areas of the roof that showed signs of uncontrolled water runoff on walls due to missing/defective roof flashing.

- Caulk unsealed exterior wall penetrations – SWA observed that there were several areas along the exterior façade of the building that contained penetrations for plumbing, electrical, etc. that should be caulked to reduce air infiltration and thermal bridging.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly. The roofs also contained many sharp objects that have been tarred over and have become part of the roof. These objects, such as glass and sharp stones, cause holes in the roof surface which allow water to leak in.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage.

- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the City of Elizabeth. Based on the requirements of the LGEA program, the City of Elizabeth must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $2,574.75.

APPENDIX A: EQUIPMENT LIST

City Hall Equipment List							
Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating	Condensate pump #1; 3/4 HP, 3,450 RPM, 3 phase	Boiler room, basement	Marathon Electric, M# AVD 56T34D5860A P, Part # 720.09002.00	Electricity	Boilers	-	20%
Heating	Condensate pump #2; 3/4 HP, 3,450 RPM, 3 phase	Boiler room, basement	Marathon Electric, M# AVD 56T34D5860A P, Part # 720.09002.00	Electricity	Boilers	-	20%
Heating	Boiler #1: Steam boiler, 3,447 MBH, 79% efficient	Boiler room, basement	HB Smith, M# 3500A-S/W-11, S# MA2003-15	Natural Gas	Entire building	2003	77%
	Natural gas burner #1: 3,447 MBH, 1 1/2 HP		Power Flame, M# C3-G-20HBS-11, S# 060309006	Electricity	Boiler #1		67%
	Burner motor, 1 1/2 HP, 3,450 RPM, 3 phase		Marathon Electric, M# AVC 56T34D5314B P, Cat. # P005		Burner #1		61%
Heating	Boiler #2: Steam boiler, 3,447 MBH, 79% efficient	Boiler room, basement	HB Smith, M# 3500A-S/W-11, S# MA2003-14	Natural Gas	Entire building	2003	77%
	Natural gas burner #2: 3,447 MBH, 1 1/2 HP		Power Flame, M# C3-G-20HBS-11, S# 060309005	Electricity	Boiler #2		67%
	Burner motor, 1 1/2 HP, 3,450 RPM, 3 phase		Marathon Electric, M# AVC 56T34D5314B P, Cat. # P005		Burner #2		61%
Heating	Automatic heating control	Boiler room, basement	Heat-Timer	Electricity	Heating system	-	-

Cooling	Chiller # 1 Water-cooled screw chiller, 135 tons	Chiller enclosure	Carrier, M# 30HXC161RY-540--, S# 2901Q00637	Electricity	Air-handlers	2001	63%
	Cooling tower w/ variable freqiency drive	Outside	Baltimore Aircoil, M# 15177, S# U071181301	Electricity	Chiller	2001	63%
	Concenser water pump #1		Taco, M# FE3010E2H1F2L0A		Cooling tower	1995	0%
	Motor: 15 HP, 1,755 RPM, 89.5% efficient, 3 phase		Baldor, Cat. # M2333T-8, Spec. # 07H203X621G1, S# F0704196271		Condenser water pump #1	2007	80%
	Condenser water pump #2		Taco, M# FE3010E2H1F2L0A		Cooling tower	1995	0%
	Motor: 15 HP, 1,755 RPM, 89.5% efficient, 3 pase		Baldor, Cat. # M2333T-8, Spec. # 07H203X621G1, S# F0804026696		Condenser water pump #2	2007	80%
	Chilled water pump #1 10 HP, 1,750 RPM motor		AO Smith, Cat. # E374, S# BY04		Chilled water	2004	60%
Cooling	Chiller # 2 Air-cooled chiller, 30ton / 66 gpm	3rd floor roof	Trane, M# CGAA0306MB51CC5 C4B361F S# L78J17397	Electricity	Air-handler Council Chambers	2001	63%
Cooling	AHU-1:Air-handler, 4,000 CFM, 122.4 MBH cooling coil	Ground floor, east wing, off human services	Trane, Type L-8 B, S# K78K45797	Electricity	Nurse & offices	1995	25%
	Motor: 3 HP, 1,760 RPM, 3 phase, 89.5% efficient		Baldor, M# 36G548X15			-	-
Cooling	AHU-2: Air-handler, 1,000 CFM, 36 MBH cooling coil	Ground floor, behind elevator east	Trane, Type L-3 B, Serial # K78K45788	Electricity	Ground floor	1995	25%

	Motor: 1/2 HP, 1,725 RPM, 1 phase		GE, M# 5KC37NN3, S# CPD/STK NO C-221			1995	17%
Cooling	AHU-3: Air-handler, 1,800 CFM, 55.8 MBH cooling coil	Ground floor, behind elevator west	Trane, Type # L-3 B, S# K78K45799	Electricity	Ground floor	1995	25%
	Motor: 1 1/2 HP, 1,725 RPM, 78.5% efficient, 3 phase		Baldor, Cat. # M3154T, Spec. # 35B01-372			1995	17%
Cooling	AHU-4: Air-handler, 3,700 CFM, 106.9 MBH cooling coil	Ground Floor behind restroom	Trane, Type # L-8 B, S# K78K45800	Electricity	Ground floor	1995	25%
	Motor: 3 HP, 1,730 RPM, 3 phase		Marathon Electric, M# HVJ 132TTDR7527AC-R1W, S# 1496085			1995	17%
Cooling	AHU-5: Air-handler, 5,300 CFM, 155.7 MBH cooling coil	East vault	Trane, Type # L-10 B, S# K78K45801	Electricity	North wing	1995	25%
	Motor: 5 HP, 1,740 RPM, 3 phase		Marathon Electric, M# HVJ 184TTDR7627AC-F1W, S# 1496864			1995	17%
Cooling	AHU-6: Air-handler, 3,000 CFM, 88.9 MBH cooling coil	Southeast vault	Trane, M# L-6-B	Electricity	East wing	1995	25%
	Motor: 2 HP, 1,745 RPM, 3 phase		Gould, Cat. # R113, Part # 8-331262-03			1995	17%
Cooling	AHU-7: Air-handler, 3,000 CFM, 88.9 MBH cooling coil	1st floor mechanical room	Trane, Type L-6 B, S# K78K45803	Electricity	West 1st floor	1995	25%
	Motor: 2 HP, 1,745 RPM, 3 phase		Gould, Cat. # R113, Part # 8-331262-03			1995	17%
Cooling	AHU-8: Air-handler, 5,300 CFM,	West, 1st floor, home	Trane, Type L-10 B, S# K78K45804	Electricity	Home improvement	1995	25%

	155.7 MBH cooling coil	improvement office			area west		
	Motor: 3 HP, 1,730 RPM, 3 phase		Marathon Electric, M# HJV 182TTDR7527AC-F1W, S# 1496049			1995	17%
Cooling	AHU-9: Air-handler, 3,350 CFM, 95.7 MBH cooling coil	East mechanical vault	Trane, Type L-6 B, S# K78K45805	Electricity	East wing, 2nd floor	1995	25%
	Motor: 3 HP, 1,725 RPM, 82.5% efficient, 3 phase		Baldor, M# M3211T, Spec. # 35L101-2112			1995	17%
Cooling	AHU-10: Air-handler, 2,550 CFM, 76.4 MBH cooling coil	East vault, 2nd floor	Trane, Type L-6 B	Electricity	Hall, south east, 2nd floor	1995	25%
	Motor: 1 1/2 HP, 1,725 RPM, 3 phase		Westinghouse, Type FS, S# 313P171			1995	17%
Cooling	AHU-11: Air-handler w/ variable frequency drive, 2,450 CFM, 70.8 MBH cooling coil	Center mechanical room	Trane, Type L-6 B	Electricity	2nd floor, mayor's office	1995	25%
	Motor: 1.5 HP, 1,740 RPM, 81.5% efficient, 3 phase		Vanguard, M# VM 5015 E, S# Y 407631			1995	17%
Cooling	AHU-12: Air-handler, 2,550 CFM, 78.1 MBH cooling coil	South corridor closet	Trane, Type L-6 B	Electricity	South west corridor, 2nd floor	1995	25%
	Motor: 1.5 HP, 1,740 RPM, 84% efficient, 3 phase		Super-E, M# EM3154T-8, Spec. # 35L405Y212, S# F497			1995	17%

Cooling	AHU-13: Air-handler w/ variable frequency drive, 3,600 CFM, 107.4 MBH cooling coil	2nd floor vault	Trane, Type # L-6 B, S# K78K45809	Electricity	West side, 2nd floor	1995	25%
	Motor: 5 HP, 1,740 RPM, 3 phase		Marathon Electric, M# HVJ 184TTDR7627AC-F1W, S# 1496192			1995	17%
Cooling	AHU-14: Air-handler, cooling only, 3,600 CFM, 107.4 MB cooling coil	3rd floor mechanical room	Trane, Type L-6 B, S# K78K45810	Electricity	East, 3rd floor	1995	25%
	Motor: 5 HP, 1,740 RPM, 3 phase		Marathon Electric, M# HVJ 184TTDR7627AC-F1W, S# 1496176			1995	17%
Cooling	AHU-15: Air-handler, cooling only, 4,000 CFM, 118.4 MBH cooling coil	3rd floor, west mechanical room	Trane, Type L-8 B, S# K78K45811	Electricity	West, 3rd floor	1995	25%
	Motor: 3 HP, 1,730 RPM, 3 phase		Marathon Electric, M# HVJ 182TTDR7627AC-F1W, S# 1496032			1995	17%
Cooling	AHU-16: Air-handler, 7,900 CFM, 221.9 MBH cooling coil	4th floor, center mechanical room	Trane, Type L-14 B, S# K78K45812	Electricity	4th floor, east and west wings	1995	25%
	Motor: 7.5 HP, 1,750 RPM, 3 phase		Gould, Part # 6-339071-01			1995	17%
Cooling	AHU-17: Air-handler, cooling only, 11,000 CFM, 328.4 MBH, 7.5 HP motor	4th floor mechanical room	Trane, Type L-21 B, S# K78K49038	Electricity	Council chambers	1995	25%
Cooling	10-ton condenser	Exterior west pit	Liebert, M# TCDV205-Y, S# 0948C24872	Electricity	Data processing	2009	93%

Cooling	10-ton condenser, 9.5 EER (back-up)	Exterior west pit	York, M# HCHB-T120AA	Electricity	Data processing	1997	13%
Ventilation	EF-1: Exhaust fan	Top floor, elevator room	Buffalo Forge, Class 1, Size 2 1/2, Shop Order A80760	Electricity	Lab exhaust	1940	0%
	Pump motor: 1 1/2 HP, 1,725 RPM, 3 phase		Diehl, M# ZP-154-53			1985	0%
Ventilation	EF-2: Exhaust fan	Top floor, elevator room	Buffalo Forge, Class 1, Size 5, Shop Order A-80761	Electricity	General exhaust	1940	0%
	Pump motor: 3 HP, 1,740 RPM, 3 phase		Diehl, M# INS25-418, S# 848283			1985	0%
Ventilation	EF-3: Exhaust fan	Top floor, elevator room	Buffalo Forge, Class 1, Size 5 1/2, Shop Order A-80762	Electricity	Restroom exhaust	1940	0%
	Pump motor: 3 HP, 1,725 RPM, 80% efficient, 3 phase		Baldor, Cat. # M3325, Spec. # 37231Y02			1985	0%
Ventilation	EF-4: Exhaust fan	Top floor, elevator room	Buffalo Forge, Class 1, Size 5 1/2, Shop Order A-80763	Electricity	CC Exhaust	1940	0%
	Pump motor: 3 HP, 1,725 RPM, 84% efficient, 3 phase		Leland-Faraday, Stock # M-7325			1985	0%
Ventilation	EF-5: Exhaust fan	Top floor, elevator room	Buffalo Forge, Class 1, Size 5 1/2, Shop Order A-80764	Electricity	General exhaust	1940	0%
	Pump motor: 3 HP, 1,725 RPM, 80% efficient, 3 phase		Baldor, M# M3325, Spec # 37E31Y02, S# 50009263225			1985	0%
Ventilation	Exhaust fan	Chiller enclosure	Greenheck, M# SBE-1H20-QD, S# 96C04056	Electricity	Chiller	-	70%

DHW	Domestic water heater, 100 gallons, 199 MBH, 192.96 GPH recovery	Boiler room, basement	AO Smith, M# BTR 197 110, S# A06M000188	Natural Gas	Entire building	2006	69%
	Hot water pump		Bell & Gossett, Series HV BNFI J20, S# 102213	Electricity	Domestic water heater	2006	80%
	Pump motor, 1/8 HP, 1,725 RPM, 1 phase		Bell & Gossett, S# M74794	Electricity	Hot water pump	2006	78%
Air-Compression	Air-compressor #1	Boiler room, basement	Challenge Air, M# E-23, S# AS06100806	Electricity	Controls	-	25%
Air-Compression	Air-compressor #2	Boiler room, basement	Challenge Air, M# E-23, S# AS5070979	Electricity	Controls	-	25%
Sump Pumps	Sump pump motor #1: 1/2 HP, 1,140 RPM	Boiler room, basement	Marathon Electric, M# AVN 56C11D5304E P, Cat. # G278	Electricity	Sump pumping system	-	-
Sump Pumps	Sump pump motor #2: 1 HP, 1,725 RPM, 72% efficient	Boiler room, basement	Leeson, M# C6K17NC11E, Cat. # 113343.00	Electricity	Sump pumping system	2002	56%
Appliances	Refrigerator	Room 402	Welbilt, M# NW 100, S# 320963 029369	Electricity	Room 402	2002	58%
Appliances	Microwave	Room 402	Sharp, M# R-405KS-T, S# 67395	Electricity	Room 402	2008	87%
Appliances	Microwave	Room 304	Welbilt, M# MR 552W, S# 0000057	Electricity	Room 304	1992	0%
Appliances	Microwave	Room 308	Hot Point, M# R E41 002, S# SV 960181 S	Electricity	Room 308	1987	0%
Appliances	Microwave	Room 306	Emerson, M# MW8627W, S# 10660258SP	Electricity	Room 306	2001	40%
Appliances	Microwave	Room 301	GE, M# JE635WW 01, S# RS02133M	Electricity	Room 301	1997	32%
Appliances	Refrigerator	Room 306	Welbilt, M# 27412-4, S# 721010 0040	Electricity	Room 306	1995	21%
Appliances	Refrigerator	Room 301	Haier, M# BC-50P	Electricity	Room 301	2008	89%
Appliances	Microwave	Room 201	GoldStar, M# MA-7801, S# 002TA03086	Electricity	Room 201	2000	33%

Appliances	Microwave	Room 212	Samsung, M# MU4270W, S# 7MBK901205V	Electricity	Room 212	1999	27%
Appliances	Microwave	Room 221	GE, M# JE635WC 03, S# TA919841M	Electricity	Room 221	2001	40%
Appliances	Microwave	Room 219	GoldStar, M# MA-7802, S# 909TA00850	Electricity	Room 219	1999	27%
Appliances	Refrigerator	Room 201	Auto-Deluxe, M# GRA-4, S# 891002166	Electricity	Room 201	1989	0%
Appliances	Refrigerator	Room 201	Magic Chef, M# MCBR270, S# IE44671852	Electricity	Room 201	2005	74%
Appliances	Refrigerator	Room 201	Westinghouse	Electricity	Room 201	1965	0%
Appliances	Microwave	1st floor office	Sharp, M# R-220HW, S# 127902	Electricity	1st floor office	2003	53%
Appliances	Refrigerator	1st floor office	Avanti, M# RM172W/173B/ 174SS, S# AV12017W405060372	Electricity	1st floor office	2004	68%
Appliances	Microwave	1st floor office	Samsung, M# MU3250W, S# 7MBK707806D	Electricity	1st floor office	1999	27%
Appliances	Microwave	1st floor office	Sharp, M# R-1A56, S# 163344	Electricity	1st floor office	1995	0%
Appliances	Refrigerator	1st floor office	GE, M# TAX4SNYBWH, S# SR083214	Electricity	1st floor office	1996	16%
Appliances	Refrigerator	Finance office	Haier, M# ESR042PWW	Electricity	Finance office	2005	74%
Appliances	Microwave	Finance office	GE, M# JES738WH 001, S# SF 924485 U	Electricity	Finance office	2003	53%
Appliances	Refrigerator	Housing Departme nt	Kenmore, M# 564.91171100, S# 010304093	Electricity	Housing Departm ent	2001	53%
Appliances	Microwave	Central License	Emerson, M# MW8627W, S# 10516406SP	Electricity	Central License	2001	40%
Appliances	Refrigerator	Central License	Whirlpool, M# EL05PPXML, S# EEP3356295	Electricity	Central License	2008	89%
Appliances	Microwave	G5	Sharp, M# R-2A46, S# 178681	Electricity	G5	1995	0%
Appliances	Refrigerator	G5	GE, M# TA4SLC	Electricity	G5	2000	47%
Appliances	Refrigerator	Aging	GE, M# GMR04AAMBWW, S# AM308276	Electricity	Aging	1995	0%

Appliances	Refrigerator	G2	GE, M# SC2SSARWG, S# AH101737	Electricity	G2	1993	11%
Appliances	Refrigerator	G1	Amana	Electricity	G1	2000	47%
Appliances	Refrigerator	G1	RCA	Electricity	G1	2000	47%
Appliances	Microwave	G13	GE, M# JES738WJ 01, S# RG955335U	Electricity	G13	2004	68%
Appliances	Refrigerator	G13	Magic Chef, M# CTL1511GEW, S# 22966362CJ	Electricity	G13	1996	26%
Appliances	Microwave	Boiler room, basement	GE, M# WES1130DM2BB, S#MR913154B	Electricity	Boiler room, basement	2008	87%
Appliances	Refrigerator	Boiler room, basement	Compact Coldspot 5	Electricity	Boiler room, basement	1980	0%
Appliances	Refrigerator	G10	Haier, M# HSE01WNAWW	Electricity	G10	2000	47%
Appliances	Microwave	G10	Galanz, M# WP700L17-8, S# GAL0504003542	Electricity	G10	2004	60%
Appliances	Refrigerator	G14	Magic Chef, M# MCBR360S, S# 0708MCBR360S06607	Electricity	G14	2008	89%

Note: The remaining useful life of a system (in %) is the relationship between the system manufactured and/or installed date and the standard life expectancy of similar equipment based on ASHRAE (2003), ASHRAE Handbook: HVAC Applications, Chapter 36.

LIGHTING ANALYSIS

Township of Elizabeth
City Hall
50 Winfield Scott Plaza

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade ($)	SmartStart Rebate per Upgrade
1	135W inc. replace w/ 44W CF	135W INCANDESCENT	135	44W CF/SI	44	35	$15.00	$0.00
2	(2) lamp T12, STD ballast, open channel hanging; retrofit w/ (2) lamp T8 w/ ELEC ballast	2L8' EE/STD	138	2L8' T8/ELEC	118	1	$50.00	$15.00
3	65W CFL in decorative hanging fixtures; no replacement	65W CF/SI	65	No Upgrade	65	39	$0.00	$0.00
4	(2) lamp T8, acrylic lens, recessed; no replacement	2L4' T8/ELEC	61	No Upgrade	61	544	$0.00	$0.00
5	34W CFL; no replacement	34W CF/SI	34	No Upgrade	34	7	$0.00	$0.00
6	(2) T8 U-tube, acrylic lens, recessed; no replacement	2L22"	62	No Upgrade	62	83	$0.00	$0.00
7	750W metal halide; no replacement	750W MH/BALLAST	795	No Upgrade	795	0	$0.00	$0.00
8	(2) lamp T8, open-channel, surf-mount; no replacement	2L4' T8/ELEC	61	No Upgrade	61	17	$0.00	$0.00
9	(2) lamp 34W T12, hanging open channel; retrofit w/ (2) lamp T8 w/ ELEC ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	1	$50.00	$15.00
10	(2) lamp 13W CFL, circular dome decorative surf-mount	(2) 13W CF/SI	26	No Upgrade	26	19	$0.00	$0.00
11	(2) lamp 34W T12, surf-mounted, wrap-around, acrylic, STD ballast; retrofit w/ (2) lamp T8 w/ ELEC ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	1	$50.00	$15.00
12	64W inc., replace w/ 13W CFL	64W INCANDESCENT	64	13W CF/SI	15	52	$6.00	$0.00
13	(2) lamp 25W CFL, wall-mounted, circular;no replacement	(2) 25W CF/SI	50	No Upgrade	50	10	$0.00	$0.00
14	(27) lamp 13W inc. chandelier, decorative; no replacement	(27) 13W INCANDESCENT	351	No Upgrade	351	3	$0.00	$0.00
15	(2) lamp 135W inc., wall-mounted; replace w/ 44W CFL	135W INCANDESCENT	135	44W CF/SI	44	10	$15.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$1,557.00	$1,320.00	$2,877.00
Rebate	$135.00	$500.00	$635.00
Net Cost	$1,422.00	$820.00	**$2,242.00**
Savings (kWh)	24,129	1,620	**25,748**
Savings ($)	$4,101.88	$275.35	**$4,377.22**
Payback	0.3	3.0	**0.5**

Variables:

$0.17	Avg. Electric Rate ($/kWh)
	Avg. Demand Rate ($/kW)
8760	Operating Hours/Year
24	Operating Hours/Work Day

Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings(>Avg)

Notes:

16	(3) lamp 34W T12, surf-mounted, STD ballast; retrofit w/ (3) lamp T8 w/ ELEC ballast	3L4' EE/STD	130	3L4' T8/ELEC	89	6	$70.00	$15.00
17	Instant start metal halide, 250W; no replacement	250W MH/BALLAST	286	No Upgrade	286	3	$0.00	$0.00
18	(2) lamp T8, hanging prismatic lens; no replacement	2L4' T8/ELEC	61	No Upgrade	61	15	$0.00	$0.00
19	(2) lamp T8, surface-mounted, wrap-around, acrylic lens; no replacement	2L4' T8/ELEC	61	No Upgrade	61	17	$0.00	$0.00
20	(2) lamp T8 U-tube, surface-mounted, acrylic lens; no replacement	2L22"	62	No Upgrade	62	13	$0.00	$0.00
21	Circular	n/a	0	No Upgrade	0	1	$0.00	$0.00
22	(3) lamp 13W CFL, surf-mount, circular; no replacement	(3) 13W CF/SI	39	No Upgrade	39	15	$0.00	$0.00
23	(4) lamp T8, surf-mounted, acrylic lens, ELEC ballast; no replacement	4L4' T8/ELEC	110	No Upgrade	110	4	$0.00	$0.00
24	Incandescent Candelabra / Replace with CFL Candelabra	20W INCANDESCENT	20	5W CF/SI	7	34	$6.00	$0.00
25	1000W Metal Halide	1000W MH/BALLAST	1070	No Upgrade	1070	6	$0.00	$0.00
26	400W Metal Halide	400W MH/BALLAST	445	No Upgrade	445	9	$0.00	$0.00

					Existing				Proposed				Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
		Totals:					58869				51922	6.947	24129	$1,557.00	$4,101.88	0.4			1620	$1,320.00	$275.35	4.8	$135.00	$500.00	25748	$2,242.00	$4,377.22	0.5
1	1	Attic/Elevator Room	8	2920	135W INCANDES	16	2160		44W CF/SI	16	704	1.456	4252	$240.00	$722.76	0.3			0	$0.00	$0.00		$0.00	$0.00	4252	$240.00	$722.76	0.3
2	1	Storage	4	1460	135W INCANDES	2	270		44W CF/SI	2	88	0.182	266	$30.00	$45.17	0.7			0	$0.00	$0.00		$0.00	$0.00	266	$30.00	$45.17	0.7
3	1	Attic	4	1460	135W INCANDES	3	405		44W CF/SI	3	132	0.273	399	$45.00	$67.76	0.7			0	$0.00	$0.00		$0.00	$0.00	399	$45.00	$67.76	0.7
4	3	4th Floor Lobby	24	8760	65W CF/SI	6	390		No Upgrade	6	390	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
5	4	403 Planning Board	10	3650	2L4' T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
6	5	Closet	0.5	182.5	34W CF/SI	1	34		No Upgrade	1	34	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
7	5	402 Office	10	3650	34W CF/SI	1	34		No Upgrade	1	34	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
8	5	402 Kitchenette	12	4380	34W CF/SI	1	34		No Upgrade	1	34	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
9	6	Office	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
10	4	Open End Office	12	4380	2L4' T8/ELEC	12	732		No Upgrade	12	732	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
11	4	Construction Official	10	3650	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
12	5	RR	12	4380	34W CF/SI	2	68		No Upgrade	2	68	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
13	1	Womens Room	12	4380	135W INCANDES	2	270		44W CF/SI	2	88	0.182	797	$30.00	$135.52	0.2			0	$0.00	$0.00		$0.00	$0.00	797	$30.00	$135.52	0.2

					Existing				Proposed				Lighting				Controls		Occupancy Sensors (ONLY)				SmartStart Rebate		Lighting & Occupancy Sensors			
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
14	1	Storage Room From Hall	4	1460	135W INCANDES	2	270		44W CF/SI	2	88	0.182	266	$30.00	$45.17	0.7			0	$0.00	$0.00		$0.00	$0.00	266	$30.00	$45.17	0.7
15	8	401	10	3650	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
16	1	Radio Room	10	3650	135W INCANDES	2	270		44W CF/SI	2	88	0.182	664	$30.00	$112.93	0.3			0	$0.00	$0.00		$0.00	$0.00	664	$30.00	$112.93	0.3
17	9		10	3650	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	69	$50.00	$11.79	4.2			0	$0.00	$0.00		$15.00	$0.00	69	$35.00	$11.79	3.0
18	5	Mens Room	12	4380	34W CF/SI	2	68		No Upgrade	2	68	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
19	4	Dept. Rec.	12	4380	2L4' T8/ELEC	11	671		No Upgrade	11	671	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
20	11		12	4380	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	83	$50.00	$14.15	3.5			0	$0.00	$0.00		$15.00	$0.00	83	$35.00	$14.15	2.5
21	4	Office	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
22	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9
23	12	Supply Vault	4	1460	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	72	$6.00	$12.16	0.5			0	$0.00	$0.00		$0.00	$0.00	72	$6.00	$12.16	0.5
24	6	Office	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00		OSR	1	339	$260.00	$57.71	4.5	$0.00	$210.00	339	$50.00	$57.71	0.9
25	4	Office	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00		OSR	1	334	$260.00	$56.78	4.6	$0.00	$210.00	334	$50.00	$56.78	0.9
26	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2
27	10	Stairs	24	8760	(2) 13W CF/SI	9	234		No Upgrade	9	234	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
28	13		24	8760	(2) 25W CF/SI	1	50		No Upgrade	1	50	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
29	14	Court Room	12	4380	(27) 13W INCAND	3	1053		No Upgrade	3	1053	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
30	15		12	4380	135W INCANDES	10	1350		44W CF/SI	10	440	0.91	3986	$150.00	$677.59	0.2			0	$0.00	$0.00		$0.00	$0.00	3986	$150.00	$677.59	0.2
31	10	Rear Stairway	24	8760	(2) 13W CF/SI	9	234		No Upgrade	9	234	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
32		408 (locked)	10	3650															0	$0.00	$0.00			$0.00				
33	12	4th Rear Hallway	24	8760	64W INCANDESC	6	384		13W CF/SI	6	90	0.294	2575	$36.00	$437.82	0.1			0	$0.00	$0.00		$0.00	$0.00	2575	$36.00	$437.82	0.1
34	16	4th Mechanical Room	4	1460	3L4' EE/STD	6	780		3L4' T8/ELEC	6	534	0.246	359	$420.00	$61.06	6.9			0	$0.00	$0.00		$90.00	$0.00	359	$330.00	$61.06	5.4
35	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2
36	12	3rd Rear Lobby	24	8760	64W INCANDESC	6	384		13W CF/SI	6	90	0.294	2575	$36.00	$437.82	0.1			0	$0.00	$0.00		$0.00	$0.00	2575	$36.00	$437.82	0.1
37		301 Committee Room (Locked)	10	3650															0	$0.00	$0.00			$0.00				
38	12	RR/ Janitor Closet	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2
39	4	Jury	12	4380	2L4' T8/ELEC	7	427		No Upgrade	7	427	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
40	17	Courtroom 3rd	12	4380	250W MH/BALLA	2	572		No Upgrade	2	572	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
41		Jury 2 (locked)	12	4380															0	$0.00	$0.00			$0.00				
42	3	3rd Hall	24	8760	65W CF/SI	8	520		No Upgrade	8	520	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
43	4	304 Engineering	10	3650	2L4' T8/ELEC	5	305		No Upgrade	5	305	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
44	4	303 Main Office	10	3650	2L4' T8/ELEC	19	1159		No Upgrade	19	1159	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
45	6		10	3650	2L22"	2	124		No Upgrade	2	124	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
46	4	302	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
47	6		10	3650	2L22"	1	62		No Upgrade	1	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
48	4	City Engineer	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
49	18	Copy/ Print Room	12	4380	2L4' T8/ELEC	12	732		No Upgrade	12	732	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
50	19	Mech Room	4	1460	2L4' T8/ELEC	3	183		No Upgrade	3	183	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
51	4	305	10	3650	2L4' T8/ELEC	14	854		No Upgrade	14	854	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
52	4	Office	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
53	4	306 Credit Union	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
54	4	307 Conference room	10	3650	2L4' T8/ELEC	10	610		No Upgrade	10	610	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
55	4	308 Public Works	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
56	4	Office	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
57	4	Office	10	3650	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
58	1	Vault	4	1460	135W INCANDES	1	135		44W CF/SI	1	44	0.091	133	$15.00	$22.59	0.7			0	$0.00	$0.00		$0.00	$0.00	133	$15.00	$22.59	0.7
59	20	Mens Room	12	4380	2L22"	1	62		No Upgrade	1	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
60		Court Entrance	12	4380		3				3									0	$0.00	$0.00			$0.00				
61	4	Break Room	12	4380	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
62	4	Council Resident	12	4380	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
63	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9
64	4	301 Tax Office	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
65	4	Office	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	

66	6		10	3650	2L22"	2	124		No Upgrade	2	124	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
67	22	Vault	4	1460	(3) 13W CF/SI	2	78		No Upgrade	2	78	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
68	4	Office	10	3650	2L4'T8/ELEC	9	549		No Upgrade	9	549	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
69	12		10	3650	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	179	$6.00	$30.40	0.2			0	$0.00	$0.00		$0.00	$0.00	179	$6.00	$30.40	0.2	
70	20	Ladies Room	12	4380	2L22"	12	744		No Upgrade	12	744	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
71	1	203 Mech Closet	4	1460	135W INCANDES	1	135		44W CF/SI	1	44	0.091	133	$15.00	$22.59	0.7			0	$0.00	$0.00		$0.00	$0.00	133	$15.00	$22.59	0.7	
72	4	201 Law Office	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
73	4	District Attorney	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00		OSW	1	223	$200.00	$37.85	5.3	$0.00	$20.00	223	$180.00	$37.85	4.8	
74	4	City Attorney	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00		OSW	1	223	$200.00	$37.85	5.3	$0.00	$20.00	223	$180.00	$37.85	4.8	
75	4	Assistant Attorney	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00		OSW	1	223	$200.00	$37.85	5.3	$0.00	$20.00	223	$180.00	$37.85	4.8	
76	1	Closet	0.5	182.5	135W INCANDES	1	135		44W CF/SI	1	44	0.091	17	$15.00	$2.82	5.3			0	$0.00	$0.00		$0.00	$0.00	17	$15.00	$2.82	5.3	
77	4	Open Office	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
78	4	File Room	12	4380	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
79	1	Mech Vault	4	1460	135W INCANDES	1	135		44W CF/SI	1	44	0.091	133	$15.00	$22.59	0.7			0	$0.00	$0.00		$0.00	$0.00	133	$15.00	$22.59	0.7	
80	4	Clerk Office	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
81	24	204 Office of the Mayor	10	3650		22				22									0	$0.00	$0.00			$0.00					
82	12		10	3650	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	179	$6.00	$30.40	0.2			0	$0.00	$0.00		$0.00	$0.00	179	$6.00	$30.40	0.2	
83				0															0	$0.00	$0.00			$0.00					
84				0															0	$0.00	$0.00			$0.00					
85				0															0	$0.00	$0.00			$0.00					
86				0															0	$0.00	$0.00			$0.00					
87	3	2nd Hallway	24	8760	65W CF/SI	12	780		No Upgrade	12	780	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
88	4	211 Public Int	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
89	4	212 Public Int	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
90	12	RR Mech	4	1460	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	72	$6.00	$12.16	0.5			0	$0.00	$0.00		$0.00	$0.00	72	$6.00	$12.16	0.5	
91	4	213 Economic Development	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
92	4	214 Internal Auditors	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
93	4	Office	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
94	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
95	4	Break Room	12	4380	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
96	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
97	12	Hall	24	8760	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	429	$6.00	$72.97	0.1			0	$0.00	$0.00		$0.00	$0.00	429	$6.00	$72.97	0.1	
98	4	218 Dept. of Finance	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
99	4	File Print	12	4380	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
100	6		12	4380	2L22"	1	62		No Upgrade	1	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
101	4	CFO	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
102	4	219 Open Office	12	4380	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
103	4	File	12	4380	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
104	4	Office	10	3650	2L4'T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
105	4	221	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
106	12	Mech Vault	4	1460	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	72	$6.00	$12.16	0.5			0	$0.00	$0.00		$0.00	$0.00	72	$6.00	$12.16	0.5	
107	1	Closet	0.5	182.5	135W INCANDES	1	135		44W CF/SI	1	44	0.091	17	$15.00	$2.82	5.3			0	$0.00	$0.00		$0.00	$0.00	17	$15.00	$2.82	5.3	
108	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9	
109	4	206 Conf.	10	3650	2L4'T8/ELEC	5	305		No Upgrade	5	305	0	0	$0.00	$0.00		OSW	1	278	$200.00	$47.31	4.2	$0.00	$20.00	278	$180.00	$47.31	3.8	
110	6		10	3650	2L22"	1	62		No Upgrade	1	62	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
111	6	207 210 Admin Purchasing	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
112	6	Open Office	12	4380	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
113	6	Office	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
114	6	207 PO	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
115	6	208	10	3650	2L22"	4	248		No Upgrade	4	248	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
116	6	Office	10	3650	2L22"	4	248		No Upgrade	4	248	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
117	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
118	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9	
119	6	209	10	3650	2L22"	8	496		No Upgrade	8	496	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
120	12		10	3650	64W INCANDESC	6	384		13W CF/SI	6	90	0.294	1073	$36.00	$182.43	0.2			0	$0.00	$0.00		$0.00	$0.00	1073	$36.00	$182.43	0.2	

												Lighting						Occupancy Sensors (ONLY)						Lighting & Occupancy Sensors			
					Existing				Proposed							Controls						SmartStart Rebate					
Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts	kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Type	Qty.	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Lighting	Sensors	Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
121	10	Vault	4	1460	(2) 13W CF/SI	1	26		No Upgrade	1	26	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
122	13	Stairway	24	8760	(2) 25W CF/SI	9	450		No Upgrade	9	450	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
123	1		24	8760	135W INCANDES	1	135		44W CF/SI	1	44	0.091	797	$15.00	$135.52	0.1			0	$0.00	$0.00		$0.00	$0.00	797	$15.00	$135.52	0.1
124	4	108 Mech	10	3650	2L4' T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
125	6	107	10	3650	2L22"	4	248		No Upgrade	4	248	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
126	4		10	3650	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
127	4	106	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
128	4	Improvements	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
129	4	Office	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
130	4	Office	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
131	4	105 City Clerk	10	3650	2L4' T8/ELEC	12	732		No Upgrade	12	732	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
132	19	Vault	4	1460	2L4' T8/ELEC	12	732		No Upgrade	12	732	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
133	4	Office	10	3650	2L4' T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
134	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9
135	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2
136	3	1st Lobby	24	8760	65W CF/SI	11	715		No Upgrade	11	715	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
137	24	ENT/EXT	24	8760		4				4									0	$0.00	$0.00			$0.00				
138	4	114 Planning	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
139	4	115	10	3650	2L4' T8/ELEC	9	549		No Upgrade	9	549	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
140	4	Cont	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
141	4	Office	10	3650	2L4' T8/ELEC	3	183		No Upgrade	3	183	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
142	4	116	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
143	2	Vault	4	1460	2L8' EE/STD	1	138		2L8' T8/ELEC	1	118	0.02	29	$50.00	$4.96	10.1			0	$0.00	$0.00		$15.00	$0.00	29	$35.00	$4.96	7.1
144	8		4	1460	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
145	12		4	1460	64W INCANDESC	3	192		13W CF/SI	3	45	0.147	215	$18.00	$36.49	0.5			0	$0.00	$0.00		$0.00	$0.00	215	$18.00	$36.49	0.5
146	4	110 Computer Center	10	3650	2L4' T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
147	4	Server Room	12	4380	2L4' T8/ELEC	15	915		No Upgrade	15	915	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
148	4	Office	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
149	4	Hallway	24	8760	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
150	18	Vault	4	1460	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
151	4	Programmer Area	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
152	12	ENT/EXT	24	8760	64W INCANDESC	3	192		13W CF/SI	3	45	0.147	1288	$18.00	$218.91	0.1			0	$0.00	$0.00		$0.00	$0.00	1288	$18.00	$218.91	0.1
153	4	102 Dept of Finance	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
154	4	Open Office	12	4380	2L4' T8/ELEC	17	1037		No Upgrade	17	1037	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
155	4	Tax Collector/Treasure	10	3650	2L4' T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
156	12	Vault	4	1460	64W INCANDESC	3	192		13W CF/SI	3	45	0.147	215	$18.00	$36.49	0.5			0	$0.00	$0.00		$0.00	$0.00	215	$18.00	$36.49	0.5
157	18		4	1460	2L4' T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
158	4	Central Licensing	10	3650	2L4' T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
159	4		10	3650	2L4' T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
160	4	101 Housing Bureau	10	3650	2L4' T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
161	1	Mech Room	4	1460	135W INCANDES	2	270		44W CF/SI	2	88	0.182	266	$30.00	$45.17	0.7			0	$0.00	$0.00		$0.00	$0.00	266	$30.00	$45.17	0.7
162	4	Central Licensing	10	3650	2L4' T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
163	4	Office	10	3650	2L4' T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	

163	4	Office	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
164	22	Basement Hall	24	8760	(3) 13W CF/SI	12	468		No Upgrade	12	468	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
165	3		24	8760	65W CF/SI	2	130		No Upgrade	2	130	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
166	4	GS	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
167	6		10	3650	2L22"	5	310		No Upgrade	5	310	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
168	4	Office	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
169	6	Closet	0.5	182.5	2L22"	4	248		No Upgrade	4	248	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
170	4	Conf	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
171	12	Closet	0.5	182.5	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	9	$6.00	$1.52	3.9			0	$0.00	$0.00		$0.00	$0.00	9	$6.00	$1.52	3.9	
172	6	Rear Hall	12	4380	2L22"	3	186		No Upgrade	3	186	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
173	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
174	4	P Office	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
175	6		10	3650	2L22"	2	124		No Upgrade	2	124	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
176	12	Vault	4	1460	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	72	$6.00	$12.16	0.5			0	$0.00	$0.00		$0.00	$0.00	72	$6.00	$12.16	0.5	
177	4	G8	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
178	4	Office	10	3650	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
179	4	G7 Mail Room	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
180	19	Vault	4	1460	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
181	12	RR	10	3650	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	179	$6.00	$30.40	0.2			0	$0.00	$0.00		$0.00	$0.00	179	$6.00	$30.40	0.2	
182	22	ENT/EXT Basement	24	8760	(3) 13W CF/SI	1	39		No Upgrade	1	39	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
183	4	G2 Youth Services	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
184	4	Office	10	3650	2L4'T8/ELEC	5	305		No Upgrade	5	305	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
185	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
186	4	G1	10	3650	2L4'T8/ELEC	32	1952		No Upgrade	32	1952	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
187	4	Nurse	10	3650	2L4'T8/ELEC	10	610		No Upgrade	10	610	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
188	12	RR	12	4380	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	215	$6.00	$36.49	0.2			0	$0.00	$0.00		$0.00	$0.00	215	$6.00	$36.49	0.2	
189		Elevator	24	8760		9				9									0	$0.00	$0.00			$0.00						
190	23	Mens Room	12	4380		2				2									0	$0.00	$0.00			$0.00						
191	17	Closet	0.5	182.5	250W MH/BALLA	1	286		No Upgrade	1	286	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
192	23	Womens Room	12	4380		2				2									0	$0.00	$0.00			$0.00						
193		G10 EMS (Locked)	10	3650															0	$0.00	$0.00			$0.00						
194	4	G13	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
195	4	Office Area	12	4380	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
196	21	Closet	0.5	182.5	n/a	1	0		No Upgrade	1	0	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
197	8	Boiler Room	4	1460	2L4'T8/ELEC	13	793		No Upgrade	13	793	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
198		G11 Locked	10	3650															0	$0.00	$0.00			$0.00						
199		G12 Locked	10	3650															0	$0.00	$0.00			$0.00						
200	4	G10 EMS	10	3650	2L4'T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
201	19		10	3650	2L4'T8/ELEC	1	61		No Upgrade	1	61	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
202	4	Office	10	3650	2L4'T8/ELEC	4	244		No Upgrade	4	244	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
203	4	G11	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
204	4	File	12	4380	2L4'T8/ELEC	2	122		No Upgrade	2	122	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
205	4	G12	10	3650	2L4'T8/ELEC	8	488		No Upgrade	8	488	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
206	6	G11 Office	10	3650	2L22"	6	372		No Upgrade	6	372	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
207			10	3650															0	$0.00	$0.00			$0.00						
208	4	G14	10	3650	2L4'T8/ELEC	6	366		No Upgrade	6	366	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00		
209	12	Mech Closet	4	1460	64W INCANDESC	1	64		13W CF/SI	1	15	0.049	72	$6.00	$12.16	0.5			0	$0.00	$0.00		$0.00	$0.00	72	$6.00	$12.16	0.5	
210	25	Exterior	24	8760		6				6									0	$0.00	$0.00			$0.00						
211	26		24	8760		9				9									0	$0.00	$0.00			$0.00						
212	24		24	8760		8				8									0	$0.00	$0.00			$0.00						

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com

Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

Third Party Gas Suppliers for Elizabethtown Gas Co. Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateastern.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com

South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measure (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Gas Rate and Electric Rate ($/therm and $/kWh): The gas rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly gas and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

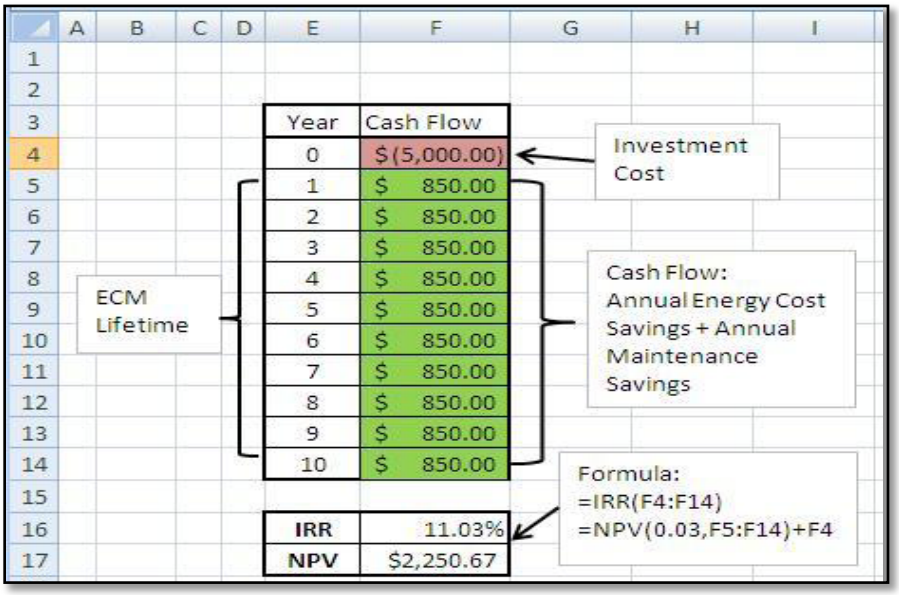
Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime Cost Savings
NPV	Net Present Value
IRR	Internal Rate of Return
DR	Discount Rate
Net ECM Cost	Total ECM Cost – Incentive
LECS	AECS X ECM Lifetime
AOCS	LOCS / ECM Lifetime
LCS	LOCS+LECS
Simple Payback	Net ECM Cost / (AECS + AOCS)
Lifetime ROI	(LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI	(Lifetime ROI / Lifetime) = [(AECS + OCS) / Net ECM Cost – (1 / Lifetime)]

* The lifetime operating cost savings are all avoided operating, maintenance, and/or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Excel NPV and IRR Calculation

In Excel, function =IRR (values) and =NPV(rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves $850 annually in energy and maintenance costs (over a 10 year lifetime) and takes $5,000 to purchase and install after incentives:



Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 50kW or less, $1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $600/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.

Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
City of Elizabeth - City Hall

Building ID: 2250071
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: May 28, 2010

Facility	Facility Owner	Primary Contact for this Facility
City of Elizabeth - City Hall 50 Winfield Scott Plaza Elizabeth, NJ 07201	N/A	N/A

Year Built: 1940
Gross Floor Area (ft²): 78,168

Energy Performance Rating[2] (1-100) 81

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,979,518
Natural Gas (kBtu)[4]	5,372,608
Total Energy (kBtu)	8,352,126

Energy Intensity[5]	
Site (kBtu/ft²/yr)	107
Source (kBtu/ft²/yr)	199

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	740

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison	
National Average Site EUI	160
National Average Source EUI	299
% Difference from National Average Source EUI	-33%
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.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	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.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. The incentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum 15%performance threshold savings has been achieved.

For further information, please see: http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings .

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 80%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program*

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to: http://njcleanenergy.com/EECBG

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.

*Subject to availability. Incentive program timelines might not be sufficient to meet the 25% in 12 months spending requirement outlined in the LGEA program.

APPENDIX G: ENERGY CONSERVATION MEASURES

Energy Conservation Measures																			
ECM #	ECM description	Cost Source	Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	Lighting upgrades	RS Means	1,551	135	1,416	24,129	5.1	0	1.1	60	4,234	15	63,515	0.3	4386%	292%	299%	48,409	43,203
2	Premium efficiency exhaust fan motor	RS Means	850	54	796	3,891	0.8	0	0.2	0	673	10	6,731	1.2	746%	75%	84%	4,888	6,967
3	Install 6 occupancy sensors	RS Means	1,320	120	1,200	1,620	0.1	0	0.1	0	280	10	2,803	4.3	134%	13%	19%	1,166	2,901
4	Upgrade plumbing fixtures	RS Means	73,200	0	73,200	0	0.0	0	0.0	14,021	14,021	20	280,420	5.2	283%	14%	19%	131,592	0
5	Install roof-mounted 2.99 Solar PV system	Similar Projects	17,940	2,990	14,950	3,564	0.8	0	0.2	0	2,417	25	60,414	6.2	304%	12%	14%	16,732	6,381
	TOTALS		**94,861**	**3,299**	**91,562**	**33,204**	**6.8**	**0**	**1.4**	**14,081**	**21,625**	-	**413,883**	**4.2**	-	-	-	**202,787**	**59,452**

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions, eQUEST
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Published and established specialized equipment material and labor costs Cost estimates also based on utility bill analysis and prior experience with similar projects

Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.