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November 11, 2010

Local Government Energy Program
Energy Audit Final Report

City of Orange Township

Polhill Justice Complex
29 Park Street
Orange, NJ 07050

Project Number: LGEA68

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EXECUTIVE SUMMARY

The City of Orange Township Polhill Justice Complex is a two-story building comprising a total conditioned floor area of 47,450 square feet. The original structure was built in 2000, and there have been no major renovations or additions since then. The following chart provides an overview of current energy usage in the building based on the analysis period of May 2009 through April 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	1,037,600	28,127	$189,885	133.9	6,353
Proposed	951,814	28,127	$171,879	127.7	6,060
Savings	85,786	0	$18,006	6.2	293
% Savings	8%	0%	9%	5%	5%

SWA has also entered energy information about the Polhill Justice Complex in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Public Safety Building is comprised of non-eligible ("Other") space type. The resulting Site Energy Use Intensity is 134 kBtu/sqft-yr, which is higher than the average comparable building by 25.0%.

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. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	$10,936	4.6	$50,437	101747
5-10 Year	$7,070	0.7	$5,036	51854
>10 year	$0	-	$0	0
Total	$18,006	3.1	$55,473	153600

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 12 cars from the roads each year or avoiding the need of 374 trees to absorb the annual CO_2 generated.

Other recommendations to increase building efficiency pertaining to operations and maintenance and capital improvements are listed below:

Further Recommendations:

SWA recommends that the Polhill Justice Complex further explore the following:

- Capital Improvements
  - Install premium motors when replacements are required
  - Properly align solar photovoltaic panels
- Operations and Maintenance
  - Discontinue use of AO Smith Natural Gas Boiler until flue pipe is replaced
  - Properly monitor and operate the 100 kW PV System
  - Overgrown ground vegetation should be removed
  - Repair/clean roof drains gutters and downspouts
  - Install/replace and maintain weather-stripping around all exterior doors and roof hatches
  - Repair insulation on all hot water piping in mechanical room as per code requirements
  - Properly mount hot water booster pump in mechanical room and repair leak
  - Replace boiler hot water temperature stats in mechanical room
  - Investigate Carrier VAV box temperature and humidity set points and train building management to make adjustments
  - Investigate piping connection for VAV reheat coils
  - Provide water-efficient fixtures and controls
  - SWA recommends that the building considers purchasing the most energy-efficient equipment
  - Use smart power electric strips
  - Create an energy educational program

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for City of Orange Township. Based on the requirements of the LGEA program, City of Orange Township 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 $2,412.50.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that City of Orange Township can take to achieve greater energy efficiency and reduce operating expenses. It is important to note that the required 25% expenditure is per building and after the other implementation incentive amounts.

Table 3: Next Steps for the Polhill Justice Complex

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Lighting and Motor Replacements	NJ Clean Energy – SmartStart, Direct Install

There are various incentive programs that the City of Orange Township could apply for that could help lower the cost of installing the ECMs. For the Polhill Justice Complex, and contingent upon available funding, SWA recommends the following incentive programs:

Direct Install 2010 Program: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades.

Smart Start: Majority of energy saving equipment and design measures have moderate incentives under this program.

Energy Efficiency and Conservation Block Grant Rebate Program: Provides up to $20,000 per local government toward energy saving measures.

Please refer to Appendix F for further details.

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.

SWA performed an energy audit and assessment for the Polhill Justice Complex at 29 Park St. Orange, NJ. The process of the audit included facility visits on March 19, 2010 and April 22, 2010, 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 Orange Township to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Polhill Justice Complex.

HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

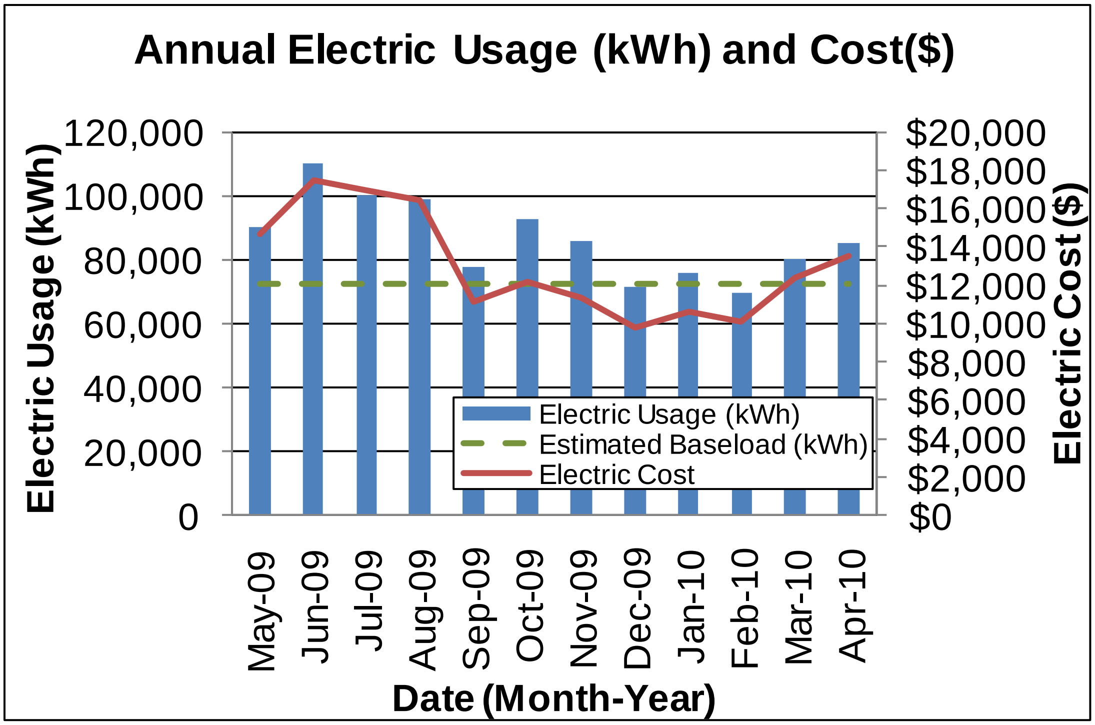
SWA reviewed utility bills from May 2008 through April 2010 that were received from the utility companies supplying the Polhill Justice Complex with electric and natural gas. There were no electric bills provided for the months of May 2009 through April 2010, so the electric usage and cost from May 2008 through April 2009 were used as an estimate. There was no major equipment or functional changes to the building during these two time periods, so the usage should be comparable.

Also, the gas meter information provided by PSEG did not seem to be complete. Both the usage and cost were far too low for this building which has gas furnaces as well as a gas boiler. Therefore, the usage from a similar type of Police Building was used and scaled for the size of the building. The cost for the usage was estimated based on the average cost per therm for a few of the Orange Township municipal buildings.

A 12 month period of analysis from May 2009 through April 2010 was used for all calculations and for purposes of benchmarking the building.

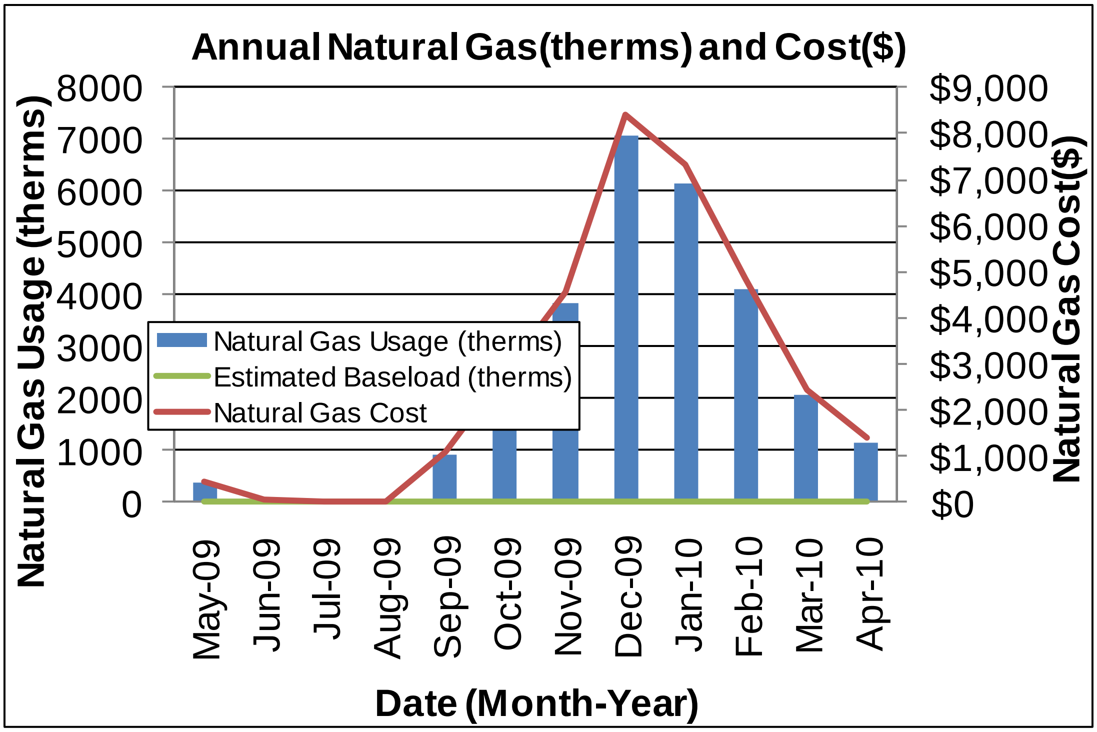
Electricity - The Polhill Justice Complex is currently served by one electric meter. The Polhill Justice Complex currently buys electricity from PSE&G at **an average aggregated rate of $0.151/kWh**. The Polhill Justice Complex purchased **approximately 1,037,600 kWh, or $156,473 worth of electricity,** in the previous year.

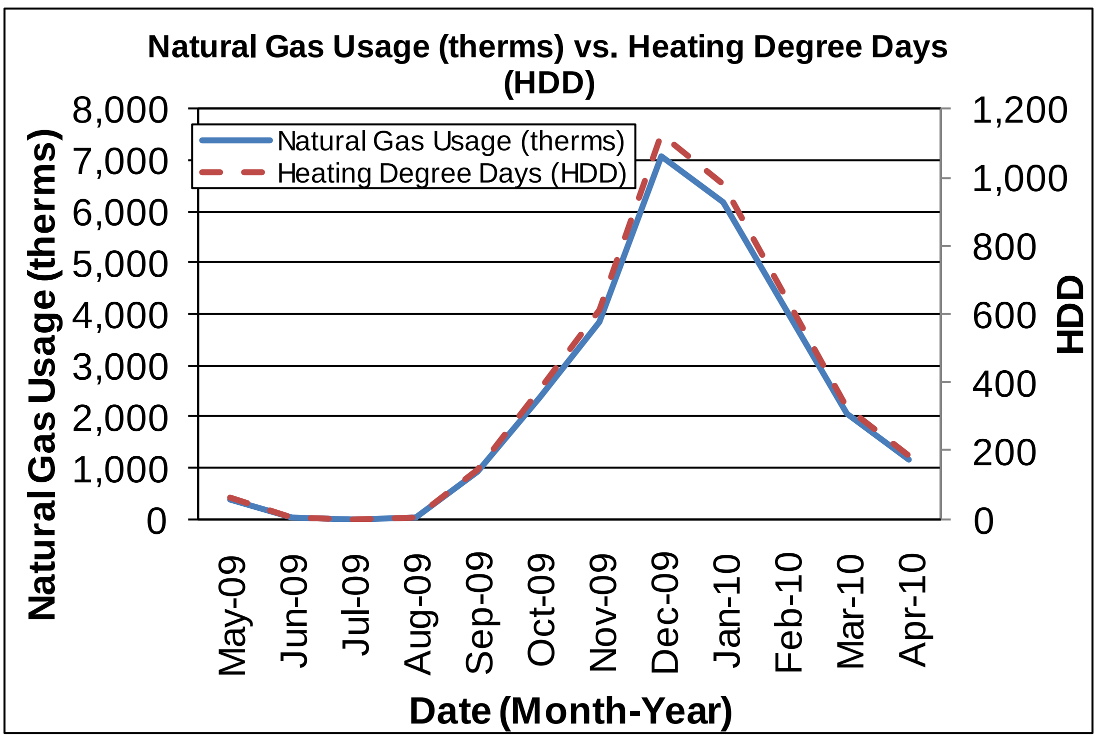
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Polhill Justice Complex.



Natural gas - The Polhill Justice Complex is currently served by one meter for natural gas. The Polhill Justice Complex currently buys natural gas from PSE&G. at **an estimated rate of $1.188/therm**. The Polhill Justice Complex purchased **approximately 28,127 therms, or $33,412 worth 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 Polhill Justice Complex.

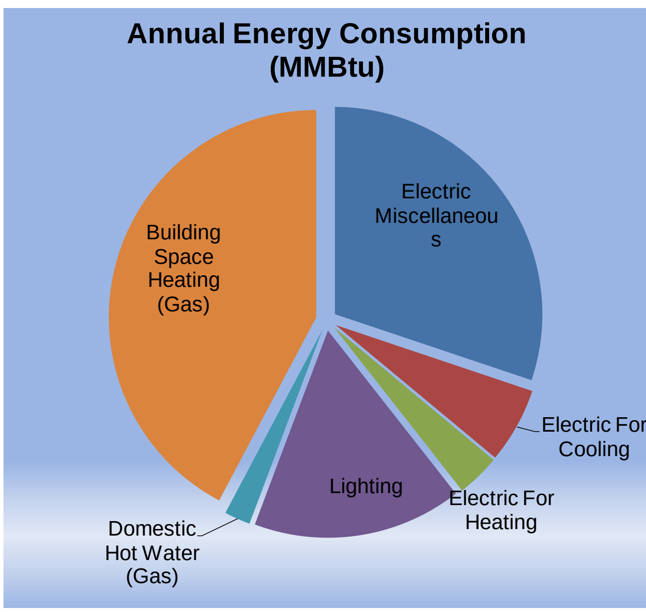


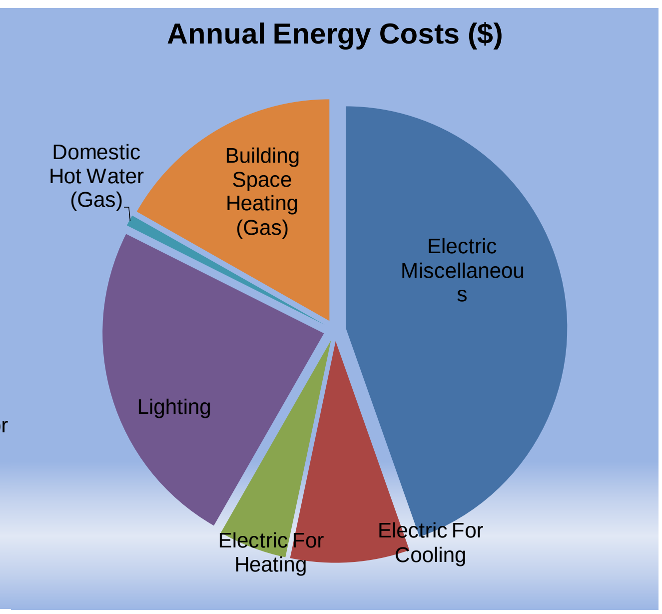


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the BUILDING based on utility bills for the 12 month period. Note: electrical cost at $44/MMBtu of energy is 3.5 times as expensive as natural gas at $12/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	1,916	30%	$84,676	45%	44
Electric For Cooling	374	6%	$16,528	9%	44
Electric For Heating	214	3%	$9,470	5%	44
Lighting	1,036	16%	$45,798	24%	44
Domestic Hot Water (Gas)	129	2%	$1,527	1%	12
Building Space Heating	2,684	42%	$31,885	17%	12
Totals	6,353	100%	$189,886	100%	
Total Electric Usage	3,541	56%	$156,473	82%	44
Total Gas Usage	2,813	44%	$33,412	18%	12
Totals	6,353	100%	$189,886	100%	

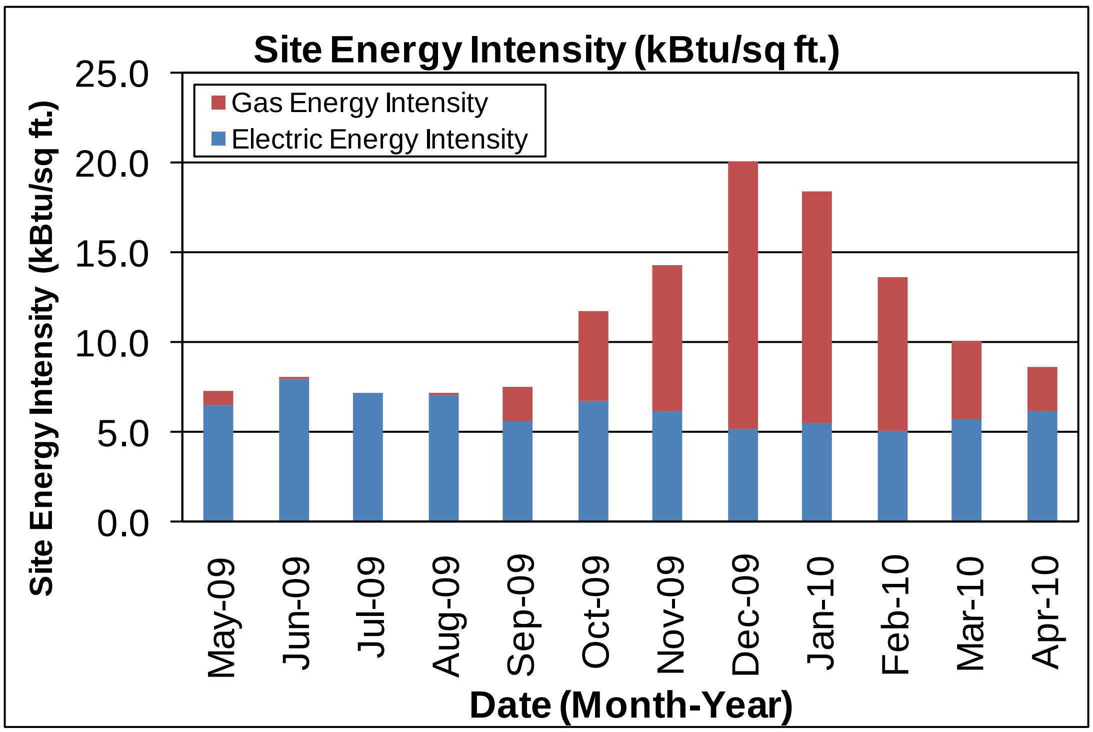




Energy benchmarking

SWA has entered energy information about the Polhill Justice Complex in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This Public Safety facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Polhill Justice Complex is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 134.0 kBtu/ft^2-yr compared to the national average of a Public Safety building consuming 90.0 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 "Other" space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the City of Orange Township 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 Orange Township to create an *ENERGY STAR® Portfolio Manager* account and share the Polhill Justice Complex 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 Orange Township [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 City of Orange Township 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 for condensing units.

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 Orange Township 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 Polhill Justice Complex pays a rate of $0.151/kWh. The Polhill Justice Complex annual electric utility costs are $1,038 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 23% over the most recent 12 month period.

The average estimated NJ commercial utility rates for gas are $1.550/therm, while Polhill Justice Complex pays a competitive rate of $1.188/therm.

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 Polhill Justice Complex 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 Polhill Justice Complex. Appendix C contains a complete list of third-party energy suppliers for the City of Orange Township 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 March 19 and April 22, 2010, the following data was collected and analyzed.

Building Characteristics

The two-story, (slab on grade,), 47,450 square feet Polhill Justice Complex Building was originally constructed in 2000 with no major additions/alterations since then. It houses police offices, administrative offices, court room, county clerk, bathrooms and utility rooms.

Front Façade

Rear Façade

Side Façade (typ.)

Front Façade

Building Occupancy Profiles

The occupancy is approximately 30 officers, 20 staff and up to 30 visitors daily from 7:00am to 5:00 pm and 30 officers daily overnight.

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.

Exterior Walls

The exterior wall envelope is mostly constructed of ribbed concrete block over concrete block with 2 inches of rigid insulation. The interior is mostly painted gypsum wallboard.

Note: Wall insulation levels could not be verified in the field and are based on available construction plans.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall good condition with no signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

Roof

The building's roof is predominantly a flat, no parapet type over steel decking, with a dark-colored EPDM single membrane finish and is original. Zero inches of detectable ceiling insulation, and six inches of fiberglass batt roof insulation were recorded. There are two sections in the center of the building that are also covered by a medium-pitch gable type over a wood structure with an asphalt shingle finish..

Note: Roof insulation levels could not be verified in the field, and are based on available construction plans.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall acceptable condition, with some signs of uncontrolled moisture, air-leakage and other energy-compromising issues on any roof areas.

The following specific roof problem spots were identified:

Signs of standing water due to raised drains

Deteriorated gutters pan

Uncontrolled vegetation growth on roof, on surfaces that do not have direct sunlight

Base

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

Slab/perimeter insulation levels could not be verified in the field and are based on available construction plans.

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 several different types of windows:

1. 16 skylight type windows with a non-insulated aluminum frame clear double glazing and no interior or exterior shading devices. The windows are located on the roof and are original.

2. Various geometrically shaped fixed type windows with a non-insulated aluminum frame clear double glazing and no interior or exterior shading devices. The windows are located on both floors of the front entrance and are original.

3. 24 fixed glass block windows with concrete sill, beveled glazing and no interior or exterior shading devices. The windows are located on the 2nd floor and are original.

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 several different types of exterior doors:

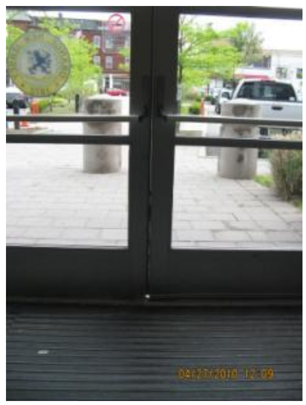
1. One glass with aluminum/steel frame type exterior double door located in the lobby and is original.

2. Eight aluminum type exterior doors located on the sides and back of the building and are original.

3. Two roll up metal garage doors located in the back of the building and are original.

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 good 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/worn weather-stripping on lobby glass door

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 Ventilation Air Conditioning

The Polhill Justice Center has cooling, heating and ventilation throughout the building. Using a variable volume air system with temperature controls, the system can adjust to to thermostat settings in each specified zone. Despite this however, there are frequent maintenance calls for repairs during both heating and cooling seasons. There is also a concern about the way the system is managed and controlled.

Equipment

The Polhill Justice Complex is primarily heated and cooled by three Carrier Packaged Rooftop Units, (RTU), two sized for 60 tons cooling and 810 MBH heating and one sized for 40 tons and 530 MBH heating. The rooftop units contain a natural gas burner for heating and a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. The burner provides heat to the passing air through the combustion of natural gas; for cooling the R-22 refrigerant absorbs heat from the passing air in the evaporator coil and transfers the heat to the atmosphere using the condenser fans.

Carrier Rooftop Units RTU-2 & RTU-1

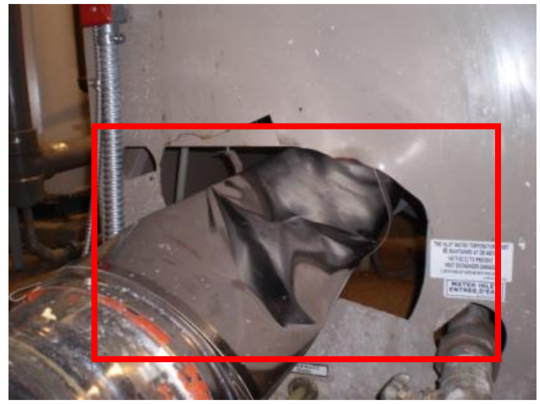
The RTU supply fans send conditioned air to over 65 Variable Air Volume (VAV) boxes, each with reheat coils. There are also several Constant Air Volume (CAV) boxes served by RTU-2. When there is high humidity, usually in summer months, the system is designed to cool the air low enough so that moisture condenses out. Then the VAV reheat coils use hot water to warm the air back up to desired space conditions.

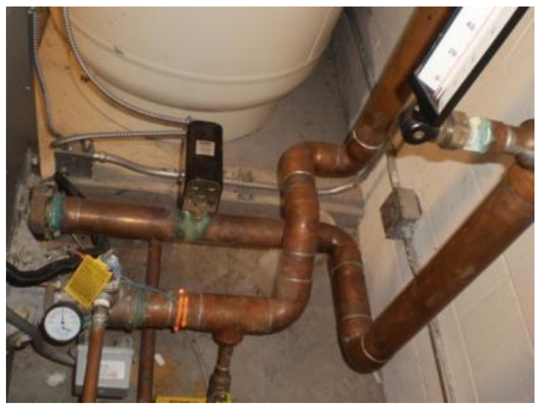
Typical VAV box with reheat coil connection

Two natural gas boilers serve the hot water heating system, one Laars 1,000 MBH boiler and an AO Smith boiler. The boilers combust natural gas in order to heat water then pumps draw the heated water away from the boiler to reheat coils, hot water unit heaters and cabinet unit heaters throughout the building. The hot water coil within the VAV boxes and unit heaters disperses heat to the surrounding air and fans disperse the heated air to the space. The water then returns to the boiler at a lower temperature to be heated again.


Laars boiler (left) and AO Smith boiler (right)

The AO Smith boiler flue pipe is badly damaged and is also not properly connected to the roof for exhaust. This is a health and safety issue that must be addressed. There is also missing insulation on hot water piping which is necessary to protect staff and also reduces heat loss.



AO Smith flue pipe not connected to roof exhaust; Flue pipe damaged at base of boiler


Missing insulation on hot water piping

The two hot water circulating pumps use 5 HP Marathon 87.5% efficient motors. There is also a hot water booster Bell & Gossett ¾ HP pump which was mounted using a piece of cardboard and has a leak at the pump section.



Hot water circulation pumps P-1 and P-2 standby; Hot Water booster pump mounted on cardboard

Some areas of the building require supplemental cooling due to high humidity and heat loads such as server rooms, or equipment rooms. There are six split DX units which serve these spaces, and have air-cooled condensers on the roof to disperse the heat. There is also supplemental heating with two electric unit heaters in the utility room and generator room.

DX Split System Condenser on Roof with R-22 piping down to units on 1st floor

Building ventilation is provided by a continuous circulation of outside air intake and exhaust. Outside air intake louvers on the rooftop units are motorized and modulate based on space conditions, but maintain a minimum open position. There are also 16 rooftop exhaust fans which serve bathrooms, machine rooms, storage rooms and rooftop units.

Rooftop Exhaust Fans, Typ.

Distribution Systems

The RTU fans draw in outside air where it is combined with return air from the building. Using transfer grills and returns grills the air from the space is draw into the above-ceiling return air plenum and ducted back to the rooftop units. A small portion of the return air is purged using exhaust fans and vented outside prior to entering the mixing box. The mixed air inside the air handler is sent through two sets of filters before passing through the evaporator or direct expansion (DX) coil. The supply air fan then pushes the air through the furnace section. The conditioned air is then sent to the supply air distribution system. The furnace is only active in the heating season and the DX system is only active in the cooling season. In between these seasons the unit may operate in economizer mode, where only the fans are active to provide fresh air to the building and neither the furnace nor DX system is operating.

The Polhill Justice Complex supply air system uses Variable Air Volume (VAV) boxes throughout the ductwork system. The VAV boxes are mounted within the ductwork and have a modulating damper to adjust the amount of supply air in order to satisfy the temperature settings of the area that it serves. The VAVs are direct digital control and have pulse width modulation. In order to reap energy savings, as the VAV boxes reduce air flow, the 15 HP or 7.5 HP supply air fans within the RTU's reduce in speed using Variable Frequency Drives, VFDs.   The Carrier VAVs each have hot water reheat coils to reheat cold air when in the cooling mode, if some areas call for warmer temperatures than others.


Typical Carrier VAV box with hot water reheat

Controls

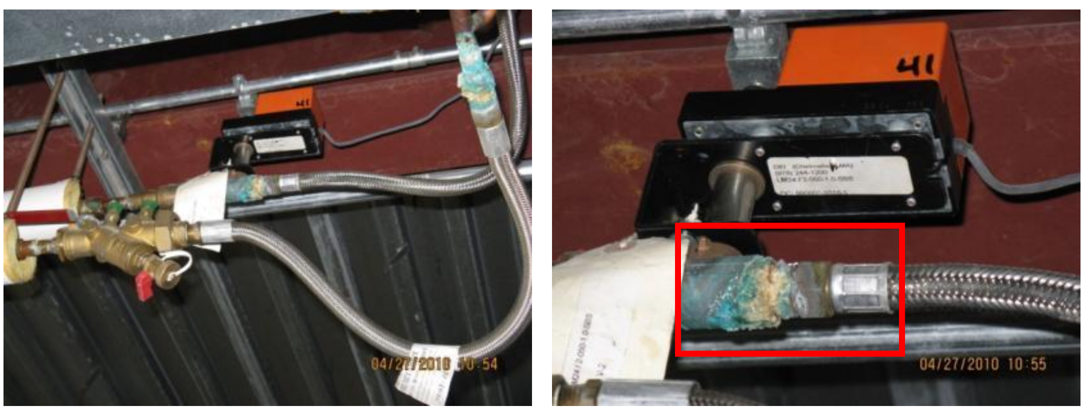
The natural gas boilers operate to maintain a supply water temperature which resets based on outside air temperature. The heating loop setpoint varies from 150˚F to 200˚F. The thermostats installed in the hot water piping however have a maximum temperature reading of 120˚F.

Thermostat at boiler supply with max temperature of 120˚F

The operating mode of the rooftop units, heating or cooling, is also determined by outside air temperature. The position of the VAV boxes is determined by Carrier temperature and humidity sensors throughout the building, one for each VAV box. The sensor set points are not adjustable by building users; building staff are unaware of how the sensors are managed.

Typical VAV box temperature and humidity sensor

The hot water reheat coils connected to each VAV box are controlled by a modulating valve on the hot water return pipe to satisfy space conditions. In at least one location corrosion was found at the valve connection on the hot water piping, likely due to the lack of a dielectric connection between the steel pipe and brass valve. When two dissimilar metals are in contact and water runs through them, often one of the metals will corrode unless a dielectric connection is installed between them.



VAV Reheat automatic control valve; Corrosion that can cause leaks

Nine of sixteen exhaust fans are interlocked with the operating of the rooftop units, so they operate at constant speed when their associate rooftop unit is operating. These fans draw in return air from the space back to the return plenum. Most other exhaust fans are controlled by thermostat. EF-9 and EF-10 in the Sally Port and Bike Storage areas operate to maintain acceptable carbon monoxide levels.

The rooftop unit supply fans have Variable Speed Drives which allows the fan motors to ramp down from 0Hz to 60Hz based on the space requirements. Therefore, if most of the building is satisfied and VAV boxes start to modulate closed, the VFD's on the supply fans will start to reduce the speed of the motors to only what is needed. This is a significant energy savings since there are two 15 HP motors, and one 7.5 HP motor for the three RTU's. Due to the nature of motors, when the speed is reduced by half, the power used is reduced by an eighth. Therefore, when controlled properly VFD's can greatly improve the efficiency of the HVAC system.

Toshiba VFD on RTU supply fan, typ.

The hot water heaters and cabinet heaters are controlled by local dial thermostats

Hot water Unit heater thermostat, typ.

Domestic Hot Water

The domestic hot water (DHW) for the Polhill Justice Complex is provided by two 400,000 Btu/hr natural gas, condensing boilers with 125 gallons storage.

Condensing Domestic Hot Water Heaters

The heaters have 50% estimated useful operating life remaining and appear in good condition.

Electrical systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

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.

Interior Lighting - The Polhill Justice Complex currently contains mostly T8 fixtures, chandeliers and wall sconces with self-ballast bulbs. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas. There are some concerns with both interior and exterior visibility in a few places.

Lobby lighting with photocells; lobby up-lighting

Standard office lighting; court room up-lighting

Exit Lights - Exit signs were found to be LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp and CFL fixtures. Exterior lighting is controlled by timers.

Exterior Metal Halide lights

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.

Elevators

The Polhill Justice Complex does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Polhill Justice Complex other than two Siemens transformers, sized for 30.0 kVa and 75.0 kVa.

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

Since January 17, 2008, a 100 kW Photo voltaic system has been serving the Polihill Justice Center building. See further details in Solar Panel section below.

Evaluated Systems

Solar Photovoltaic

Currently, the Polhill Justice Complex contains a 100.2 kW Photovoltaic system made of a total of 487 panels. 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.

The existing system consists of 435 Sharp 208 Watt PV modules and 52 Sharp 187 Watt PV modules which feed 12 SMA 7,000 Watt inverters, which convert direct current to usable alternating current to serve the main electrical panel for the building. The panels have a synchronized connection to the grid and therefore can receive grid power or sell power back to the grid if the power produced exceeds the load. This capability is referred to as Net Metering.

The 100.2 kW system was designed to serve 15% to 20% of the building electric needs, at approximately 108,000 kWh per year.

The panels are installed in three configurations. There are flat panels on the North and South side of the building and south facing panels on a sloped section of roof in the center of the building. There are also 12 SMA Sunny Tower Racks installed which convert PV DC electricity to AC to feed the building.

Bird’s eye view of building roof with PV panels throughout


PV panels on North Side roof

PV light sensor

An output monitor in the Justice Center lobby is meant to display the energy production of the solar panels. According to building staff the monitor has not been operating for over a year.

PV Usage Display Panel – not operating

SWA observed that all PV panels that were mounted on the flat portion of the roof were mounted with no incline. Typically, Solar PV panels are mounted at a specific angle in order to capture the largest amount of solar radiation throughout the day. Also, since these panels are mounted flat, each panel has a lip near the edge where the metal mounting bracket secures the PV panel. This lip around the flat, un-inclined surface allows a thin layer of water to sit; preventing the solar panels from receiving the full amount of solar radiation. Currently, when the sitting water evaporates it also leaves a thin film across the panel further reducing solar radiation.


Standing water on flat-mounted solar panels

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.

Geothermal

The Polhill Justice Complex is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 56% and 76% remaining useful life.

Combined Heat and Power

The Polhill Justice Complex 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	Energy Vending Misers
2	Building Lighting Upgrades: Inc to CFL
3	Replace Fan Motors with Premium Eff.
4	Building Lighting Upgrades: MH to PSMH
	Description of Recommended 5-10 Year Payback ECMs
5	Replace HW Pumps with Premium Eff.
6	Building Lighting Upgrades: MH indoor to T5

Assumptions: Discount Rate: 3.2%; Energy Price Escalation Rate: 0%
Note: A 0.0 electrical demand reduction/month indicates that it is very low/negligible

ECM#1: *Energy Vending Misers*

SWA recommends installing vending misers on the beverage vending machine and snack machine in the lounge area of the building.

Energy vending miser devices are now available for conserving energy used by beverage vending machines and coolers. There isn't a need to purchase new machines to reduce operating costs and greenhouse gas emissions. When equipped with the vending miser devices, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the vending machine. Vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

Snack vending miser devices can be used on snack vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snack vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up. There is a snack machine and drink vending machine in the first floor break room which can operate more efficiently by using this low cost device.

Installation cost:

Estimated installed cost: $258 (includes $50 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
1	258	0	258	2,536	1	0	0	0	383	12	4,595	0.6	1,681	4,541

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA assumes energy savings based on modeling calculator found at www.usatech.com or http://www.usatech.com/energy_management/energy_calculator.php

Rebates/financial incentives:

- *NJ Clean Energy – Direct Install (Up to 60% of installation cost)*

Please see Appendix F for more information on Incentive Programs.

ECM#2: *Building Lighting Upgrades: Replace Inc with CFL*

The existing lighting contains over 20 inefficient incandescent lamps. SWA recommends that each incandescent lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power when compared to incandescent, halogen and Metal Halide fixtures. CFL bulbs produce the same lumen output with less wattage than incandescent bulbs and last up to five times longer. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $1,707 (includes $1,280 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
2	1,707	0	1,707	3,376	1	0	0	1,005	1,515	5	7,573	0.6	344	6,044

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 25 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *None at this time*

Please see Appendix F for more information on Incentive Programs.

ECM#3: ***Replace RTU Fan Motors with Premium Efficiency***

During the field audit, SWA completed the building equipment inventory and observed standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs.

The existing RTU supply and exhaust fan motors are standard efficiency and vary in size from 25.0 HP to 7.5 HP. Due to the fact that the building is operated 24 hours a day, replacing these motors with premium efficiency can generate significant savings. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $7,310 (includes $2,001 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM Details	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
Replace two 25 HP Supply Fans with Premium Eff.	3,652	260	3,392	6,422	2.2	0	0.5	0	970	20	19,394	3.5	24	11,499
Replace Three 15 HP Supply/Exhaust Fans with Premium Eff.	3,567	345	3,222	8,163	2.8	0	0.6	0	1,233	20	24,652	2.6	33	14,616
Replace one 7.5 HP Exhaust Fans with Premium Eff.	786	90	696	1,484	0.5	0	0.1	0	224	20	4,482	3.1	27	2,657
3	**8,005**	**695**	**7,310**	**16,069**	**5**	**0**	**1**	**0**	**2,426**	**20**	**48,528**	**3.0**	**564**	**28,772**

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html . For fan motors it was assumed that they operate for the EPA combined full load heating and cooling hours for 3340 hours annually.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors*
    - *25 HP - $130/motor*
    - *15 HP - $115/motor*
    - *7.0 HP - $90/motor*

Please see Appendix F for more information on Incentive Programs.

ECM#4: *Building Lighting Upgrade: Replace MH with PSMH*

The existing lighting contains over 85 standard probe start Metal Halide (MH) lamps. SWA recommends replacing the higher wattage MH fixtures with pulse start MH lamps which offer the advantages of standard probe start MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $40,143 (includes $30,107 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
4	42,368	2225	40,143	34,093	7	0	2	1,351	6,499	15	97,481	4.2	143	61,044

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - Metal Halide with pulse start ($25 per fixture) - Maximum incentive amount is $2,225.*

Please see Appendix F for more information on Incentive Programs.

ECM#5: *Replace RTU Fan Motors with Premium Efficiency*

During the field audit, SWA completed the building equipment inventory and observed standard efficiency motors. Efficiency varies by motor size, with larger motors tending toward higher efficiency. The highest-efficiency motors available commercially today have efficiencies of 93-94%, and higher for the largest motors. Focusing on the entire motor system, not just the motor, offers even greater potential for energy savings. Premium-efficiency motors cost 15-25% more than standard motors, or $8-$40 more per horsepower, they pay for themselves quickly in saved operating costs.

The existing hot water pump set has two standard efficiency 5.0 HP motors. Due to the fact that the building is operated 24 hours a day, replacing these motors with premium efficiency can generate significant savings. The exact length of the payback period depends on several factors, including annual hours of use, energy rates, costs of installation and downtime, and the availability of utility rebates. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $1,020 (includes $285 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM Details	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
5	1,140	120	1,020	752	0	0	0	0	114	20	2,271	6.0	123	1,346

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA used MotorMaster+ International Savings Calculator - http://www1.eere.energy.gov/industry/bestpractices/software_motormaster_intl.html . SWA estimated for existing pumps: used EPA full load heating hours of 2340 for HW pumps. For pump sets, there is one primary pump and one standby, so for those calculations, the cost and incentive is for both pumps, but the savings is only for one pump since they would not operate at the same time.

Rebates/financial incentives:

- *NJ Clean Energy – Premium Efficiency Motors*
    - *5 HP - $60/motor*

Please see Appendix F for more information on Incentive Programs.

ECM#6: *Building Lighting Upgrades: Replace indoor MH with T5*

The existing indoor lighting contains 24 standard probe start Metal Halide (MH) lamps. SWA recommends replacing the indoor higher wattage MH fixtures with 8-lamps 4'T5 fixtures which offer the advantages of standard probe start MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $5,036 (includes $3,022 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

ECM #	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	annual return on investment, %	CO_2 reduced, lbs/yr
6	5,420	384	5,036	28,961	6	0	2	2,697	7,070	15	106,046	9.5	2,006	51,854

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 5 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - Metal Halide with T5 ($16 per fixture) - Maximum incentive amount is $384.*

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 Polhill Justice Complex:

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

- Properly align solar photovoltaic panels – SWA recommends that the City of Orange contact the installer of the Solar Panels in order to address concerns that they are not mounted at the proper angle. Typically, Solar Panels should be mounted at an angle (typically in the same range as degrees latitude for the location) but should be based on calculations for maximum irradiation.

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.

- Discontinue use of AO Smith Natural Gas Boiler until flue pipe is replaced. Currently the pipe is crimped and disconnected from the roof so the products of combustion will enter the mechanical room or back up in the boiler furnace. This is a major code violation and life safety issue. The replacement to a stainless steel flue is approximately $115 installed cost.

- Properly monitor and operate the 100 kW PV System – According to building staff, the 100 kW photovoltaic system on the roof is not properly metered for usage and is not regularly maintained. The huge capital investment in this renewable system will only payback if the electric generation is monitored and the panels are properly maintained.

- Overgrown ground vegetation should be removed to not touch or block wall surfaces from necessary access, ventilation and sunlight.

- Repair/clean roof drains gutters and downspouts.

- Install/replace and maintain weather-stripping around all exterior doors and roof hatches.

- Repair insulation on all hot water piping in mechanical room as per code requirements. It was noted during the field audit that the mechanical room piping was missing insulation. Insulation ensures minimal heat loss of process fluids as well as protection from burning.

- Properly mount hot water booster pump in mechanical room and repair leak. Pump is currently balanced using a piece of cardboard.

- Replace boiler hot water temperature stats in mechanical room to allow temperature readings up to 200˚ F.

- Investigate Carrier VAV box temperature and humidity set points and train building management to make adjustments.

- Investigate piping connection for VAV reheat coils and install dielectric couplings where corrosion is found

- 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.

- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced.   More information can be found in the "Products" section of the ENERGY STAR® website at: http://www.energystar.gov.

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

- Create an energy educational program - that teaches how to minimize energy use. The U.S. Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: http://www1.eere.energy.gov/education/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for City of Orange Township. Based on the requirements of the LGEA program, City of Orange Township 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 $2,412.50.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating/ Cooling	RTU-1; Carrier packaged rooftop unit, gas-fired furnace with DX cooling, R-22 refrigerant, 810,00 Btuh heating input, 648,000 Btuh heating output, 80% thermal efficiency, 237.41 kW input, 189.93 kW output, 60 tons, 20,000 CFM, 25 HP Fan Motor, 6 Condenser Fans 40,800 CFM, 15 HP Exhaust Fan	Carrier, Model #48FPE064-H-, Series 600EK, Serial #2999 F35856	N. Gas/ Electricity	Rooftop	North & Core	1999	56%
Heating/ Cooling	RTU-3; Carrier packaged rooftop unit, gas-fired furnace with DX cooling, R-22 refrigerant, 810,000 Btuh heating input, 648,000 Btuh heating output, 80% thermal efficiency, 237.41 kW input, 189.93 kW output, 60 tons, 20,000 CFM, 25 HP Fan Motor, 6 Condenser Fans, 40,800 CFM, 15 HP Exhaust Fan	Carrier, Model #48FPE064-H-, Series 600EK, Serial #2999 F35851	N. Gas/ Electricity	Rooftop	South & Core	1999	56%
Heating/ Cooling	RTU-2; Carrier packaged rooftop unit, gas-fired furnace with DX cooling, R-22 refrigerant, 529,000 Btuh heating input, 423,000 Btuh heating output, 80% thermal efficiency, 237.41 kW input, 189.93 kW output, 40 tons, 14,000 CFM, 15 HP Fan Motor, 4 Condenser Fans, 28,200 CFM, 7.5 HP Exhaust Fan	Carrier, Model #48FPE044-G-, Series 600DJ, Serial #2999F35846	N. Gas/ Electricity	Rooftop	West	1999	56%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	B-1; Laars Pennant boiler, 999,960 Btuh input, 839,000 Btuh output, 83.9% thermal efficiency, automatic circulating tank water heater	Laars Pennant, Model #PNCV1000NACN2BJN, Serial #C04106916	N. Gas	Boiler room, second floor	All Areas/ VAV boxes	2004	76%
Heating	B-2; AO Smith-Burkay, 90% thermal efficiency, low-Nox hydronic heating boilers	AO Smith-Burkay, Legend 2000, Model #NA, Serial #L9949891	N. Gas	Boiler room, second floor	All Areas/ VAV boxes	1999	56%
Heating	Heating Hot Water booster pump, B&G, 3/4 HP, 60Hz, 1,725 RPM, encl-DP	B&G, Model #AQK56A17D60EP, Part #903582	Electricity	Boiler room, second floor	HHW system	2004	76%
Heating	P-1, Hot Water Pump, 5HP, 1745 RPM, 3ph, 87.5% Eff.,	Marathon, Series E-High Efficiency, Catalog #E719, M# 5VC184TTDB4026ANX, Type TDR,	Electric	Mechanical Penthouse	Heating Hot Water	1999	56%
Heating	P-2 Hot Water Pump Standby, 5HP, 1745 RPM, 3ph, 87.5% Eff.,	Marathon, Series E-High Efficiency, Catalog #E719, M# 5VC184TTDB4026ANX, Type TDR,	Electric	Mechanical Penthouse	Heating Hot Water	1999	56%
Heating	EUH-1 Electric Hot Unit Heaters, 10.0 kW, 650 CFM, 1/30 HP	Qmark MUH-10-8	Electric	Generator Room'	Generator Room	1999	56%
Heating	EUH-2 Electric Hot Unit Heaters, 3.0 kW, 650 CFM, 1/100 HP	Qmark MUH-03-71	Electric	Utility Room	Utility Room	1999	56%
Heating	UH-1 64.6 MBH, 1/6 HP,	Airtherm HSW-92	Electric/ HW	Motor Units	Motor Units	1999	56%
Heating	UH-2, 36.1 MBH, 1/20 HP	Airtherm HU-45	Electric/ HW	Large Evidence Room	Large Evidence Room	1999	56%
Heating	UH-3 & UH-4, Each, 64.6 MBH, 1/6 HP	Airtherm HSW-92	Electric/ HW	Sally Port	Sally Port	1999	56%
Heating	CUH-1, 2, 3, & 4; 30.7 MBH, 55 Watt Fan Motor,	Airtherm Rw-C40-2	Electric/ HW	Fire Stair No 1 & 2, Public Stair 1 & 2	Fire Stair No 1 & 2, Public Stair 1 & 2	1999	56%
Cooling	AC-1, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 4.8 KW Reheat, 2.5 Lbs/hr Humidifier, 22,000 Btu/hr Cooling, temp controlled	Liebert, Model #PFC027A-PLO, Serial #D054749	Electricity	1st Floor UPS Room	UPS Room	1999	56%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	AC-2, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 4.8 KW Reheat, 2.5 Lbs/hr Humidifier, 22,000 Btu/hr Cooling	Liebert, Model #PFC027A-PLO, Serial #D054678	Electricity	1st Fl. Communication Equipment Rm	Equipment Rm	1999	56%
Cooling	AC-3, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 4.8 KW Reheat, 2.5 Lbs/hr Humidifier, 22,000 Btu/hr Cooling	Liebert, Model #PFC037A-YLO, Serial #D054685	Electricity	1st Fl. Communication Equipment Rm	Equipment Rm	1999	56%
Cooling	AC-4, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 4.8 KW Reheat, 22,000 Btu/hr Cooling	Liebert, Model #PFC027A-PLO, Serial #D054612	Electricity	1st Fl. Complaint Office	Complaint Ofiice	1999	56%
Cooling	AC-5, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 6.5 KW Reheat, 33,600 Btu/hr Cooling	Liebert, Model #PFC027A-PLO, Serial #D054748	Electricity	1st Fl. Training Room	Training Room	1999	56%
Cooling	AC-6, Liebert split DX unit, R-22 refrigerant, 277V, 1ph, 60Hz, 1/2 HP fan, 4.8 KW Reheat, 22,000 Btu/hr Cooling	Liebert, Model #PFC027A-PLO, Serial #D054750	Electricity	2nd floor Computer Room	2nd floor Computer room	1999	56%
Cooling	ACCU-1, Liebert Condensing Unit, R-22 refrigerant, 208V, 1ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC027A-PLO, Serial #D054749	Electricity	Rooftop	Computer Room	1999	56%
Cooling	ACCU-2, Liebert Condensing Unit, R-22 refrigerant, 208V, 1ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC027A-PLO, Serial #D054678	Electricity	Rooftop	Computer Room	1999	56%
Cooling	ACCU-5, Liebert Condensing Unit, R-22 refrigerant, 208V, 3ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC037A-YLO, Serial #D054685	Electricity	Rooftop	Computer Room	1999	56%
Cooling	ACCU-3, Liebert Condensing Unit, R-22 refrigerant, 208V, 1ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC027A-PLO, Serial #D054612	Electricity	Rooftop	Computer Room	1999	56%
Cooling	ACCU-4, Liebert Condensing Unit, R-22 refrigerant, 208V, 1ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC027A-PLO, Serial #D054748	Electricity	Rooftop	Computer Room	1999	56%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	ACCU-6, Liebert Condensing Unit, R-22 refrigerant, 208V, 1ph, 60Hz, 1/5 HP fan	Liebert, Model #PFC027A-PLO, Serial #D054750	Electricity	Rooftop	Computer Room	1999	56%
HVAC	69 Modulating Variable Air Volume boxes in supply air system, 200 to 700 CFM each, hot water reheat coils	Carrier	Electricity	Through Supply Air Ductwork	All Areas	1999	56%
HVAC	4, Constant Air Volume boxes, 500 to 800 CFM, hot water reheat	Carrier	Electricity	2nd floor center	2nd floor center	1999	56%
Ventilation	EF-1, Penn Ventilation rooftop exhaust fan controlled with RTU-2, 825 CFM ,1/3 HP, 1550 RPM	Penn Ventilation, Model DX11B	Electricity	Rooftop	1st Fl Toilets	1999	56%
Ventilation	EF-2, Penn Ventilation rooftop exhaust fan controlled with RTU-2, 500 CFM, 1/4 HP, 1530 RPM	Penn Ventilation, Model DX11B	Electricity	Rooftop	2nd Fl Toilets	1999	56%
Ventilation	EF-3, Penn Ventilation rooftop exhaust fan controlled with RTU-1, 1050 CFM, 1/3 HP, 1750 RPM	Penn Ventilation, Model DX12B	Electricity	Rooftop	Toilet	1999	56%
Ventilation	EF-4, Penn Ventilation rooftop exhaust fan controlled with RTU-3, 750 CFM, 1/4 HP, 1530 RPM	Penn Ventilation, Model DX11B	Electricity	Rooftop	Toilet/Elev Machine rm	1999	56%
Ventilation	EF-5, Penn Ventilation rooftop exhaust fan controlled with TSTAT 1500 CFM, 1/2 HP, 1565 RPM	Penn Ventilation	Electricity	Generator Room	Generator Rm	1999	56%
Ventilation	EF-6, Penn Ventilation rooftop exhaust fan controlled with RTU-2, 2400 CFM, 1.5 HP, 1800 RPM	Penn Ventilation	Electricity	Generator Room	Jail Cell Exhaust	1999	56%
Ventilation	EF-7, Penn Ventilation rooftop exhaust fan controlled with TSTAT, 185 CFM, 1/30 HP, 1300 RPM	Penn Ventilation	Electricity	Generator Room	Elev Machine Rm	1999	56%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	EF-8, Penn Ventilation rooftop exhaust fan controlled with RTU-1, 900 CFM, 1/3 HP, 1550 RPM	Penn Ventilation, Model DX11B	Electricity	Rooftop	1st Fl Toilets	1999	56%
Ventilation	EF-9, Penn Ventilation rooftop exhaust fan controlled with CO Sensor, 700 CFM, 1/4 HP, 1600 RPM	Penn Ventilation, Model DX11B	Electricity	Rooftop	Sally Port	1999	56%
Ventilation	EF-10, Penn Ventilation rooftop exhaust fan controlled with CO Sensor, 400 CFM, 1/4 Hp, 1375 RPM	Penn Ventilation, Model DX08B	Electricity	Rooftop	Police Bike Storage	1999	56%
Ventilation	EF-11, Penn Ventilation rooftop exhaust fan controlled with TSTAT, 1800/900 CFM, 1/2 HP, 1450 RPM	Penn Ventilation, Model DX14B	Electricity	Rooftop	MER	1999	56%
Ventilation	EF-12, Penn Ventilation rooftop exhaust fan controlled with RTU-1, 1000 CFM, 1/3 HP, 1750 RPM	Penn Ventilation, Model DX12B	Electricity	Rooftop	Holding, Etc	1999	56%
Ventilation	EF-13, Penn Ventilation rooftop exhaust fan controlled with RTU-3, 375 CFM, 1/4 HP, 1230 RPM	Penn Ventilation, Model DX13B	Electricity	Rooftop	Tele & Elec Closet	1999	56%
Ventilation	EF-14, Penn Ventilation rooftop exhaust fan controlled with TSTAT 150 CFM, 1/6 HP, 1025 RPM	Penn Ventilation, Model DX08B	Electricity	Rooftop	Evidence Storage	1999	56%
Ventilation	EF-15, Penn Ventilation rooftop exhaust fan controlled with TSTAT 500 CFM, 1/6 HP, 1025 RPM	Penn Ventilation, Model DX08B	Electricity	Rooftop	Elec Rm	1999	56%
Ventilation	EF-16, Penn Ventilation rooftop exhaust fan controlled with RTU-3, 250 CFM, 1/20 HP, 1550 RPM	Penn Ventilation, Model DX11Q	Electricity	Rooftop	Armory	1999	56%

Building System	Description	Make/ Model	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	SPF-1 3.0 HP, 1050 RPM, 4800 CFM controlled with Fire alarm, 4800 CFM, 3.0 HP, 1050 RPM	NA	Electricity	Generator Room	Jail Cell Exhaust	1999	56%
Domestic Hot Water	DHW-1; Pvi, Power VT water heater, sealed combustion, condensing, 125 gallon storage, 399,000 Btuh input, 94% thermal efficiency	Pvi, Power VT, Model #560 P 125A-PV, Serial #069998181, Part #124934-1	N. Gas	Boiler room, second floor	All Areas	1999	56%
Domestic Hot Water	DHW-2; Pvi, Power VT water heater, sealed combustion, condensing, 125 gallon storage, 399,000 Btuh input, 94% thermal efficiency	Pvi, Power VT, Model #560 P 125A-PV, Serial #069998180, Part #124934-1	N. Gas	Boiler room, second floor	All Areas	1999	56%
Solar Panels	Approx 500 4'x6' Sharp solar panels, 208W each, (In back 195, 60 raised back, 50 sloped toward back, 145 in front, 60 raised front)	Sharp, Model #ND-208U2	Electricity	Rooftop	Net-meter	1999	56%
Transformer	Siemens dry-type Transformer, 30.0 kVA, 480-208V, Type 2 enclosure, 3ph	Siemens, Catalog #3F3Y030, Series 4192	Electricity	Boiler room, second floor	All Areas	1999	56%
Transformer	Siemens dry-type Transformer, 75.0 kVA	Siemens, Catalog #3F3Y075	Electricity	Utility room, Second Fl	All Areas	1999	56%
Lighting	See Appendix A	-	-	-	-	-	-

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

Appendix B: Lighting Study

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	1	Bathroom	Recessed Parabolic	E	4'T8 U-Shaped	1	2	32	Sw	9	365	5	69	227	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	1	2	32	9	365	5	69	227	0	0	0
2	1	Bathroom	Ceiling Mounted	E	4'T8	2	2	32	Sw	9	365	5	138	453	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	365	5	138	453	0	0	0
3	1	Bathroom Men	Parabolic Wall Mounted	E	4'T8	1	2	32	Sw	9	365	5	69	227	N/A	Parabolic Wall Mounted	4'T8	E	Sw	1	2	32	9	365	5	69	227	0	0	0
4	1	Bathroom Men	Recessed	S	CFL	4	1	13	Sw	9	365	0	52	171	N/A	Recessed	CFL	S	Sw	4	1	13	9	365	0	52	171	0	0	0
5	1	Bathroom Women	Ceiling Mounted	S	CFL	4	1	32	Sw	9	365	0	128	420	N/A	Ceiling Mounted	CFL	S	Sw	4	1	32	9	365	0	128	420	0	0	0
6	1	Bathroom Women	Ceiling Mounted	E	4'T8	1	2	32	Sw	9	365	5	69	227	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	365	5	69	227	0	0	0
7	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
8	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
9	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
10	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
11	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
12	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
13	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
14	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
15	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
16	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
17	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
18	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
19	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
20	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
21	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
22	1	Bay Areas	Ceiling Suspended	E	4'T8	2	2	32	Sw	9	260	5	138	323	N/A	Ceiling Suspended	4'T8	E	Sw	2	2	32	9	260	5	138	323	0	0	0
23	1	Bay Areas	Ceiling Mounted	S	CFL	2	1	32	Sw	9	260	0	64	150	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	9	260	0	64	150	0	0	0
24	1	Bay Areas	Ceiling Mounted	S	CFL	1	1	26	Sw	9	260	0	26	61	N/A	Ceiling Mounted	CFL	S	Sw	1	1	26	9	260	0	26	61	0	0	0
25	1	Break Room	Ceiling Mounted	S	CFL	6	1	32	Sw	9	190	0	192	328	N/A	Ceiling Mounted	CFL	S	Sw	6	1	32	9	190	0	192	328	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
26	1	Bureau Offices	Recessed Parabolic	E	4'T8	6	3	32	Sw	8	365	5	606	1770	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	8	365	5	606	1770	0	0	0
27	1	Bureau Offices	Recessed Parabolic	E	4'T8	6	3	32	Sw	8	365	5	606	1770	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	8	365	5	606	1770	0	0	0
28	1	Bureau Offices	Recessed Parabolic	E	4'T8	6	3	32	Sw	8	365	5	606	1770	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	8	365	5	606	1770	0	0	0
29	1	Bureau Offices	Recessed Parabolic	E	4'T8	6	3	32	Sw	8	365	5	606	1770	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	8	365	5	606	1770	0	0	0
30	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
31	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
32	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
33	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
34	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
35	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
36	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
37	1	Bureau Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
38	1	Captiain Admin	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	260	5	202	420	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	260	5	202	420	0	0	0
39	1	Captiain Admin 2	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	260	5	202	420	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	260	5	202	420	0	0	0
40	1	Conference Rm	Recessed Parabolic	E	4'T8	8	3	32	Sw	9	260	5	808	1891	N/A	Recessed Parabolic	4'T8	E	Sw	8	3	32	9	260	5	808	1891	0	0	0
41	1	Conference Rm	Ceiling Mounted	S	Inc	6	1	150	Sw	9	190	0	900	1539	CFL	Ceiling Mounted	CFL	S	Sw	6	1	50	9	190	0	300	513	1026	0	1026
42	1	Conference Room	Ceiling Mounted	E	4'T8	3	3	32	Sw	9	365	5	303	995	N/A	Ceiling Mounted	4'T8	E	Sw	3	3	32	9	365	5	303	995	0	0	0
43	1	Corridor	Ceiling Mounted	E	4'T8 U-Shaped	9	2	32	Sw	12	365	5	621	2720	N/A	Ceiling Mounted	4'T8 U-Shaped	E	Sw	9	2	32	12	365	5	621	2720	0	0	0
44	1	Court Supervisor	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
45	1	Director	Recessed Parabolic	E	4'T8	6	3	32	Sw	24	365	5	606	5309	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	24	365	5	606	5309	0	0	0
46	1	Elevator Mech. Rms	Pendant	E	4'T8	2	2	32	Sw	2	365	5	138	101	N/A	Pendant	4'T8	E	Sw	2	2	32	2	365	5	138	101	0	0	0
47	1	Evidence	Recessed Parabolic	E	4'T8	8	3	32	Sw	4	365	5	808	1180	N/A	Recessed Parabolic	4'T8	E	Sw	8	3	32	4	365	5	808	1180	0	0	0
48	1	Exersize Room	Ceiling Mounted	E	4'T8	6	3	32	Sw	8	365	5	606	1770	N/A	Ceiling Mounted	4'T8	E	Sw	6	3	32	8	365	5	606	1770	0	0	0
49	1	Generator Room	Pendant	E	4'T8	7	2	32	Sw	2	365	5	483	353	N/A	Pendant	4'T8	E	Sw	7	2	32	2	365	5	483	353	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
50	1	Hallway	Ceiling Mounted	E	CFL	103	1	32	Sw	24	365	0	3296	28873	N/A	Ceiling Mounted	CFL	E	Sw	103	1	32	24	365	0	3296	28873	0	0	0
51	1	Hallway	Exit Sign	S	LED	20	1	5	Sw	24	365	0.5	110	964	N/A	Exit Sign	LED	S	Sw	20	1	5	24	365	0.5	110	964	0	0	0
52	1	Hallway Detention	Ceiling Mounted	E	4'T8	2	2	32	Sw	24	365	5	138	1209	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	24	365	5	138	1209	0	0	0
53	1	Hallway Detention	Wall Mounted	E	4'T8	6	2	32	Sw	24	365	5	414	3627	N/A	Wall Mounted	4'T8	E	Sw	6	2	32	24	365	5	414	3627	0	0	0
54	1	Holding	Wall Mounted	E	4'T8	6	2	32	Sw	24	365	5	414	3627	N/A	Wall Mounted	4'T8	E	Sw	6	2	32	24	365	5	414	3627	0	0	0
55	1	Jail Cell	Wall Mounted	E	4'T8	16	2	32	Sw	12	365	5	1104	4836	N/A	Wall Mounted	4'T8	E	Sw	16	2	32	12	365	5	1104	4836	0	0	0
56	1	Jail Cell	Ceiling Mounted	E	4'T8	8	2	32	Sw	12	365	5	552	2418	N/A	Ceiling Mounted	4'T8	E	Sw	8	2	32	12	365	5	552	2418	0	0	0
57	1	Janitor's Closet	Ceiling Mounted	S	Fl.	2	1	20	Sw	2	365	2	44	32	N/A	Ceiling Mounted	FL.	S	Sw	2	1	20	2	365	2	44	32	0	0	0
58	1	Judges Chambers	Ceiling Mounted	S	Inc	6	1	150	Sw	8	190	0	900	1368	CFL	Ceiling Mounted	CFL	S	Sw	6	1	50	8	190	0	300	456	912	0	912
59	1	Judges Chambers	Ceiling Mounted	S	Inc	6	1	150	Sw	8	190	0	900	1368	CFL	Ceiling Mounted	CFL	S	Sw	6	1	50	8	190	0	300	456	912	0	912
60	1	Kitchen	Recessed Parabolic	E	4'T8	1	3	32	Sw	8	365	5	101	295	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	8	365	5	101	295	0	0	0
61	1	Laundry	Ceiling Mounted	E	4'T8	1	3	32	Sw	2	365	5	101	74	N/A	Ceiling Mounted	4'T8	E	Sw	1	3	32	2	365	5	101	74	0	0	0
62	1	Lobby	Ceiling Mounted	S	CFL	6	1	32	Sw	8	365	0	192	561	N/A	Ceiling Mounted	CFL	S	Sw	6	1	32	8	365	0	192	561	0	0	0
63	1	Lunch Rm	Recessed Parabolic	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
64	1	Mechanical Rm	Ceiling Mounted	E	4'T8	2	2	32	Sw	2	365	5	138	101	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	2	365	5	138	101	0	0	0
65	1	Motor Units	Pendant	E	4'T8	2	2	32	Sw	2	365	5	138	101	N/A	Pendant	4'T8	E	Sw	2	2	32	2	365	5	138	101	0	0	0
66	1	Office	Recessed Parabolic	E	4'T8	2	3	32	Sw	9	260	5	202	473	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	9	260	5	202	473	0	0	0
67	1	Offices	Recessed Parabolic	E	4'T8	4	3	32	Sw	9	260	5	404	945	N/A	Recessed Parabolic	4'T8	E	Sw	4	3	32	9	260	5	404	945	0	0	0
68	1	Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	9	260	5	202	473	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	9	260	5	202	473	0	0	0
69	1	Patrol Offices	Recessed Parabolic	E	4'T8	14	3	32	Sw	8	365	5	1414	4129	N/A	Recessed Parabolic	4'T8	E	Sw	14	3	32	8	365	5	1414	4129	0	0	0
70	1	PBA	Ceiling Mounted	E	4'T8	2	3	32	Sw	8	365	5	202	590	N/A	Ceiling Mounted	4'T8	E	Sw	2	3	32	8	365	5	202	590	0	0	0
71	1	Police Desk	Recessed Parabolic	E	4'T8 U-Shaped	2	2	32	Sw	9	365	5	138	453	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	2	2	32	9	365	5	138	453	0	0	0
72	1	Police Desk	Recessed Parabolic	E	4'T8	2	3	32	Sw	9	365	5	202	664	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	9	365	5	202	664	0	0	0
73	1	Police Equipment Rooms	Ceiling Mounted	E	4'T8	5	3	32	Sw	8	365	5	505	1475	N/A	Ceiling Mounted	4'T8	E	Sw	5	3	32	8	365	5	505	1475	0	0	0
74	1	Police Equipment Rooms	Ceiling Mounted	E	4'T8	1	2	32	Sw	8	365	5	69	201	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	8	365	5	69	201	0	0	0
75	1	Records	Recessed Parabolic	E	4'T8	6	3	32	Sw	2	260	5	606	315	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	2	260	5	606	315	0	0	0
76	1	sally port	Recessed Parabolic	E	4'T8	6	2	32	MS	8	365	5	414	1209	N/A	Recessed Parabolic	4'T8	E	MS	6	2	32	8	365	5	414	1209	0	0	0
77	1	Security	Ceiling Mounted	S	CFL	8	1	32	Sw	16	365	0	256	1495	N/A	Ceiling Mounted	CFL	S	Sw	8	1	32	16	365	0	256	1495	0	0	0
78	1	Showers Men	Ceiling Mounted	E	4'T8	1	2	32	Sw	8	365	5	69	201	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	8	365	5	69	201	0	0	0
79	1	Showers Women	Ceiling Mounted	E	4'T8	1	2	32	Sw	8	365	5	69	201	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	8	365	5	69	201	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
80	1	Special Operations	Recessed Parabolic	E	4'T8	6	3	32	Sw	16	260	5	606	2521	N/A	Recessed Parabolic	4'T8	E	Sw	6	3	32	16	260	5	606	2521	0	0	0
81	1	Storage Closet	Ceiling Mounted	E	4'T8	1	2	32	Sw	2	365	5	69	50	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	365	5	69	50	0	0	0
82	1	Storage Rm	Recessed Parabolic	E	4'T8	2	3	32	Sw	2	365	5	202	147	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	2	365	5	202	147	0	0	0
83	1	Storage Rm	Pendant	E	4'T8	2	2	32	Sw	2	365	5	138	101	N/A	Pendant	4'T8	E	Sw	2	2	32	2	365	5	138	101	0	0	0
84	1	Supervisors Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	2	260	5	202	105	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	2	260	5	202	105	0	0	0
85	1	Supervisors Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	2	260	5	202	105	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	2	260	5	202	105	0	0	0
86	1	Supervisors Offices	Recessed Parabolic	E	4'T8	2	3	32	Sw	2	260	5	202	105	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	2	260	5	202	105	0	0	0
87	1	Support Services	Recessed Parabolic	E	4'T8	4	3	32	Sw	2	260	5	404	210	N/A	Recessed Parabolic	4'T8	E	Sw	4	3	32	2	260	5	404	210	0	0	0
88	1	Support Services	Ceiling Mounted	S	CFL	2	1	32	Sw	2	260	0	64	33	N/A	Ceiling Mounted	CFL	S	Sw	2	1	32	2	260	0	64	33	0	0	0
89	1	Training	Recessed Parabolic	E	4'T8 U-Shaped	12	2	32	Sw	12	260	5	828	2583	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	12	2	32	12	260	5	828	2583	0	0	0
90	1	Truck Bay	Wall Mounted	E	4'T8	8	2	32	Sw	12	365	5	552	2418	N/A	Wall Mounted	4'T8	E	Sw	8	2	32	12	365	5	552	2418	0	0	0
91	1	Utility Rm	Recessed Parabolic	E	4'T8	1	2	32	Sw	2	365	5	69	50	N/A	Recessed Parabolic	4'T8	E	Sw	1	2	32	2	365	5	69	50	0	0	0
92	2	Bathroom Men	Ceiling Mounted	E	4'T8	1	1	32	Sw	9	365	5	37	122	N/A	Ceiling Mounted	4'T8	E	Sw	1	1	32	9	365	5	37	122	0	0	0
93	2	Bathroom Men	Ceiling Mounted	E	2'T8	1	1	17	Sw	9	365	2	19	62	N/A	Ceiling Mounted	2'T8	E	Sw	1	1	17	9	365	2	19	62	0	0	0
94	2	Bathroom Men	Ceiling Mounted	S	CFL	9	1	32	Sw	9	365	0	288	946	N/A	Ceiling Mounted	CFL	S	Sw	9	1	32	9	365	0	288	946	0	0	0
95	2	Bathroom Women	Ceiling Mounted	S	CFL	9	1	32	Sw	9	365	0	288	946	N/A	Ceiling Mounted	CFL	S	Sw	9	1	32	9	365	0	288	946	0	0	0
96	2	Bathroom Women	Ceiling Mounted	E	4'T8	1	1	32	Sw	9	365	5	37	122	N/A	Ceiling Mounted	4'T8	E	Sw	1	1	32	9	365	5	37	122	0	0	0
97	2	Bathroom Women	Ceiling Mounted	E	2'T8	1	1	17	Sw	9	365	2	19	62	N/A	Ceiling Mounted	2'T8	E	Sw	1	1	17	9	365	2	19	62	0	0	0
98	2	Boiler Rm	Parabolic Ceiling Suspended	E	4'T8	4	4	32	N	9	365	5	532	1748	N/A	Parabolic Ceiling Suspended	4'T8	E	N	4	4	32	9	365	5	532	1748	0	0	0
99	2	Boiler Rm	Ceiling Mounted	E	8'T8	4	2	59	Sw	2	365	7	500	365	N/A	Ceiling Mounted	8'T8	E	Sw	4	2	59	2	365	7	500	365	0	0	0
100	2	Court Bathroom	Ceiling Mounted	E	4'T8 U-Shaped	1	2	32	Sw	8	190	5	69	105	N/A	Ceiling Mounted	4'T8 U-Shaped	E	Sw	1	2	32	8	190	5	69	105	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
101	2	Court Bathroom	Ceiling Mounted	E	4'T8 U-Shaped	1	2	32	Sw	8	190	5	69	105	N/A	Ceiling Mounted	4'T8 U-Shaped	E	Sw	1	2	32	8	190	5	69	105	0	0	0
102	2	Court Hallway	Wall Mounted	S	CFL	40	1	70	Sw	8	190	0	2800	4256	N/A	Wall Mounted	CFL	S	Sw	40	1	70	8	190	0	2800	4256	0	0	0
103	2	Court Hallway	Ceiling Mounted	S	CFL	10	1	32	Sw	8	190	0	320	486	N/A	Ceiling Mounted	CFL	S	Sw	10	1	32	8	190	0	320	486	0	0	0
104	2	Court Misc Rooms	Ceiling Mounted	E	8'T8	1	2	59	Sw	8	365	7	125	365	N/A	Ceiling Mounted	8'T8	E	Sw	1	2	59	8	365	7	125	365	0	0	0
105	2	Court Misc Rooms	Ceiling Mounted	E	4'T8	2	2	32	Sw	8	365	5	138	403	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	8	365	5	138	403	0	0	0
106	2	Court Offices	Ceiling Mounted	E	4'T8	9	3	32	Sw	8	190	5	909	1382	N/A	Ceiling Mounted	4'T8	E	Sw	9	3	32	8	190	5	909	1382	0	0	0
107	2	Court Room #1	Wall Mounted	S	MH	12	1	250	Sw	8	190	70	3840	5837	PSMH	Wall Mounted	PSMH	S	Sw	12	1	##	8	190	30	2160	3283	2553.6	0	2554
108	2	Court Room #1	Wall Mounted	S	CFL	20	1	70	Sw	8	190	0	1400	2128	N/A	Wall Mounted	CFL	S	Sw	20	1	70	8	190	0	1400	2128	0	0	0
109	2	Court Room #1	Wall Mounted	S	MH	7	1	70	Sw	8	190	19.6	627.2	953	PSMH	Wall Mounted	PSMH	S	Sw	7	1	50	8	190	10	420	638	314.944	0	315
110	2	Court Room #2	Wall Mounted	S	MH	12	1	250	Sw	8	190	70	3840	5837	PSMH	Wall Mounted	PSMH	S	Sw	12	1	##	8	190	30	2160	3283	2553.6	0	2554
111	2	Court Room #2	Wall Mounted	S	CFL	20	1	70	Sw	8	190	0	1400	2128	N/A	Wall Mounted	CFL	S	Sw	20	1	70	8	190	0	1400	2128	0	0	0
112	2	Court Room #2	Wall Mounted	S	MH	7	1	70	Sw	8	190	19.6	627.2	953	PSMH	Wall Mounted	PSMH	S	Sw	7	1	50	8	190	10	420	638	314.944	0	315
113	2	Court Storage	Ceiling Mounted	E	8'T8	2	2	59	Sw	2	190	7	250	95	N/A	Ceiling Mounted	8'T8	E	Sw	2	2	59	2	190	7	250	95	0	0	0
114	2	Defender	Recessed Parabolic	E	4'T8	3	3	32	Sw	8	190	5	303	461	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	8	190	5	303	461	0	0	0
115	2	Detention Coor.	Ceiling Mounted	E	4'T8	5	2	32	Sw	2	190	5	345	131	N/A	Ceiling Mounted	4'T8	E	Sw	5	2	32	2	190	5	345	131	0	0	0
116	2	Elec Closet	Ceiling Mounted	E	8'T8	2	2	59	Sw	2	365	7	250	183	N/A	Ceiling Mounted	8'T8	E	Sw	2	2	59	2	365	7	250	183	0	0	0
117	2	Hallway	Ceiling Mounted	S	CFL	48	1	32	Sw	24	365	0	1536	13455	N/A	Ceiling Mounted	CFL	S	Sw	48	1	32	24	365	0	1536	13455	0	0	0
118	2	Hallway	Exit Sign	S	LED	6	1	5	N	24	365	0.5	33	289	N/A	Exit Sign	LED	S	N	6	1	5	24	365	0.5	33	289	0	0	0
119	2	Hallway	Exit Sign	S	LED	21	1	5	Sw	24	365	0.5	115.5	1012	N/A	Exit Sign	LED	S	Sw	21	1	5	24	365	0.5	115.5	1012	0	0	0
120	2	Lobby	Parabolic Ceiling Suspended	S	CFL	32	1	32	N	12	365	0	1024	4485	N/A	Parabolic Ceiling Suspended	CFL	S	N	32	1	32	12	365	0	1024	4485	0	0	0
121	2	Lobby	Ceiling Suspended	S	MH	10	2	250	PC	12	365	70	5700	24966	T5	Ceiling Suspended	4'T5	E	PC	10	8	28	12	365	4	2280	9986	14979.6	0	14980
122	2	Lobby	Ceiling Mounted	S	CFL	32	1	32	PC	12	365	0	1024	4485	N/A	Ceiling Mounted	CFL	S	PC	32	1	32	12	365	0	1024	4485	0	0	0
123	2	Lobby	Exit Sign	S	LED	2	1	5	N	24	365	0.5	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	0.5	11	96	0	0	0
124	2	Maintenance	Ceiling Mounted	E	4'T8	6	3	32	Sw	2	365	5	606	442	N/A	Ceiling Mounted	4'T8	E	Sw	6	3	32	2	365	5	606	442	0	0	0
125	2	Office (209)	Parabolic Ceiling Suspended	E	4'T8	6	4	32	Sw	9	365	5	798	2621	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	4	32	9	365	5	798	2621	0	0	0

Location			Existing Fixture Information												Retrofit Information													Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
126	2	Office	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	365	5	606	1991	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	365	5	606	1991	0	0	0
127	2	Office Area	Recessed Parabolic	E	4'T8	16	4	32	Sw	9	365	5	2128	6990	N/A	Recessed Parabolic	4'T8	E	Sw	16	4	32	9	365	5	2128	6990	0	0	0
128	2	Probation	Parabolic Ceiling Suspended	E	4'T8	8	3	32	Sw	8	365	5	808	2359	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	8	3	32	8	365	5	808	2359	0	0	0
129	2	Probation	Recessed Parabolic	E	4'T8	8	3	32	Sw	8	260	5	808	1681	N/A	Recessed Parabolic	4'T8	E	Sw	8	3	32	8	260	5	808	1681	0	0	0
130	2	Prosecutor	Recessed Parabolic	E	4'T8	3	3	32	Sw	8	190	5	303	461	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	8	190	5	303	461	0	0	0
131	2	Stairs	Ceiling Mounted	S	CFL	10	1	32	Sw	24	365	0	320	2803	N/A	Ceiling Mounted	CFL	S	Sw	10	1	32	24	365	0	320	2803	0	0	0
132	2	Storage Areas	Pendant	E	8'T8	52	2	59	Sw	2	365	7	6500	4745	N/A	Pendant	8'T8	E	Sw	52	2	59	2	365	7	6500	4745	0	0	0
133	2	Unfinshed Space #1	Recessed Parabolic	E	8'T8	6	2	59	Sw	8	260	7	750	1560	N/A	Recessed Parabolic	8'T8	E	Sw	6	2	59	8	260	7	750	1560	0	0	0
134	2	Unfinshed Space #2	Recessed Parabolic	E	8'T8	6	2	59	Sw	8	260	7	750	1560	N/A	Recessed Parabolic	8'T8	E	Sw	6	2	59	8	260	7	750	1560	0	0	0
135	2	Utility Rm	Recessed Parabolic	E	4'T8	1	2	32	Sw	2	365	5	69	50	N/A	Recessed Parabolic	4'T8	E	Sw	1	2	32	2	365	5	69	50	0	0	0
136	2	Utility Rm (212)	Recessed Parabolic	E	4'T8	2	2	32	Sw	2	365	5	138	101	N/A	Recessed Parabolic	4'T8	E	Sw	2	2	32	2	365	5	138	101	0	0	0
137	2	Violations	Ceiling Suspended	S	MH	14	2	250	PC	8	365	70	7980	23302	T5	Ceiling Suspended	4'T5	E	PC	14	8	28	8	365	4	3192	9321	13981	0	13981
138	2	Gymnasium	Parabolic Ceiling Suspended	E	4'T8	2	4	32	Sw	9	365	5	266	874	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	4	32	9	365	5	266	874	0	0	0
139	Ext	Exterior	Pole Mounted Off Building	S	MH	8	1	400	PC	12	365	112	4096	17940	PSMH	Pole Mounted Off Building	PSMH	S	PC	8	1	##	12	365	50	2400	10512	7428.48	0	7428
140	Ext	Exterior	Pole Mounted Off Building	S	Inc	3	1	60	PC	12	365	0	180	788	CFL	Pole Mounted Off Building	CFL	S	PC	3	1	20	12	365	0	60	263	525.6	0	526
141	Ext	Exterior	Pole Mounted	S	MH	5	1	100	PC	12	365	28	640	2803	PSMH	Pole Mounted	PSMH	S	PC	5	1	70	12	365	14	420	1840	963.6	0	964
142	Ext	Exterior	Pole Mounted	S	MH	11	2	100	PC	12	365	28	2508	10985	PSMH	Pole Mounted	PSMH	S	PC	11	2	70	12	365	14	1694	7420	3565.32	0	3565
143	Ext	Street Lights	Pole Mounted	S	MH	27	1	175	PC	16	365	49	6048	35320	PSMH	Pole Mounted	PSMH	S	PC	27	1	##	16	365	20	3240	18922	16398.7	0	16399
Totals:						974	289	6,651				1,023	93,816	303,696						974	301				673	74,376	237,266	66,429	0	66429

Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	47,450		
Average Power Cost ($/kWh)	0.1510		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	67,837	38,956	**28,882**
Exterior Power (watts)	13,472	7,814	**5,658**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	235,858	198,310	**37,548**
Lighting Power (watts)	80,344	66,562	**13,782**
Lighting Power Density (watts/SF)	1.69	1.40	**0.29**
Estimated Cost of Fixture Replacement ($)	46,885		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**15,083**		

Legend								
Fixture Type		**Lamp Type**			**Control Type**	**Ballast Type**	**Retrofit Category**
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	Fl.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Gas Suppliers for PSEG 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
Dominion Retail, Inc. 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.retail.dom.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
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 www.hudsonenergyservices.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 www.systrumenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.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

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
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
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
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 www.stuyfuel.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

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

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
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

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.

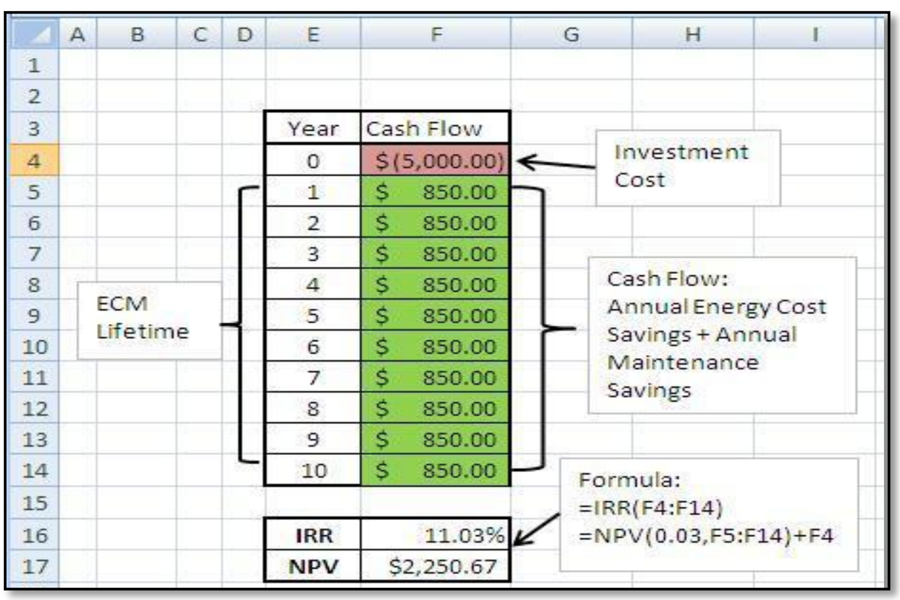
Calculation References

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

ENERGY STAR

STATEMENT OF ENERGY PERFORMANCE
City of Orange Township - Polhill Justice Complex

Building ID: 2381056
For 12-month Period Ending: April 30, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 27, 2010

Facility	**Facility Owner**	**Primary Contact for this Facility**
City of Orange Township - Polhill Justice Complex 29 Park Street Orange, NJ 07050	N/A	N/A

Year Built: 1998
Gross Floor Area (ft²): 47,450

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	3,476,564
Natural Gas (kBtu)[4]	2,838,791
Total Energy (kBtu)	6,315,355
Energy Intensity[5]	
Site (kBtu/ft²/yr)	133
Source (kBtu/ft²/yr)	307
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	680
Electric Distribution Utility	
Public Service Elec & Gas Co	
National Average Comparison	
National Average Site EUI	90
National Average Source EUI	189
% Difference from National Average Source EUI	63%
Building Type	Public Order and Safety

Stamp of Certifying Professional

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

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
N/A

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

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

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.

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

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
0-5 Year Payback	1	Install one beverage and one Snacks vending machine energy miser in Break Room	none at this time	258	2,536	1	0	0	0	383	12	4,595	0.6	1,681	140	148	3,400	4,541
	2	21 New CFL fixtures to be installed with incentives	none at this time	1,707	3,376	1	0	0	1,005	1,515	5	7,573	0.6	344	69	85	5,029	6,044
	3	Replace Fan Motors with Premium Eff.	695	7,310	16,069	5	0	1	0	2,426	20	48,528	3.0	564	28	33	27,258	28,772
	4	89 New pulse start metal halide fixtures to be installed with incentives	2,225	40,143	34,093	7	0	2	1,351	6,499	15	97,481	4.2	143	10	14	35,202	61,044

5-10 Year Payback	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
	5	Replace two 5.0 HP HW Pump with Premium Eff.	120	1,020	752	0	0	0	0	114	20	2,271	6.0	123	6	9	619	1,346
	6	24 New T5 fixtures to be installed with incentives	384	5,036	28,961	6	0	2	2,697	7,070	15	106,046	9.5	2,006	134	140	75,730	51,854

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool:	Established/standard industry assumptions
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.