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December 29, 2010

Local Government Energy Program
Energy Audit Final Report

Glen Ridge Public Schools
Glen Ridge High School
200 Ridgewood Avenue
Glen Ridge, NJ 07028

Project Number: LGEA78

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EXECUTIVE SUMMARY

The Glen Ridge Public Schools Glen Ridge High School is a three-story building with basement comprising a total conditioned floor area of 160,000 square feet. The original structure was built in 1968 with an addition in 2004. The following chart provides an overview of current energy usage in the building based on the analysis period of July 2009 through June 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Other fuel usage, gal/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	1,234,872	59,754	N/A	$261,038	63.7	10,189
Proposed	1,117,502	59,572	N/A	$233,853	61.1	9,770
Savings	117,370	182	N/A	$27,185*	2.6	419
% Savings	11%	1%	N/A	10%	4%	4%
Solar PV	59,000	Includes SRECs		$30,622	1.3	201.4
*Includes operation and maintenance savings						

There may be energy procurement opportunities for the Glen Ridge Public Schools Glen Ridge High School to reduce annual utility costs, which are $16,105 higher, when compared to the average estimated NJ commercial utility rates. Glen Ridge Board of Education should explore the option to participate in the NJSBA ACES program to cooperatively buy both electric and gas, like many other schools throughout New Jersey.

SWA has also entered energy information about the Glen Ridge High School in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This school is comprised of rating eligible ("School") space type that received a rating of 69 which does not meet the minimum ENERGY STAR® requirement of 75. The Site Energy Use Intensity is 64.0 kBtu/ft^2-yr compared to the national average of a school building consuming 77.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

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	$7,509	3.4	$25,668	75,494
5-10 Year	$19,676	9.2	$180,122	136,664
>10 year	N/A	N/A	N/A	N/A
Total	$27,185	7.6	$205,790	212,158
Renewables	$30,622	10.7	$327,500	110,789

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 18 cars from the roads each year or avoiding the need of 517 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 Glen Ridge High School further explore the following:

- Capital Improvements
  - Install premium motors when replacements are required
  - Replace broken/deteriorated bricks and re-point cracked mortar joints.
  - Domestic hot water heater replacement
- Operations and Maintenance
  - Inspect and maintain the roof with a focus on ensuring proper drainage.
  - Provide water-efficient fixtures and controls
  - Repair/seal wall cracks and penetrations
  - SWA recommends that the building considers purchasing the most energy-efficient equipment
  - Repair window sills to reduce water damage to surround exterior walls

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Glen Ridge Public Schools. Based on the requirements of the LGEA program, Glen Ridge Public Schools 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 $6,141.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that Glen Ridge Public Schools can take to achieve greater energy efficiency and reduce operating expenses. It includes the amount in dollars that Glen Ridge Public Schools is required to spend per building according to the LGEA program guidelines. 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 Glen Ridge High School

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install thirty-five (35) new CFL fixtures	**Direct Install**
Install two (2) VendingMiser™ devices	**Direct Install**
Install one (1) SnackMiser™ device	**Direct Install**
Install thirty-five (35) new LED exit signs	**Smart Start, Direct Install**
Install seventy-two (72) new T5 fluorescent fixtures	**Smart Start, Direct Install**
Install twenty-two (22) new occupancy sensors	**Smart Start, Direct Install**

There are various incentive programs that the Glen Ridge Public Schools could apply for that could help lower the cost of installing the ECMs. For the Glen Ridge High School, and contingent upon available funding, SWA recommends the following incentive programs:

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

Direct Install 2010 Program: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades. Glen Ridge Board of Education is exempt from this demand requirement if they apply for the EECBG grant before December 31, 2010.

Renewable Energy Incentive Program: Receive up to $0.75/Watt toward installation cost for PV panels upon available funding.
For each 1,000 kWh generated by renewable energy, receive a credit between $475 and $600.

Utility Sponsored Programs: See available programs with PSE&G. http://www.pseg.com/

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 Glen Ridge High School at 200 Ridgewood Avenue. The process of the audit included facility visits on 08/04/10 and 08/05/10, 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 Glen Ridge Public Schools to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Glen Ridge High School.

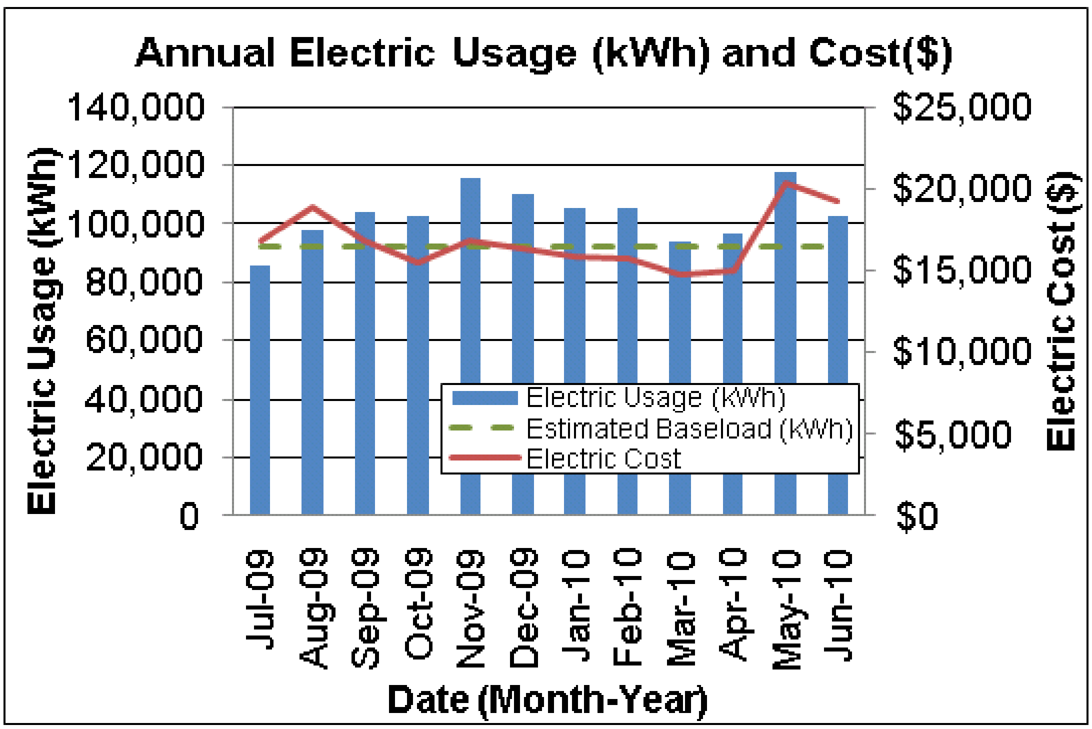
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from July 2009 through June 2010 that were received from the utility companies supplying the Glen Ridge High School with electric and natural gas. A 12 month period of analysis from July 2009 through June 2010 was used for all calculations and for purposes of benchmarking the building.

Electricity - The Glen Ridge High School is currently served by one electric meter. The Glen Ridge High School currently buys electricity from PSE&G at **an average aggregated rate of $0.163/kWh**. The Glen Ridge High School purchased **approximately 1,234,872 kWh, or $201,284 worth of electricity,** in the previous year. The average monthly demand was 306.0 kW and the annual peak demand was 340.8 kW.

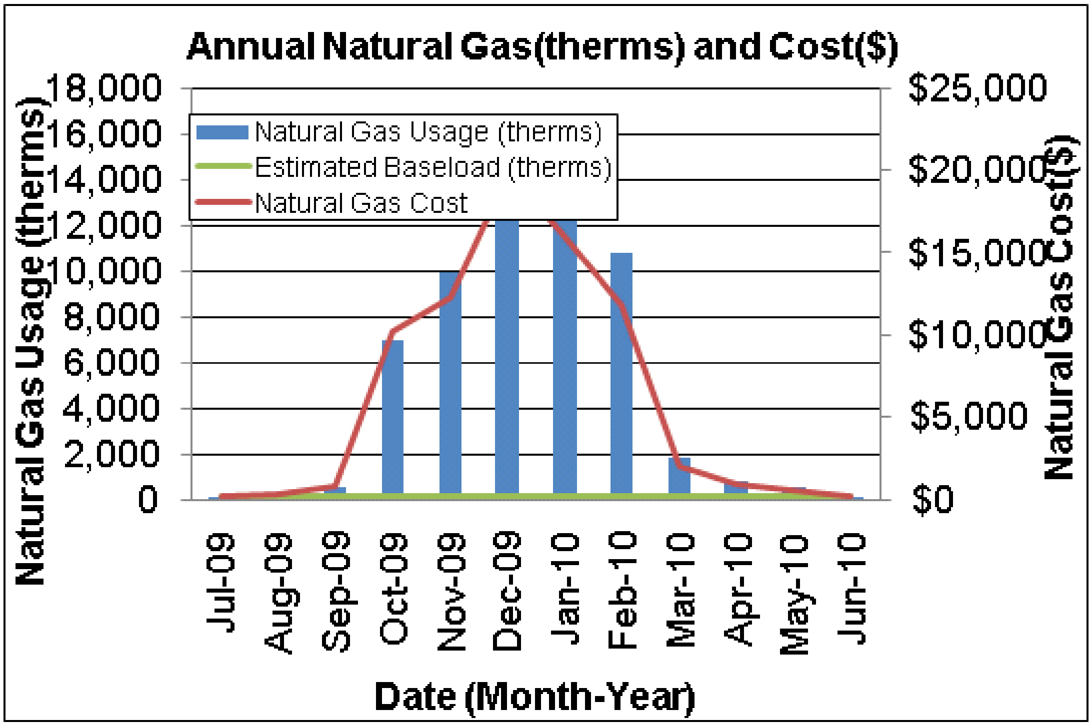
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the Glen Ridge High School.

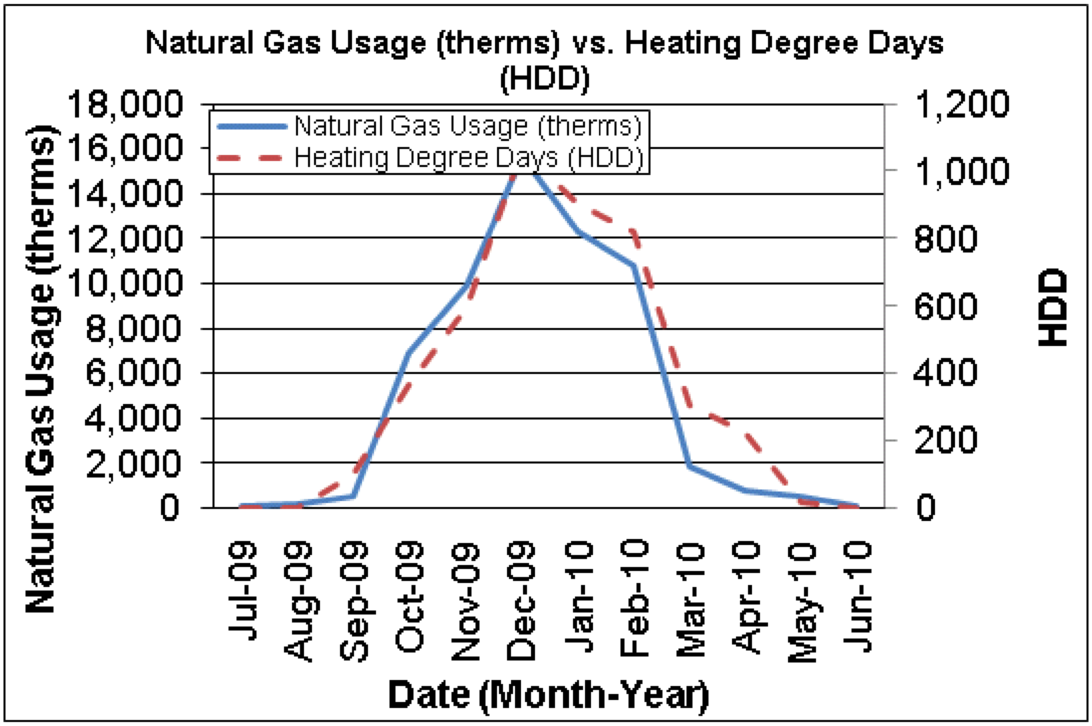


The above chart shows that electric consumption is relatively level throughout the year compared to the other schools within the Glen Ridge School district. Glen Ridge High School uses more electricity on a consistent level compare to the other school because it is used during the summer for classes, sports and other extracurricular activities which are not common to the other schools. Although the building is used more year round, this further strengthens recommendations for lighting upgrades, occupancy sensors, HVAC upgrades, etc. due to a high number of operating hours per year.

Natural gas - The Glen Ridge High School is currently served by one meter for natural gas. The Glen Ridge High School currently buys natural gas from PSE&G through HESS who acts as a third party supplier at **an average aggregated rate of $1.255/therm**. The Glen Ridge High School purchased **approximately 59,754 therms, or $74,991 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 Glen Ridge High School.

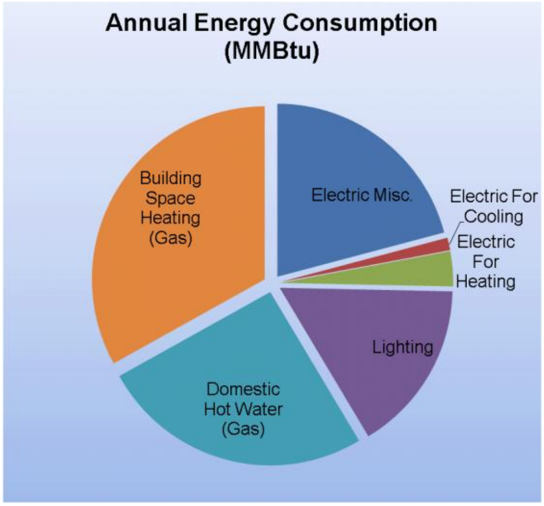


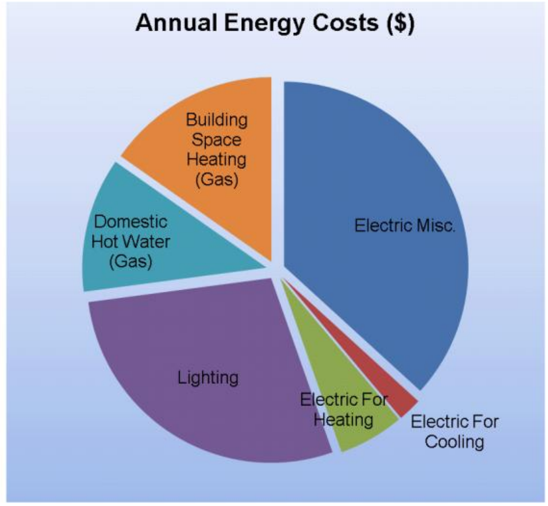


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following graphs, pie charts, and table show energy use for the high school based on utility bills for the 12 month period. Note: electrical cost at $48/MMBtu of energy is almost 4 times as expensive as natural gas at $13/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	2,132	21%	$101,870	37%	48
Electric For Cooling	120	1%	$5,753	2%	48
Electric For Heating	333	3%	$15,929	6%	48
Lighting	1,642	16%	$78,481	28%	48
Domestic Hot Water (Gas)	2,606	26%	$32,695	12%	13
Building Space Heating	3,375	33%	$42,342	15%	13
Totals	10,209	100%	$277,071	100%	
Total Electric Usage	4,227	41%	$202,034	73%	48
Total Gas Usage	5,981	59%	$75,037	27%	13
Totals	10,209	100%	$277,071	100%	



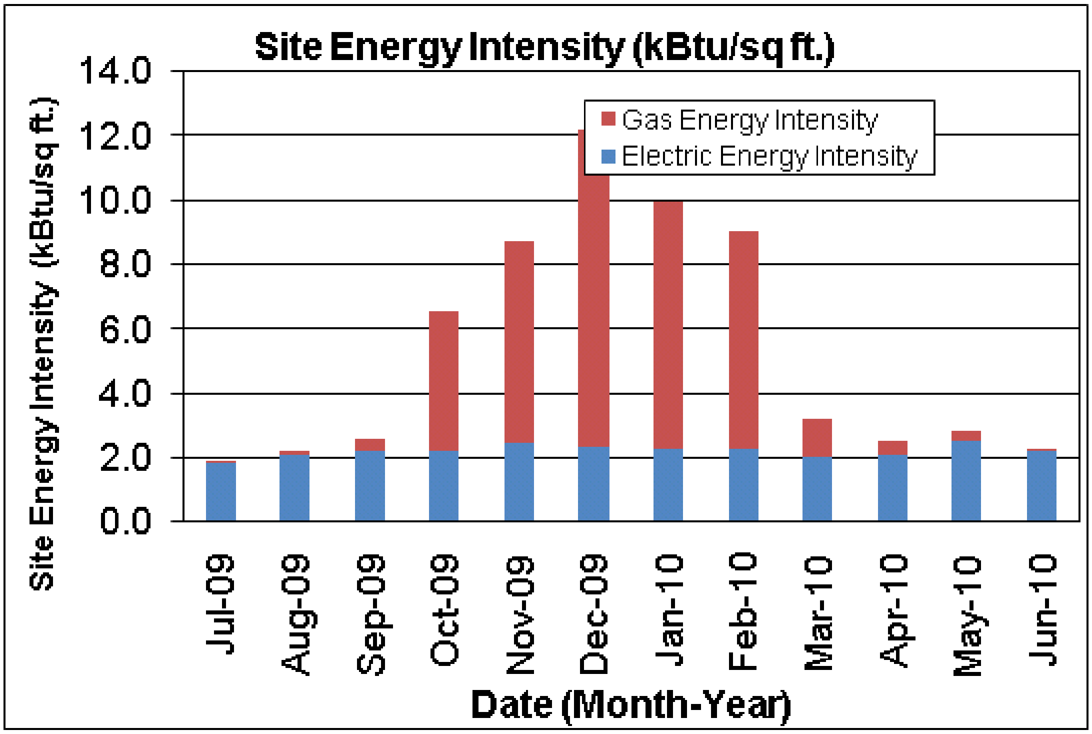


As noted in the above charts, Electric Miscellaneous represents electric loads that are not associated with heating or cooling loads. These miscellaneous loads are mostly associated with various plug-loads such as computers and other electronics. At this building, these loads are typically not monitored and computers are left on with only screensavers to conserve power.

Energy benchmarking

SWA has also entered energy information about the Glen Ridge High School in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This school is comprised of rating eligible ("School") space type that received a rating of 69 which does not meet the minimum ENERGY STAR® requirement of 75. The Site Energy Use Intensity is 64.0 kBtu/ft^2-yr compared to the national average of a school building consuming 77.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating. 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.



Per the LGEA program requirements, SWA has assisted the Glen Ridge Public Schools to create an *ENERGY STAR® Portfolio Manager* account and share the Glen Ridge High School 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 Glen Ridge Public Schools (user name of "glenridgeboe" with a password of "glenridgeboe") and TRC Energy Services (user name of "TRC-LGEA").

Tariff analysis

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

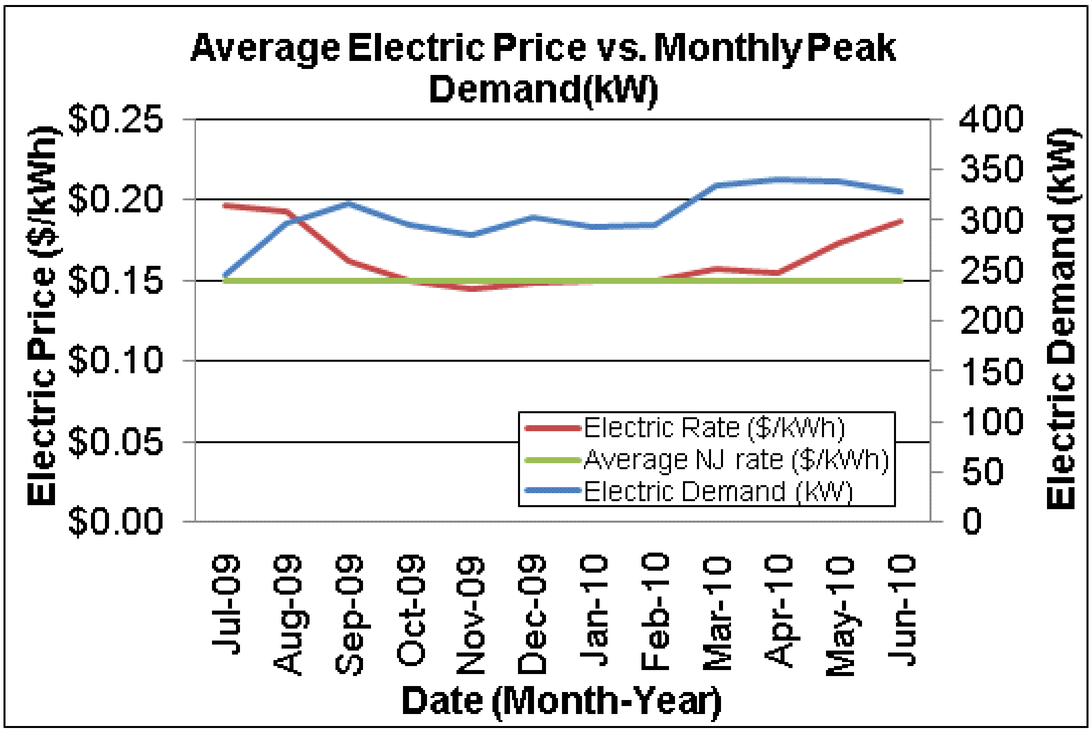
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used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

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 Glen Ridge Public Schools 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.

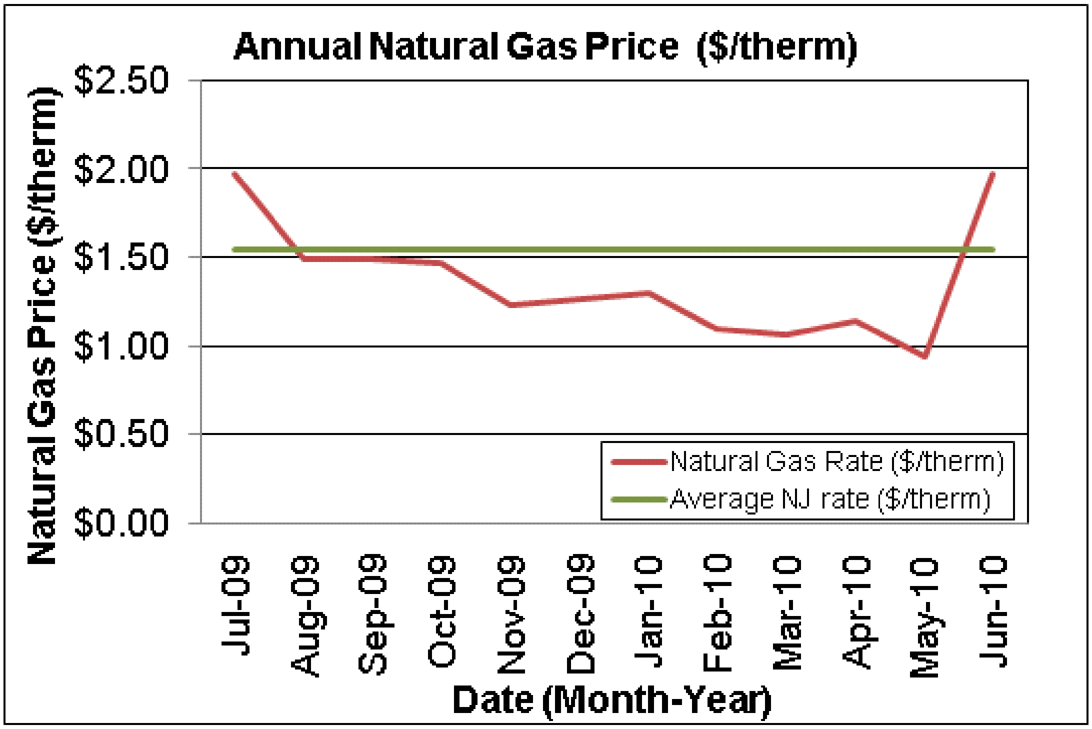
Energy Procurement strategies

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 Glen Ridge High School pays a rate of $0.163/kWh. The Glen Ridge High School annual electric utility costs are $16,105 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 93% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Glen Ridge High School pays a rate of $1.255/therm. Natural gas bill analysis shows fluctuations up to 29% over the most recent 12 month period.



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

SWA recommends that the Glen Ridge High School 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 Glen Ridge High School. Appendix C contains a complete list of third-party energy suppliers for the Glen Ridge Public Schools 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 Wednesday, August 04, 2010, and Thursday, August 05, 2010 the following data was collected and analyzed.

Building Characteristics

The three-story, including a full basement, 160,000 square feet Glen Ridge High School was originally constructed in 1968 with additions completed in 2004. It houses a high school and administrative offices.

Partial Northeast Façade

Partial Northwest Façade

Partial Southeast Façade

Partial Southwest Façade

Building Occupancy Profiles

Its occupancy is approximately 799 students and 100 building staff employees. Typical school hours are from 8:00 AM to 3:00 PM Monday through Friday, however, the school is open year round as the administrative offices are used in the summer as well as the athletic facilities, auditorium and some classes due to camps and summer athletics programs.

Building Envelope

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

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

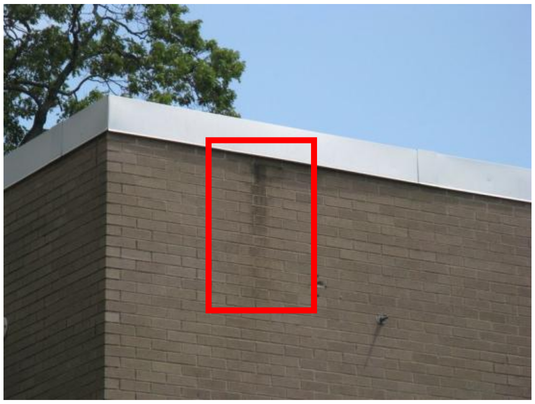
Exterior Walls

The exterior wall envelope is mostly constructed of brick masonry units, over concrete block with 2 inches of cavity wall insulation board. Other areas are constructed brick masonry units, over concrete block with 1-1/2 inches of cavity wall insulation board. The interior is mostly painted gypsum wallboard and painted concrete block.

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 only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

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



Typical exterior wall surfaces with signs of cracked bricks and mortar joints, damaged exterior wall finishes, and water damage.

Roof

The building's roof is predominantly a flat, no parapet type over steel decking, with a built-up asphalt finish and gravel ballast. Three and a half inches of foam board roof insulation were recorded. Other parts of the building are also covered by a flat, no parapet type over steel decking with a dark colored EPDM single membrane finish. Three and a half inches of foam board roof insulation, were recorded.

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 good condition, with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all roof areas.

The following specific roof problem spots were identified:

Typical roof surfaces with signs of water pooling and water damage

Base

The building's base is composed of a below grade slab floor with a perimeter footing with poured concrete foundation walls and a slab edge/perimeter 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 neither visible on the interior nor exterior.

Windows

The building contains several different types of windows:

1. Fixed-type windows with an insulated aluminum frame, clear double glazing and interior roller blinds. The windows are located throughout the building.

2. Unit (fixed and hopper) type windows with an insulated aluminum frame, clear double glazing and interior mini blinds. The windows are located throughout the building.

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 only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:

Exterior water damage signs on areas around windows and ineffective drip-edge detail

Exterior doors

The building contains several different types of exterior doors:

1. Solid metal type exterior doors. They are located throughout the building.

2. Solid metal type exterior doors with glass panels. They are located throughout the building.

3. Fiberglass type exterior doors with glass panels. They are located throughout the building.

4. Glass with aluminum frame type exterior doors with glass panels. They are located throughout the building.

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:

Typical exterior doors with some instances of worn weather-stripping

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

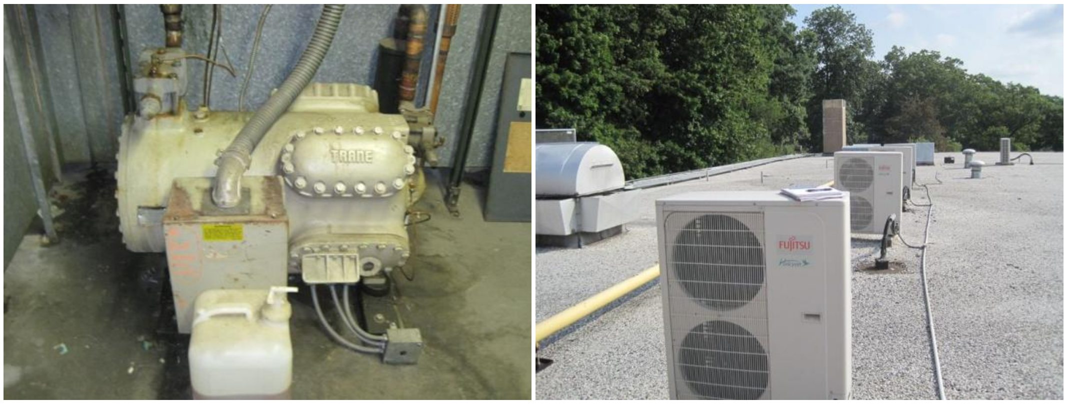
Heating and cooling for the building is accomplished through a variety of different types of equipment and systems. The building is completely heated with heat primarily provided by cast iron hot water boilers which supply hot water to a combination of fin tube radiators, radiant ceiling heating panels, unit heaters, cabinet heaters, packaged rooftop gas fired heaters, and variable air volume box hot water coils. The building is partially cooled, with all offices, gymnasium, libraries and office areas cooled by a combination of packaged rooftop cooling unit, direct expansion cooling split systems, and indoor packaged air conditioner. Ventilation is provided to the school through a combination of makeup air units, variable air volume boxes, air handlers, and unit ventilators for the classrooms.

Equipment

The Glen Ridge High School is heated primarily through hydronic equipment supplied with hot water by two Smith Mills cast iron hot water boilers with Power Flame natural gas burners. The units each have a rated capacity of 150 horsepower, 6,341 MBH or 5,014 MBH output capacity and 81.1% combustion efficiency. The hot water from these boilers is used to supply the fin tube radiators, radiant ceiling heating panels, unit heaters, cabinet heaters, and variable air volume box hot water coils. There are also three packaged rooftop units with gas furnaces. For more details about any of the units a comprehensive Equipment List can be found in Appendix A.

Typical hot water boilers and nameplates

The building is partially cooled, with all offices, gymnasium, libraries and office areas cooled by a combination of systems. There are a total of eighteen direct expansion (DX) split system cooling unit. They vary in size between 18,000 BTU/Hr. to 36,000 BTU/Hr and efficiencies of 10 SEER to 15 SEER. Most of the systems consist of a roof mounted condenser and indoor evaporator unit; however, some of the condensers are floor mounted in exterior courtyards. Also installed are indoor packaged air conditioners, and packaged rooftop units that have cooling capabilities. The other main cooling system is a Trane reciprocating air cooled chiller that services most of the cafeteria, library and gymnasium areas. For more details about any of the units a comprehensive Equipment List can be found in Appendix A.



Trane chiller unit (L.) and typical roof mounted split systems (R.)

Heating and cooling is provided by some of the packaged rooftop units. These 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 furnace units also contain a natural gas burner for heating and an evaporator section, but the condenser is a separate unit located outside/on the roof. For more details about any of the units a comprehensive Equipment List can be found in Appendix A.


Typical rooftop packaged heating and cooling units.

The various spaces of the building are provided ventilation by outside air intake louvers on the rooftop units, ducted outside air intake ducts for makeup air units. The outside air louvers are motorized to allow economizer operation when the outside air conditions are favorable. The packaged units have gravity dampers on the return section, which purge excess air out of the system in order to maintain pressure equilibrium. There are also several unit ventilators



Typical unit ventilators and exhaust fans

There are also several exhaust fans located on the roof which are serve the bathrooms, kitchen hoods, general exhaust and laboratory fume hoods. In general, the building exhaust fans have an estimated 53% useful operating life left.

Distribution Systems

A typical rooftop unit arrangement draws in fresh air and brings it into a mixing box, where it is combined with return air from the building. A small portion of the return air is purged and vented outside prior to entering the mixing box. The mixed air inside the air handler is sent through a filter before passing through the evaporator or direct expansion (DX) coil. The air handler fan then pushes the air through the furnace section before the conditioned air is distributed into the building spaces. The furnace is only active in the heating season and the DX system is only active in the cooling season. In between these seasons neither system may operate and only the blower will be active to provide fresh air to the building.

The Glen Ridge High School has a Variable Air Volume (VAV) system, using VAV boxes throughout the ductwork system. The VAV boxes have a modulating damper within the ductwork to adjust the amount of supply air to satisfy the temperature settings of the rooms that it serves. The VAVs are direct digital control and have pulse width modulation. Typically with a VAV arrangement the air handler fans operate using a Variable Frequency Drive, VFD. The VAVs are each equipped with a hydronic heating element to for winter time heating. Also used to distribute the heat for the building are fin tube radiators, radiant ceiling heating panels, unit heaters and cabinet heaters all of which are supplied by hot water from the boiler.

Controls

The heating and cooling equipment is controlled by a Building Management System (BMS). Each room has programmable thermostats with a temperature set point schedule based on season and occupancy with allowed overrides of 3-4 degrees. There is a 3˚F deadband built into the thermostats which indicates that the heating and cooling equipment will not operate when the space is within that temperature range. There is also a pneumatic control system used to operate the unit ventilators and heating elements and manual thermostats used to control the unit heaters.

Domestic Hot Water

The domestic hot water (DHW) for the Glen Ridge High School is provided by a natural gas heated storage unit with 90 gal storage capacity. The heater is in good operating condition and has 60% estimated useful operating life remaining and appears 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 Glen Ridge High School currently contains a mixture of fixtures with both inefficient magnetically ballasted T12 lamps and more efficient electronically ballasted T8 lamps. Also installed were a combination of incandescent, CFL and metal halide lamped fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.

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

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of metal halide, high pressure sodium lamp and CFL fixtures. Exterior lighting is controlled by photocells.

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.

Installed in the school was two pieces of laundry equipment. There is a modern, efficient, commercial washing machine manufactured by Alliance Laundry Systems under the Speed Queen brand name. Its model number is AWN311SP111TW01 and serial number is 1001006219. There is also an older inefficient dryer manufactured by General Electric. Also installed is an ENERGY STAR® qualified dishwasher manufactured by Electrolux home products under the Frigidaire brand name. Its model number is FDB750RCS0 and serial number TH34027123.

A total of fifteen refrigerators were installed. All of them are older model, inefficient non ENERGY STAR® qualified units. Of those units eight are small compact refrigerators and seven are large residential type units. There are also three commercial refrigerators installed in the cafeteria.

Also installed at the high school were four refrigerated vending machines. Two are newer model, efficient, and ENERGY STAR® qualified units while two are older model inefficient units. There is also an older model non-refrigerated vending machine installed.

Elevators

The Glen Ridge High School has three installed elevators. Elevator # 1 is a submersible hydraulic type with a cargo capacity of 2,000 pounds and was manufactured by the Otis Elevator Corp. It is powered by a motor rated at 15 HP, 3430 RPM, 70% efficiency and 11 kilowatts. It is model # SUB140-59 and serial # 6962-Y26. Elevator # 2 is a submersible hydraulic type with a cargo capacity of 2,100 pounds and was manufactured by the Otis Elevator Corp. It is powered by a motor rated at 25 HP, 3450 RPM, 75.5% efficiency and 19 kilowatts. Elevator # 3 is a submersible hydraulic type with a cargo capacity of 2,000 pounds and was manufactured by the Thyssen Krupp Elevator Corp. It is powered by a motor rated at 75 HP, and 45 kilowatts. It is part of the TAC20 line, model # EPO6020 and serial # EP8143.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the Glen Ridge High School.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

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

Existing systems

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

Evaluated Systems

Solar Photovoltaic

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

Based on utility analysis and a study of roof conditions, the Glen Ridge High School is a good candidate for a 50 kW Solar Panel installation. See ECM# 16 for details.

Solar Thermal Collectors

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

Wind

The Glen Ridge High School is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The Glen Ridge High School 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 33% and 77% remaining useful life.

Combined Heat and Power

The Glen Ridge High School 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	Install thirty-five (35) new CFL fixtures
2	Install two (2) VendingMiser™ devices on refrigerated vending machines
3	Install one (1) SnackMiser™ device on a vending machine
4	Install thirty-five (35) new LED exit signs
5	Install seventy-two (72) new T5 fluorescent fixtures
6	Install twenty-two (22) new occupancy sensors
	Description of Recommended 5-10 Year Payback ECMs
7	Install two (2) 7.5 HP NEMA premium efficiency motors
8	Install a five (5) HP NEMA premium efficiency motor
9	Install two (2) 7.5 HP NEMA premium efficiency motors
10	Install four new demand control ventilation systems
11	Replace seven (7) large refrigerators with 17 cu. ft. ENERGY STAR® models
12	Replace eight (8) compact refrigerators with 2.7 cu. ft. ENERGY STAR® models
13	Install sixty-three (63) new pulse start metal halide fixtures
14	Install nine hundred and fifty-five (955) new T8 fluorescent fixtures
15	Install one new ENERGY STAR® label washing machines
	Description of Recommended Renewable ECMs
16	Install a 49.9 kW solar photovoltaic rooftop system

In order to clearly present the overall energy opportunities for the building and ease the decision of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential overlaps between some of the listed ECMs (i.e. lighting change influence on heating/cooling.

ECM#1: Install thirty-five (35) new CFL lamps

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The existing lighting inventory contained a total of 35 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.

Installation cost:

Estimated installed cost: $315 (includes $175 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1	315	0	315	1,720	0.4	0	0.0	246	527	5	2,634	0.6	736	147	166	2,084	3,080

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#2: Install two (2) VendingMiser™ devices on refrigerated vending machines

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.

Installation cost:

Estimated installed cost: $398 (includes $40 of labor)
Source of cost estimate: www.usatech.com and established costs

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
2	398	0	298	1,109	0.2	0	0.0	0	181	5	904	2.2	127	25	35	425	1,986

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 program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#3: Install one (1) SnackMiser™ device on a vending machine

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.

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.

Installation cost:

Estimated installed cost: $99 (includes $20 of labor)
Source of cost estimate: www.usatech.com and established costs

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
3	99	0	99	266	0.1	0	0.0	0	43	5	217	2.3	119	24	33	98	476

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 program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#4: Install thirty-five (35) new LED exit signs

On the days of the site visits, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The high school currently contains 35 fluorescent exit signs. SWA recommends replacing these exit signs with newer, more efficient LED models. Exit signs present a good opportunity for savings since they are operated 24 hours per day.

Installation cost:

Estimated installed cost: $4,568 (includes $525 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
4	5,268	700	4,568	6,948	1.4	0	0.1	145	1,278	15	19,163	3.6	319	21	27	10,462	12,440

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- NJ Clean Energy – SmartStart – LED Exit Signs ($20 per fixture)
    - Maximum Incentive Amount: $700
- NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs

ECM#5: Install seventy-two (72) new T5 fluorescent fixtures

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The existing lighting inventory contains seventy-two ceiling suspended metal halide lamps that should be replaced with T5 lamps. SWA recommends replacing each existing fixture with more efficient T5 fluorescent fixtures with electronic ballasts. T5 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast or a metal halide lamp.

Installation cost:

Estimated installed cost: $15,888 (includes $6,840 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
5	17,040	1,152	15,888	25,182	5.2	0	0.5	246	4,351	15	65,260	3.7	311	21	27	35,302	45,089

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 4 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- NJ Clean Energy - Smart Start - T8 fixtures with electronic ballasts ($16 per fixture)
    - Maximum incentive amount: $1,152
- NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#6: Install twenty-two (22) new occupancy sensors

On the days of the site visits, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The building contains sixteen areas that could benefit from the installation of occupancy sensors. These areas consisted of various locker rooms, fitness rooms, and offices that are used sporadically throughout the day and could show energy savings by having the lights turn off after a period of no occupancy. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advanced micro-phonic lighting sensors include sound detection as a means to controlling lighting operation.

Installation cost:

Estimated installed cost: $4,400 (includes $660 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
6	5,060	660	4,400	6,938	1.4	0	0.1	0	1,131	15	16,963	3.9	286	1	25	8,908	12,423

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:

- NJ Clean Energy – SmartStart – Wall-mounted Occupancy Sensors ($20 per control)
    - Maximum Incentive Amount: $440.
- NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#7: Install two (2) 7.5 HP NEMA premium efficiency motors

Electric motors have a significant impact on the total energy operating costs in a building, and may vary widely in terms of energy efficiency. The NEMA Premium Motors energy efficiency program was established to assist users to optimize motor systems efficiency in light of power supply and utility deregulation issues. NEMA Premium motors help to optimize systems thereby reducing electrical consumption and reducing pollution associated with electrical power generation. SWA noted that existing motors on the two domestic hot water pumps are of standard efficiency. SWA recommends replacing these motors with premium efficiency motors. Note that there are two chilled water pumps, and SWA recommends replacing motor on only the lead pump as per this measure.

Installation cost:

Estimated installed cost: $1,258(estimated labor cost $440)
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
7	1,348	90	1,258	1,466	0.3	0	0.0	0	96	20	1,914	5.5	264	13	18	873	1,051

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The DOE Motor Master International selection and calculator was used considering equipment should operate for approximately 75% loading factor. Motor use hours were estimated to be 5,000 hours for air handling units and fans, and 2,500 hours for pumps.

Rebates/financial incentives:

NJ Clean Energy - Premium three-phase motors ($45-$700 per motor); for 7.5 hp motor - $90/motor, for 10 hp motor - $100/motor, for 25 hp motor - $130/motor, and for 30 hp motor - $150/motor; maximum incentive available is $470.

NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#8: Install a five (5) HP NEMA premium efficiency motor

Electric motors have a significant impact on the total energy operating costs in a building, and may vary widely in terms of energy efficiency. The NEMA Premium Motors energy efficiency program was established to assist users to optimize motor systems efficiency in light of power supply and utility deregulation issues. NEMA Premium motors help to optimize systems thereby reducing electrical consumption and reducing pollution associated with electrical power generation. SWA noted that existing motors on the pneumatic compressor is of standard efficiency. SWA recommends replacing these motors with premium efficiency motors. Note that there are two chilled water pumps, and SWA recommends replacing motor on only the lead pump as per this measure.

Installation cost:
Estimated installed cost: $525(estimated labor cost $130)
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
8	525	0	525	587	0.1	0	0.0	0	96	20	1,914	5.5	264	13	18	873	1,051

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The DOE Motor Master International selection and calculator was used considering equipment should operate for approximately 75% loading factor. Motor use hours were estimated to be 5,000 hours for air handling units and fans, and 2,500 hours for pumps.

Rebates/financial incentives:
NJ Clean Energy - Premium three-phase motors ($45-$700 per motor); for 7.5 hp motor - $90/motor, for 10 hp motor - $100/motor, for 25 hp motor - $130/motor, and for 30 hp motor - $150/motor; maximum incentive available is $470.

NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#9: Install two (2) 7.5 HP NEMA premium efficiency motors

Electric motors have a significant impact on the total energy operating costs in a building, and may vary widely in terms of energy efficiency. The NEMA Premium Motors energy efficiency program was established to assist users to optimize motor systems efficiency in light of power supply and utility deregulation issues. NEMA Premium motors help to optimize systems thereby reducing electrical consumption and reducing pollution associated with electrical power generation. SWA noted that existing motors on the two hot water supply pumps are of standard efficiency. SWA recommends replacing these motors with premium efficiency motors. Note that there are two chilled water pumps, and SWA recommends replacing motor on only the lead pump as per this measure.

Installation cost:
Estimated installed cost: $1,258(estimated labor cost $440)
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
9	1,348	90	1,258	1,372	0.3	0	0.0	0	224	20	4,473	5.6	356	13	17	2,008	2,457

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The DOE Motor Master International selection and calculator was used considering equipment should operate for approximately 75% loading factor. Motor use hours were estimated to be 5,000 hours for air handling units and fans, and 2,500 hours for pumps.

Rebates/financial incentives:
NJ Clean Energy - Premium three-phase motors ($45-$700 per motor); for 7.5 hp motor - $90/motor, for 10 hp motor - $100/motor, for 25 hp motor - $130/motor, and for 30 hp motor - $150/motor; maximum incentive available is $470.

NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#10: Install four new demand control ventilation systems

On the day of the site visit, SWA observed that there were not any air flow controls based on occupancy. SWA recommends that carbon dioxide sensors be installed (in return air ducts) in the larger spaces to sense occupancy and improve Indoor Air Quality (IAQ). Signals from these sensors need to be taken back to the HVAC air flow controls for programming to regulate the amount of cooling and heating for these spaces and vary air flows according to occupancy. Thus, many a time when these spaces are sparsely occupied, savings will be realized in the heating and cooling of these spaces, by bringing into the spaces the right amount of fresh air (rather than too much unconditioned air).

Demand controlled ventilation (DCV) is the process of automatically modulating the rate of outdoor air supply (i.e., rate of ventilation) as the "demand" or need for ventilation varies. The objective is to keep ventilation rates at or above design specifications and code requirements and also to save energy by avoiding excessive ventilation rates, as energy is normally required to heat, cool, and dehumidify the ventilation air supplied to buildings. The need for ventilation is increased when the rate of air pollutant generation from indoor sources is high. People and their activities are among the important indoor pollutant sources and in many indoor spaces occupant density is highly variable. Thus, DCV is most often implemented in spaces with sometimes high and temporally variable occupant density, for example meeting rooms and theatres. In the usual application of DCV, ventilation rates are automatically modulated based on measured indoor concentrations of carbon dioxide (CO2), as CO2 is emitted by people as a metabolic by product and more easily measured than other air pollutants resulting from occupancy. When the indoor occupant density is increased, the indoor concentration of CO2 increases, unless the ventilation rate also increases. Carbon dioxide is not generally considered a directly harmful air pollutant at the concentrations found indoors - rather the concentration of CO2 is considered a proxy for the concentration of a variety of other odorous or potentially harmful pollutants emitted by people or their activities. A typical DCV system is designed to modulate ventilation rates over time so that indoor carbon dioxide concentrations do not exceed a set point, or target, value. The set point CO2 concentration is typically between 800 and 1000 parts per million with outside CO2 levels typically at low concentrations of around 400 to 450 ppm.

Building codes require that a minimum amount of fresh air be provided to ensure adequate air quality. To comply, ventilation systems often operate at a fixed rate based on an assumed occupancy (e.g., 15 cfm per person multiplied by the maximum design occupancy). The result is there often is much more fresh air coming into buildings than is necessary. That air must be conditioned, resulting in higher energy consumption and costs than is necessary with appropriate ventilation. ANSI/ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality, sets minimum ventilation rates and other requirements for commercial and institutional buildings, besides state and local building codes. (Add any ECM specifics)

Installation cost:

Estimated installed cost: $4,800(estimated labor cost $1,600)
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
10	4,800	0	4,800	3,342	0.7	182	0.2	0	773	12	9,278	6.2	93	8	12	2,805	7,990

Assumptions: SWA assumed thermal savings based on heating and cooling loads calculated using the billing analysis. In order to estimate savings for this measure, SWA calculated energy reductions equivalent to ratio-ing energy saved to the total heating and cooling used by the size of the space(s), occupancy and utilization according to known schedules (in view that some of the spaces are rarely used at the full designed capacity).

Rebates/financial incentives:

- NJ Clean Energy – Direct Install program (Up to 60% of installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#11: Replace seven (7) large refrigerators with 17 cu. ft. ENERGY STAR® models

On the day of the site visit, SWA observed that there were eight older refrigerators, 17 cu. ft. model in the building which were not Energy Star rated (using approximately 773 kWh/year). Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. SWA recommends the replacement of the existing refrigerators with a 17 cu. ft. top freezer ENERGY STAR® refrigerator. Besides saving energy, the replacement will also keep their surroundings cooler. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings. Look for the Energy Star label when replacing appliances and equipment, including: window air conditioners, refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

Installation cost:

Estimated installed cost: $3,675 (Includes $800 in labor cost)
Source of cost estimate: Manufacturer and Store established costs

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
11	3,675	0	3,675	2,975	0.6	0	0.1	0	485	12	5,819	7.6	58	5	10	2,031	5,327

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis aggregate utility rate.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#12: Replace eight (8) compact refrigerators with 2.7 cu. ft. ENERGY STAR® models

On the day of the site visit, SWA observed that there were eight older 2.7 cu. ft. model refrigerators that are not ENERGY STAR® rated (using approximately 254 kWh/year). Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. SWA recommends the replacement of the older model compact refrigerators with a 2.7 cf. ft. ENERGY STAR® model or equivalent. Besides saving energy, the replacement will also keep their surroundings cooler. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings. Look for the Energy Star label when replacing appliances and equipment, including: window air conditioners, refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

Installation cost:

Estimated installed cost: $792 (Includes $120 in labor cost)
Source of cost estimate: Manufacturer and Store established costs

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
12	792	0	792	640	0.1	0	0.0	0	104	12	1,252	7.6	58	5	10	436	1,146

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis aggregate utility rate.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#13: Install sixty-three (63) new pulse start metal halide fixtures

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The existing lighting inventory contained sixty-three fixtures with inefficient metal halide and high pressure sodium lamps. SWA recommends replacing them with more efficient, Pulse Start Metal Halide fixtures with electronic ballasts. Pulse Start Metal Halide fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to metal halide or high pressure sodium fixtures. .

Installation cost:

Estimated installed cost: $39,200 (includes $7,324 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
13	40,775	1,575	39,200	23,039	4.8	0	0.5	529	4,284	15	64,265	9.1	64	4	7	11,218	41,251

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 1 hr/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- NJ Clean Energy - Smart Start - Pulse Start Metal Halide Fixtures ($25 per fixture)
    - Maximum Incentive Amount: $1,575
- NJ Clean Energy – Direct Install program (Up to 60% of the installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#14: Install nine hundred and fifty-five (955) new T8 fluorescent fixtures

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge High School (see Appendix B). The existing lighting inventory contained nine hundred and fifty-five inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each existing fixture with more efficient T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast.

Installation cost:

Estimated installed cost: $128,064 (includes $90,725 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
14	142,389	14,325	128,064	41,436	8.6	0	0.9	6,659	13,413	15	201,196	9.5	57	4	6	29,767	74,190

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 4 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- NJ Clean Energy - Smart Start - T8 fixtures with electronic ballasts ($15 per fixture)
  - Maximum Incentive Amount: $14,325
- NJ Clean Energy – Direct Install program (Up to 60% of the installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#15: Install one new ENERGY STAR® label washing machines

On the day of the site visit, SWA observed that there was one older model washing machine installed in the high school. SWA recommends replacing this unit with a new ENERGY STAR® labeled washing machine.

Installation Cost:

Estimated installed cost: $550 (Includes $100 of labor)
Source of cost estimate: *Manufacturers info*

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
15	550	0	550	350	0.1	0	0.0	0	57	12	685	9.6	24	2	6	121	627

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis.

Rebates/financial incentives:
NJ Clean Energy – None available for this ECM

Options for funding the ECM: *This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.*
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

Please see Appendix F for more information on Incentive Programs

ECM#16: Install a 49.9 kW Solar Photovoltaic system

Currently, the building does not use any renewable energy systems. Renewable energy systems such as photovoltaic (PV) panels can be mounted on the building roof facing south which can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, electric demand at a power station is high, due to the amount of air conditioners, lights, and other equipment being used within the region. Demand charges increase to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems offset the amount of electricity used by a building and help to reduce the building's electric demand, resulting in a higher cost savings. Installing a PV system will offset electric demand and reduce annual electric consumption, while utilizing available state incentives. PV systems are modular and readily allow for future expansions.

The size of the system was determined considering the best available incentives and available roof surface area without compromising service space for roof equipment and safety, as well as the facilities' annual base load and mode of operation. A PV system could be installed on a portion of the roof with panels facing south. A commercial multi-crystalline 208 watt panel has 17.5 square feet of surface area (providing 11.9 watts per square foot). A 49.9 kW system needs approximately 240 panels which would take up 4,200 square feet. SWA found the available roof area for solar panels to be 80,000 square feet, however a system of less than 50kW is recommended in order to capitalize on installation incentives. The price of a 49.9 kW system is $327,500, and the payback comes to 10.7 years. The price of a 30 kW system is $165,000, and the payback comes to 7.0 years.

A PV system would reduce the building's electric load and allow more capacity for surrounding buildings as well as serve as an example of energy efficiency for the community. The building is not eligible for a residential 30% federal tax credit. The building owner may want to consider applying for a grant and engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. Typically, a major utility provides the ability to buy SREC's at $600/MWh or best market offer. However, this option is not available from the local utility. Please see below for more information.

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that Glen Ridge Public Schools contract with a structural engineer to determine if additional building structure is required to support the recommended system and what costs would be associated with incorporating the additional supports prior to system installation. Should additional costs be identified, Glen Ridge Public Schools should include these costs in the financial analysis of the project.

Installation cost:

Estimated installed cost: $327,500 (includes $ 149,700 of labor)
Source of cost estimate: Similar projects

Economics:

ECM #	Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
16	349,440	22,500	327,500	61,876	49.9	0	1.3	0	30,622	25	765,540	10.7	134	5	6	80,889	110,789

Annual Solar PV Cost Savings Breakdown

Rated Capacity (kW)	49.9
Rated Capacity (kWh)	61,876
Annual Capacity Loss	0%

Year	kWh Capacity	Installed Cost	Incentives	Electric Savings ($)
0		$349,440	$22,500	
1	61,876		$36,600	$10,091
2	61,876		$36,600	$10,091
3	61,876		$36,600	$10,091
4	61,876		$36,600	$10,091
5	61,876		$36,600	$10,091
6	61,876		$36,600	$10,091
7	61,876		$36,600	$10,091
8	61,876		$36,600	$10,091
9	61,876		$36,600	$10,091
10	61,876		$36,600	$10,091
11	61,876		$36,600	$10,091
12	61,876		$36,600	$10,091
13	61,876		$36,600	$10,091
14	61,876		$36,600	$10,091
15	61,876		$36,600	$10,091
16	61,876		$0	$10,091
17	61,876		$0	$10,091
18	61,876		$0	$10,091
19	61,876		$0	$10,091
20	61,876		$0	$10,091
21	61,876		$0	$10,091
22	61,876		$0	$10,091
23	61,876		$0	$10,091
24	61,876		$0	$10,091
25	61,876		$0	$10,091
	kWh	Cost	Saving	
Lifetime Total	**1,546,900**	**($349,440)**	**$571,500**	**$252,265**

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Sharp Polycrystalline Solar Panel (208 Watts, model #ND-U208U1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:
NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $0.75 / watt Solar PV application for systems 30 kW or less. Incentive amount for this application is $22,500 for the proposed option. http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total annual SREC credit of $36,600 has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

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 Glen Ridge High School:

- Upgrade windows - SWA recommends that Glen Ridge Board of Education upgrade all windows to double-pane, argon-filled windows with a low-e coating, frame insulation and a thermal break. At this time, this measure would not be cost-effective but should be considered as a capital improvement or if there is an opportunity for additional funding through energy conservation block grants.

- Upgrade building insulation – SWA recommends that Glen Ridge Board of Education upgrade all insulation at the roof level to a minimum of R-30 and wall insulation is increased to recent energy code minimums. At this time, this measure would not be cost-effective but should be considered as a capital improvement or if there is an opportunity for additional funding through energy conservation block grants.

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

- Replace broken/deteriorated bricks and re-point cracked mortar joints.

- Domestic hot water heater replacement – At the end of its life cycle or when a major repair becomes necessary replace the existing domestic water heater with a new efficient sealed combustion hot water boiler.

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.

- Install occupancy-based power strips or power management software for computers – The Glen Ridge High School School contains computers and other electronic devices that consume a significant amount of power. Typically, computers are left on for extended periods of time such as during nights, weekends and holiday breaks with only screensavers to power down the screens. SWA recommends that the school deploy either a power management software that can be programmed to automatically shutdown computers or install occupancy based power strips. New SmartStrips are power strips that contain an occupancy sensor to automatically shutdown computers if no motion is detected within a set period of time.

- 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 200 Ridgewood Avenue 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.

- Repair/seal wall cracks and penetrations - SWA recommends as part of the maintenance program installing weep holes, installing proper flashing and correct masonry efflorescence, and sealing wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
- 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.
- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Repair/seal wall cracks and penetrations - SWA recommends as part of the maintenance program installing weep holes, installing proper flashing and correct masonry efflorescence, and sealing wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.
- Repair window sills to reduce water damage to surround exterior walls - install/repair pan or strip flashing and drip edge detail at window sill.
- 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 Glen Ridge Public Schools. Based on the requirements of the LGEA program, Glen Ridge Public Schools 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 $6,141.

APPENDIX A: EQUIPMENT LIST
Mechanical Inventory

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Appliances	Refrigerated Vending Machine ENERGY STAR® Rated R134a	Royal Vendors Econo-Cool: M# RVDVE-650-10	Electric	Lunchroom Hallway	Lunchroom Hallway	2003	53%
Appliances	Vending Machine	Crane Vending	Electric	Lunchroom Hallway	Lunchroom Hallway	2003	53%
Appliances	Refrigerated Vending Machine	Dixie Narco	Electric	Lunchroom Hallway	Lunchroom Hallway	2003	53%
Appliances	Refrigerated Vending Machine	Dixie Narco: M# DN276E HV/Sll-6	Electric	Gymnasium Hallway	Gymnasiu m Hallway	2007	80%
Appliances	Refrigerated Vending Machine	Dixie Narco	Electric	Gymnasium Hallway	Gymnasiu m Hallway	2003	53%
Appliances	ENERGY STAR® Dishwasher	Frigidaire: M#FDB750RCS 0 S#TH34027123	Electricity	Classroom # 115	Classroom # 115	2003	53%
Appliances	Washing Machine	Alliance Laundry Systems Speed Queen: M#AWN311SP1 11TW01 S#1001006219	Electricity	Classroom # 115	Classroom # 115	2003	53%
Appliances	Clothing dryer	General Electric	Electricity	Classroom # 115	Classroom # 115	2003	53%
Controls	Pneumatic Controls - Compressor - R22	Dunham-Bush	Electric	1st Floor Mechanical Room	Entire Building	2000	33%
Controls	Pneumatic Controls - Compressor - R409	Dunham-Bush	Electric	1st Floor Mechanical Room	Entire Building	2000	33%
Controls	Pnuematic Controls - Air Compressor	Air Compressor Products Inc.: M# ACP-655B-520DP3 S#0793C9905	Electric	Basement Mechanical Room	Entire Building	2000	33%
Controls	Compressed Air Dryer - 10 SCFM @ 100 PSIG @ 100°F, MWP - 175 PSIG, R-134a	Seimens - M#8010 S#0302-101-9310-25961	Electric	Basement Mechanical Room	Entire Building	2000	33%
Cooling	CU-1; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN00923	Electricity	Lower Roof, Front	Interior	2003	53%

Building System	Description	Model #	Fuel	Location	Interior	Date Installed	Estimated Remaining Useful Life %
Cooling	CU-2; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN00924	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-3; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009223	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-4; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009075	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-5; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009231	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-6; Fujitsu air-cooled condensing unit, 28,700 Btuh capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009074	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-7; Fujitsu air-cooled condensing unit, 28,700 Btuh capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009073	Electricity	Lower Roof, Front	Interior	2003	53%

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	CU-8; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009222	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-9; Fujitsu air-cooled condensing unit, 28,700 Btuh cooling capacity, 2.4 tons capacity, R-22, 10 SEER, 9.5 EER, matching indoor unit ASU30C1	Fujitsu, Halcyon, Model #AOU30CL, Serial #AEN009239	Electricity	Lower Roof, Front	Interior	2003	53%
Cooling	CU-10; Sanyo air-cooled condensing unit (older), 27,000 Btuh cooling capacity, 2.3 tons capacity, R-22, SEER 10.0, matching indoor unit KS3012	Sanyo, Model #C3012, Serial #0036564	Electricity	Lower Roof,Lower portion, Front	Interior	2003	53%
Cooling	CU-11; Sanyo air-cooled condensing unit (newer), 30,700 Btuh cooling capacity, 2.5 tons capacity, R-410A , 15.0 SEER	Sanyo, Halcyon, Model #AOU30CLX, Serial #DEN011775	Electricity	Lower Roof, Lower portion, Front	Interior	2003	53%
Cooling	CU-12; Sanyo air-cooled condensing unit, Tri-zone AC, 32,000 Btuh cooling capacity, 2.7 tons capacity, R-22, connected to indoor units KMS0712	Sanyo, Tri-zone, Model #CM3212, Serial #0023102	Electricity	Upper roof, West side	Interior	2003	53%
Cooling	CU-13; Sanyo air-cooled condensing unit, Tri-zone AC, 32,000 Btuh cooling capacity, 2.7 tons capacity, R-22, connected to indoor units KMS0712	Sanyo, Tri-zone, Model #CM3212, Serial #0029913	Electricity	Upper roof, West side	Interior	2003	53%

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	CU-14; Fujitsu air-cooled condensing unit, 36,000 Btuh cooling capacity, 3 tons capacity, R-410A, 10.0 SEER, 9.5 EER	Fujitsu, Halcyon, Model #AOU36RML, Serial #GPN006046	Electricity	Upper roof, Upper Section near Cafeteria	Interior	2003	53%
Cooling	CU-15; Carrier air-cooled condesing unit, Energy Star, 18,000 cooling capacity, 1.5 tons capacity, R-22, 12.0 SEER, 11.0 EER	Carrier, Model #38HDC018341, Serial #90803X60122	Electricity	Upper roof, Upper Section near Cafeteria	Interior	2003	53%
Cooling	CU-16; Lierbert Corp (disconnected) air-cooled condensing unit, R-22, TO BE REMOVED from building	Lierbert, Model #D0440, Serial #F81431	Electricity	Upper roof, Upper Section near Cafeteria	Interior	2003	53%
Cooling	Dunham Bush, smaller unit	Dunham-Bush, Model G, Model #RCU-10-1, Serial #YF8C-99257	Electricity	Middle roof, through Chiller room	Interior	2003	53%
Cooling	Dunham Bush, larger unit	N/A	Electricity	Middle roof, through Chiller room	Interior	2003	53%
Cooling	Trane Chiller				Interior	2003	53%
Cooling	Air Conditioner - 5 Ton Unit	Liebert: M# Challenger2	Electric	Basement Classroom B02	Basement Classroom B02	2003	53%
Cooling	Dx split system; Fujitsu air-cooled condensing unit, 33,100 Btuh cooling capacity, 2.75 tons capacity, R-410A, 15 SEER, matching indoor unit ASU36CLX	Fujitsu, Halcyon, Model #AOU36CLX, Serial #EBN009909	Electricity	Exterior Courtyard	Classroom	2003	53%
Cooling	Dx split system; Fujitsu air-cooled condensing unit, 30,700 Btuh cooling capacity, 2.75 tons capacity, R-410A, 15 SEER, matching indoor unit ASU30CLX	Fujitsu, Halcyon, Model #AOU30CLX, Serial #DEN009732	Electricity	Exterior Courtyard	Classroom	2003	53%

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	Dx split system; Fujitsu air-cooled condensing unit, 30,700 Btuh cooling capacity, capacity, R-410A, 15 SEER, matching indoor unit ASU30CLX	Fujitsu, Halcyon, Model #AOU30CLX, Serial #DEN007325	Electricity	Exterior Courtyard	Classroom	2003	53%
Elevators	Submersible hydraulic type, cargo capacity 2,000, 15 HP, 3430 RPM, 70% eff. and 11 kW	Otis Elevator Corp - M # SUB140-59 and S # 6962-Y26.	Electric	Elevator by 1st floor nurses office	1st Floor stairs by nurses office	1990	33%
Elevators	Submersible hydraulic type, cargo capacity 2,100 pounds, 25 HP, 3450 RPM, 75.5% efficiency and 19 kilowatts	Otis Elevator Corp	Electric	Basement Staircase	Basement and First Floor	1990	33%
Elevators	Submersible hydraulic type, cargo capacity 2,000 pounds, 75 HP, 45 kilowatts.	Thyssen Krupp Elevator Corp. TAC20 line, model # EPO6020 and serial # EP8143.	Electric	A-Wing	First - Third Floor	2003	77%
Heating	Two (2) Cast Iron Hot Water Boilers - 81.1% Eff. 6341 MBH Input, 5014 MBH Output, 150 HP, Power Flame Burner	Smith Mills Boilers: M# 4500A-S/W-15	Natural Gas	Boiler Room	Entire Building	2003	77%
Heating	Two (2) Gas Burner & Controller- 6341 MBH Input	Power Flame Burner: M#LNIC5-G-30	Natural Gas	Boiler Room	Hot Water Boilers	2003	77%
Heating	Expansion Tank	Amtrol Inc: M# 117856	---	Boiler Room	Hot Water Heating	2003	77%
Heating	Two (2) Hot Water Supply Pumps, 220 GPM @ 70 TDH	Paco Pumps: M#321020 S#2231202 A,M#321020 S#2231202 B,	Electricity	Basement Mechanical Room	Boilers	2003	53%
Heating/ Cooling/ Ventilation	McQuay packaged rooftop unit, gas-fired heating, 4,000-16,000 CFM	McQuay, Model #RDS800CYA, Serial #FBOU0303007 1600	Natural Gas/ Electricity	Upper roof, Middle Section, near Gymnasium	Interior	2003	72%
Heating/ Ventilation	Modine packaged rooftop unit, gas-fired heating with DX cooling		Electricity	Upper roof, Middle Section, near Gymnasium	Interior	2003	72%

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating/ Ventilation	McQuay packaged rooftop unit, gas-fired, no cooling, 4,000-16,000 CFM	McQuay, Model #RDS800CYA, Serial #FB0U3030055 800	Natural Gas/ Electricity	Upper roof, Back	Interior	2003	72%
Heating/ Ventilation	McQuay packaged rooftop unit, gas-fired heating, 4,000-16,000 CFM	McQuay, Model #RPS030CLA, Serial #FBOU0303005 5500	Natural Gas/ Electricity	Upper roof, Back	Interior	2003	72%
Hot Water	Domestic Hot Water Heater	Information Unavailable	Natural Gas	Boiler Room	Entire Building	1995	50%
Hot Water	Two (2) Domestic Hot Water Circulating Pumps	Bell and Gossett: Series 100A-B-B30	Electricity	Basement Mechanical Room	Entire Building	2003	53%
Ventilation	Greenheck exhaust fan for Science lab hoods	Greenheck, Model #CUBE-121-7, Serial #03A30654	Electricity	Upper roof, Back	Science labs	2003	53%
Ventilation	Greenheck exhaust fan for Science lab hoods	Greenheck, Model #CUBE-121-7, Serial #03A30655	Electricity	Upper roof, Back	Science Labs	2003	53%
Ventilation	Four (4) Make Up Air Units	Penn: M# TS1006	Electricity	Roof	Interior	2003	53%
Lighting	See details - Appendix B	-	Electric	See details - Appendix B	Library	2000	33%

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	Classroom (117)	Ceiling Suspended	M	4'T12	27	2	40	Sw	9	190	12	2,484	4,248	T8	Ceiling Suspended	4'T8	E	Sw	27	2	32	9	190	5	1863	3186	1062	0	1062
2	1	Storage Room (117)	Recessed	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Recessed	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
3	1	Storage Room (117)	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
4	1	Storage Room (117)	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
5	1	Storage Room (117)	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
6	1	Office (117)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	261	12	184	432	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	261	5	138	324	108	0	108
7	1	Office (117)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	261	12	184	432	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	261	5	138	324	108	0	108
8	1	Office (117)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	261	12	184	432	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	261	5	138	324	108	0	108
9	1	Hallway	Recessed	E	4'T8	8	4	32	Sw	12	261	5	1,064	3,332	N/A	Recessed	4'T8	E	Sw	8	4	32	12	261	5	1064	3332	0	0	0
10	1	Hallway	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
11	1	Hallway	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
12	1	Elevator	Recessed	M	4'T12	1	2	40	N	24	365	12	92	806	T8	Recessed	4'T8	E	N	1	2	32	24	365	5	69	604	201	0	201
13	1	Hallway	Recessed	E	4'T8	2	3	32	Sw	12	261	5	202	633	N/A	Recessed	4'T8	E	Sw	2	3	32	12	261	5	202	633	0	0	0
14	1	Hallway	Recessed	E	4'T8	12	4	32	Sw	12	261	5	1,596	4,999	N/A	Recessed	4'T8	E	Sw	12	4	32	12	261	5	1596	4999	0	0	0
15	1	Classroom (116)	Ceiling Mounted	M	4'T12	9	2	40	Sw	9	190	12	828	1,416	T8	Ceiling Mounted	4'T8	E	Sw	9	2	32	9	190	5	621	1062	354	0	354
16	1	Classroom (115)	Ceiling Mounted	M	4'T12	30	2	40	Sw	9	190	12	2,760	4,720	T8	Ceiling Mounted	4'T8	E	Sw	30	2	32	9	190	5	2070	3540	1180	0	1180
17	1	Classroom (114)	Ceiling Mounted	M	4'T12	18	2	40	Sw	9	190	12	1,656	2,832	T8	Ceiling Mounted	4'T8	E	Sw	18	2	32	9	190	5	1242	2124	708	0	708
18	1	Classroom (113)	Ceiling Mounted	M	4'T12	27	2	40	Sw	9	190	12	2,484	4,248	T8	Ceiling Mounted	4'T8	E	Sw	27	2	32	9	190	5	1863	3186	1062	0	1062
19	1	Meeting Room (112)	Recessed	E	4'T8	6	4	32	Sw	4	190	5	798	606	N/A	Recessed	4'T8	E	Sw	6	4	32	4	190	5	798	606	0	0	0
20	1	Hallway	Exit Sign	E	Fl.	2	2	15	N	24	365	2	63	552	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	456	0	456
21	1	Vestibule	Recessed	M	4'T12	4	4	40	Sw	24	365	12	688	6,027	T8	Recessed	4'T8	E	Sw	4	4	32	24	365	5	532	4660	1367	0	1367
22	1	Vestibule	Recessed	S	CFL	2	1	23	Sw	24	365	0	46	403	N/A	Recessed	CFL	S	Sw	2	1	23	24	365	0	46	403	0	0	0
23	1	Lobby	Recessed	M	4'T12	8	4	40	Sw	12	261	12	1,376	4,310	T8	Recessed	4'T8	E	Sw	8	4	32	12	261	5	1064	3332	977	0	977
24	1	Lobby	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
25	1	Classroom (111)	Ceiling Mounted	M	4'T12	24	2	40	Sw	9	190	12	2,208	3,776	T8	Ceiling Mounted	4'T8	E	Sw	24	2	32	9	190	5	1656	2832	944	0	944
26	1	Classroom (111)	Recessed	S	CFL	1	1	13	Sw	9	190	0	13	22	N/A	Recessed	CFL	S	Sw	1	1	13	9	190	0	13	22	0	0	0
27	1	Office (111)	Ceiling Mounted	M	4'T12	1	2	40	N	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	N	1	2	32	9	190	5	69	118	39	0	39
28	1	Storage Room (111)	Ceiling Mounted	M	4'T12	4	2	40	Sw	2	190	12	368	140	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	2	190	5	276	105	35	0	35
29	1	Hallway	Recessed	E	4'T8	10	4	32	Sw	12	261	5	1,330	4,166	N/A	Recessed	4'T8	E	Sw	10	4	32	12	261	5	1330	4166	0	0	0
30	1	Classroom (110)	Ceiling Mounted	M	4'T12	24	2	40	Sw	9	190	12	2,208	3,776	T8	Ceiling Mounted	4'T8	E	Sw	24	2	32	9	190	5	1656	2832	944	0	944
31	1	Classroom	Recessed	S	CFL	1	1	13	Sw	9	190	0	13	22	N/A	Recessed	CFL	S	Sw	1	1	13	9	190	0	13	22	0	0	0
32	1	Office (110B)	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
33	1	Classroom (109)	Ceiling Mounted	M	4'T12	28	2	40	Sw	9	190	12	2,576	4,405	T8	Ceiling Mounted	4'T8	E	Sw	28	2	32	9	190	5	1932	3304	1101	0	1101
34	1	Classroom (109)	Recessed	S	CFL	1	1	23	Sw	9	190	0	23	39	N/A	Recessed	CFL	S	Sw	1	1	23	9	190	0	23	39	0	0	0
35	1	Office (109)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
36	1	Storage Room (108)	Ceiling Mounted	M	4'T12	4	2	40	Sw	2	190	12	368	140	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	2	190	5	276	105	35	0	35
37	1	Office (108)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
38	1	Classroom (108)	Ceiling Mounted	M	4'T12	24	2	40	Sw	9	190	12	2,208	3,776	T8	Ceiling Mounted	4'T8	E	Sw	24	2	32	9	190	5	1656	2832	944	0	944
39	1	Classroom (107)	Recessed	M	4'T12	24	2	40	Sw	9	190	12	2,208	3,776	T8	Recessed	4'T8	E	Sw	24	2	32	9	190	5	1656	2832	944	0	944
40	1	Classroom (107)	Recessed	M	4'T12 U-Shaped	3	2	40	Sw	9	190	12	276	472	T8	Recessed	4'T8 U-Shaped	E	Sw	3	2	32	9	190	5	207	354	118	0	118
41	1	Classroom (107)	Recessed	S	CFL	9	1	23	Sw	9	190	0	207	354	N/A	Recessed	CFL	S	Sw	9	1	23	9	190	0	207	354	0	0	0
42	1	Classroom (107)	Pendant	S	CFL	2	1	23	Sw	9	190	0	46	79	N/A	Pendant	CFL	S	Sw	2	1	23	9	190	0	46	79	0	0	0
43	1	Storage Room (107)	Ceiling Mounted	M	4'T12	4	2	40	Sw	2	190	12	368	140	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	2	190	5	276	105	35	0	35
44	1	Mechanical Room (107)	Ceiling Mounted	S	Inc	1	1	60	Sw	2	261	0	60	31	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	261	0	20	10	21	0	21
45	1	Storage Room (107)	Ceiling Mounted	S	CFL	1	1	23	Sw	2	190	0	23	9	N/A	Ceiling Mounted	CFL	S	Sw	1	1	23	2	190	0	23	9	0	0	0
46	1	Classroom (107)	Exit Sign	E	Fl.	2	2	15	N	9	190	2	63	108	LEDex	Exit Sign	LED	E	N	2	1	5	9	190	1	11	19	89	0	89
47	1	Hallway	Recessed	E	4'T8	8	2	32	Sw	12	261	5	552	1,729	N/A	Recessed	4'T8	E	Sw	8	2	32	12	261	5	552	1729	0	0	0
48	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
49	1	Hallway	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
50	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
51	1	Hallway	Recessed	E	4'T8	4	2	32	Sw	12	261	5	276	864	N/A	Recessed	4'T8	E	Sw	4	2	32	12	261	5	276	864	0	0	0
52	1	Hallway	Recessed	E	2'T8	1	4	17	Sw	12	261	2	70	219	N/A	Recessed	2'T8	E	Sw	1	4	17	12	261	2	70	219	0	0	0
53	1	Hallway	Recessed	E	4'T8	8	2	32	Sw	12	261	5	552	1,729	N/A	Recessed	4'T8	E	Sw	8	2	32	12	261	5	552	1729	0	0	0
54	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
55	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
56	1	Office Area (100)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
57	1	Office Area (100)	Recessed	M	4'T12	6	2	40	Sw	9	261	12	552	1,297	T8	Recessed	4'T8	E	Sw	6	2	32	9	261	5	414	972	324	0	324
58	1	Office Area (100)	Recessed	E	4'T8	3	2	32	Sw	9	261	5	207	486	N/A	Recessed	4'T8	E	Sw	3	2	32	9	261	5	207	486	0	0	0
59	1	Office (100A)	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	261	5	276	648	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	261	5	276	648	0	0	0
60	1	Office (100B)	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	261	5	276	648	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	261	5	276	648	0	0	0
61	1	Office (100C)	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	261	5	276	648	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	261	5	276	648	0	0	0
62	1	Office (100D)	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	261	5	276	648	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	261	5	276	648	0	0	0
63	1	Meeting Room (100E)	Recessed	E	4'T8 U-Shaped	6	2	32	Sw	4	261	5	414	432	N/A	Recessed	4'T8 U-Shaped	E	Sw	6	2	32	4	261	5	414	432	0	0	0
64	1	Hallway	Recessed	E	4'T8	3	2	32	Sw	12	261	5	207	648	N/A	Recessed	4'T8	E	Sw	3	2	32	12	261	5	207	648	0	0	0
65	1	Hallway	Recessed	E	2'T8	1	4	17	Sw	12	261	2	70	219	N/A	Recessed	2'T8	E	Sw	1	4	17	12	261	2	70	219	0	0	0
66	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
67	1	Classroom (102)	Recessed	E	4'T8 U-Shaped	6	2	32	Sw	9	190	5	414	708	N/A	Recessed	4'T8 U-Shaped	E	Sw	6	2	32	9	190	5	414	708	0	0	0
68	1	Classroom (102)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
69	1	Classroom (102)	Parabolic Ceiling Suspende	E	4'T8	27	3	32	Sw	9	190	5	2,727	4,663	N/A	Parabolic Ceiling Suspende	4'T8	E	Sw	27	3	32	9	190	5	2727	4663	0	0	0
70	1	Janitor's Closet	Recessed	E	4'T8	1	2	32	Sw	2	261	5	69	36	N/A	Recessed	4'T8	E	Sw	1	2	32	2	261	5	69	36	0	0	0
71	1	Bathroom Men	Recessed	E	4'T8	2	2	32	Sw	4	190	5	138	105	N/A	Recessed	4'T8	E	Sw	2	2	32	4	190	5	138	105	0	0	0
72	1	Bathroom Women	Recessed	E	4'T8	2	2	32	Sw	4	190	5	138	105	N/A	Recessed	4'T8	E	Sw	2	2	32	4	190	5	138	105	0	0	0
73	1	Office (101A)	Recessed	E	4'T8	4	2	32	Sw	9	190	5	276	472	N/A	Recessed	4'T8	E	Sw	4	2	32	9	190	5	276	472	0	0	0
74	1	Office (101B)	Recessed	E	4'T8	4	2	32	Sw	9	190	5	276	472	N/A	Recessed	4'T8	E	Sw	4	2	32	9	190	5	276	472	0	0	0
75	1	Classroom (101)	Recessed	E	4'T8	4	4	32	Sw	9	190	5	532	910	N/A	Recessed	4'T8	E	Sw	4	4	32	9	190	5	532	910	0	0	0
76	1	Storage Room (101B)	Recessed	E	4'T8	6	4	32	Sw	2	190	5	798	303	N/A	Recessed	4'T8	E	Sw	6	4	32	2	190	5	798	303	0	0	0
77	1	Vestibule	Recessed	E	4'T8	4	2	32	Sw	24	365	5	276	2,418	N/A	Recessed	4'T8	E	Sw	4	2	32	24	365	5	276	2418	0	0	0
78	1	Vestibule	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
79	1	Hallway	Recessed	E	4'T8	4	2	32	N	12	261	5	276	864	N/A	Recessed	4'T8	E	N	4	2	32	12	261	5	276	864	0	0	0
80	1	Electrical Room	Parabolic Ceiling Suspende	E	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Parabolic Ceiling Suspende	4'T8	E	Sw	2	2	32	2	261	5	138	72	0	0	0
81	1	Electrical Room	Parabolic Ceiling Suspende	E	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Parabolic Ceiling Suspende	4'T8	E	Sw	2	2	32	2	261	5	138	72	0	0	0
82	1	Elevator Mechanical Room	Parabolic Ceiling Suspende	E	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Parabolic Ceiling Suspende	4'T8	E	Sw	2	2	32	2	261	5	138	72	0	0	0
83	1	Storage Room (105)	Recessed	E	4'T8	4	2	32	Sw	2	261	5	276	144	N/A	Recessed	4'T8	E	Sw	4	2	32	2	261	5	276	144	0	0	0
84	1	Storage Room (106)	Recessed	E	4'T8	1	3	32	Sw	2	261	5	101	53	N/A	Recessed	4'T8	E	Sw	1	3	32	2	261	5	101	53	0	0	0
85	1	Office (121)	Recessed	E	4'T8	8	2	32	Sw	9	261	5	552	1,297	C	Recessed	4'T8	E	OS	8	2	32	7	261	5	552	972	0	324	324
86	1	Office (121)	Recessed	E	4'T8	4	3	32	Sw	9	261	5	404	949	C	Recessed	4'T8	E	OS	4	3	32	7	261	5	404	712	0	237	237
87	1	Office (121)	Recessed Parabolic	E	4'T8 U-Shaped	1	2	32	Sw	9	261	5	69	162	N/A	Recessed Parabolic	4'T8 U-Shaped	E	Sw	1	2	32	9	261	5	69	162	0	0	0
88	1	Kitchen	Recessed	M	4'T12	2	2	40	Sw	4	261	12	184	192	T8	Recessed	4'T8	E	Sw	2	2	32	4	261	5	138	144	48	0	48
89	1	Corridor	Ceiling Mounted	M	4'T12	4	2	40	Sw	9	261	12	368	864	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	9	261	5	276	648	216	0	216
90	1	Office	Recessed	M	4'T12	4	2	40	Sw	9	261	12	368	864	T8	Recessed	4'T8	E	Sw	4	2	32	9	261	5	276	648	216	0	216

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)
91	1	Office Closet	Recessed	S	Inc	1	1	60	N	9	261	0	60	141	CFL	Recessed	CFL	S	N	1	1	20	9	261	0	20	47	94	0	94
92	1	Office	Recessed	M	4'T12	2	2	40	Sw	9	261	12	184	432	T8	Recessed	4'T8	E	Sw	2	2	32	9	261	5	138	324	108	0	108
93	1	Guidance Office	Recessed	E	4'T8	5	2	32	Sw	9	261	5	345	810	C	Recessed	4'T8	E	OS	5	2	32	7	261	5	345	608	0	203	203
94	1	Guidance Office	Recessed	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Recessed	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
95	1	Server Room	Recessed	M	4'T12	1	2	40	Sw	2	261	12	92	48	T8	Recessed	4'T8	E	Sw	1	2	32	2	261	5	69	36	12	0	12
96	1	Office	Recessed	M	4'T12	1	4	40	Sw	9	261	12	172	404	T8	Recessed	4'T8	E	Sw	1	4	32	9	261	5	133	312	92	0	92
97	1	Office	Recessed	M	4'T12	1	4	40	Sw	9	261	12	172	404	T8	Recessed	4'T8	E	Sw	1	4	32	9	261	5	133	312	92	0	92
98	1	Office	Recessed	M	4'T12	1	4	40	Sw	9	261	12	172	404	T8	Recessed	4'T8	E	Sw	1	4	32	9	261	5	133	312	92	0	92
99	1	Bathroom Men	Ceiling Mounted	S	CFL	1	1	23	Sw	4	261	0	23	24	N/A	Ceiling Mounted	CFL	S	Sw	1	1	23	4	261	0	23	24	0	0	0
100	1	Bathroom Women	Ceiling Mounted	S	CFL	1	1	23	Sw	4	261	0	23	24	N/A	Ceiling Mounted	CFL	S	Sw	1	1	23	4	261	0	23	24	0	0	0
101	1	Corridor	Recessed	M	4'T12	2	2	40	Sw	9	261	12	184	432	T8	Recessed	4'T8	E	Sw	2	2	32	9	261	5	138	324	108	0	108
102	1	Corridor	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	261	12	92	216	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	261	5	69	162	54	0	54
103	1	Office	Recessed	M	4'T12	4	2	40	Sw	9	261	12	368	864	T8	Recessed	4'T8	E	Sw	4	2	32	9	261	5	276	648	216	0	216
104	1	Office-closet	Ceiling Mounted	S	Inc	1	1	60	Sw	2	261	0	60	31	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	261	0	20	10	21	0	21
105	1	Nurse's Station	Recessed	M	4'T12	4	2	40	Sw	9	190	12	368	629	T8	Recessed	4'T8	E	Sw	4	2	32	9	190	5	276	472	157	0	157
106	1	Nurse's Station (125)	Recessed	M	4'T12	1	4	40	Sw	9	190	12	172	294	T8	Recessed	4'T8	E	Sw	1	4	32	9	190	5	133	227	67	0	67
107	1	Nurse's Station Office	Recessed Parabolic	E	4'T8	2	3	32	Sw	9	190	5	202	345	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	9	190	5	202	345	0	0	0
108	1	Office	Recessed	M	4'T12	4	2	40	Sw	9	261	12	368	864	T8	Recessed	4'T8	E	Sw	4	2	32	9	261	5	276	648	216	0	216
109	1	Hallway	Recessed	E	4'T8	6	4	32	Sw	12	261	5	798	2,499	N/A	Recessed	4'T8	E	Sw	6	4	32	12	261	5	798	2499	0	0	0
110	1	Bathroom Men	Ceiling Mounted	M	4'T12	2	2	40	Sw	4	261	12	184	192	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	4	261	5	138	144	48	0	48
111	1	Bathroom Women	Ceiling Mounted	M	4'T12	2	2	40	Sw	4	261	12	184	192	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	4	261	5	138	144	48	0	48
112	1	Janitor's Closet	Ceiling Mounted	S	CFL	1	1	13	Sw	2	261	0	13	7	N/A	Ceiling Mounted	CFL	S	Sw	1	1	13	2	261	0	13	7	0	0	0
113	1	Office	Recessed	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Recessed	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
114	1	Office (124)	Recessed	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Recessed	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
115	1	Hallway	Recessed Parabolic	E	4'T8	2	3	32	Sw	12	261	5	202	633	N/A	Recessed Parabolic	4'T8	E	Sw	2	3	32	12	261	5	202	633	0	0	0
116	1	Elevator	Recessed	M	4'T12	2	1	40	Sw	24	365	12	104	911	T8	Recessed	4'T8	E	Sw	2	1	32	24	365	5	74	648	263	0	263
117	1	Hallway	Recessed Parabolic	E	4'T8	1	3	32	Sw	12	261	5	101	316	N/A	Recessed Parabolic	4'T8	E	Sw	1	3	32	12	261	5	101	316	0	0	0
118	1	Mechanical Room (127)	Parabolic Ceiling Suspended	M	8'T12	1	2	80	Sw	2	261	20	180	94	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	1	2	59	2	261	7	125	65	29	0	29
119	1	Hallway	Recessed	E	4'T8	2	4	32	Sw	12	261	5	266	833	N/A	Recessed	4'T8	E	Sw	2	4	32	12	261	5	266	833	0	0	0
120	1	Hallway	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
121	1	Mens Locker Room	Ceiling Mounted	M	4'T12	18	2	40	Sw	9	190	12	1,656	2,832	T8	Ceiling Mounted	4'T8	E	OS	18	2	32	7	190	5	1242	1593	708	531	1239
122	1	Mens Locker Room	Exit Sign	E	Fl.	2	2	15	N	24	365	2	63	552	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	456	0	456
123	1	Mens Locker Room Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
124	1	Mens Locker Room Bathroom	Ceiling Mounted	M	4'T12	1	2	40	Sw	4	190	12	92	70	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	4	190	5	69	52	17	0	17
125	1	Mens Locker Room	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
126	1	Mens Locker Room	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
127	1	Mens Locker Room Showers	Recessed	S	Inc	6	1	60	Sw	9	190	0	360	616	CFL	Recessed	CFL	S	Sw	6	1	20	9	190	0	120	205	410	0	410
128	1	Elevator Mechanical Room	Ceiling Mounted	E	4'T8	1	2	32	Sw	2	261	5	69	36	N/A	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	261	5	69	36	0	0	0
129	1	Storage Room	Ceiling Suspended	M	8'T12	1	2	80	Sw	2	190	20	180	68	T8	Ceiling Suspended	8'T8	E	Sw	1	2	59	2	190	7	125	48	21	0	21
130	1	Mens Locker Room - Storage	Ceiling Mounted	S	Inc	1	1	60	Sw	2	190	0	60	23	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	190	0	20	8	15	0	15
131	1	Mens Locker Room - Storage	Ceiling Mounted	S	Inc	1	1	60	Sw	2	190	0	60	23	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	190	0	20	8	15	0	15
132	1	Mens Locker Room - Storage	Ceiling Mounted	S	Inc	1	1	60	Sw	2	190	0	60	23	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	2	190	0	20	8	15	0	15
133	1	Mens Locker Room - Bathroom	Ceiling Mounted	S	Inc	1	1	60	Sw	4	190	0	60	46	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	4	190	0	20	15	30	0	30
134	1	Mens Locker Room - Team room	Ceiling Mounted	M	4'T12	2	2	40	Sw	4	190	12	184	140	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	4	190	5	138	105	35	0	35
135	1	Mens Locker Room - Storage	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
136	1	Cafeteria	Recessed	M	4'T12	1	4	40	Sw	9	261	12	172	404	T8	Recessed	4'T8	E	Sw	1	4	32	9	261	5	133	312	92	0	92
137	1	Cafeteria	Exit Sign	E	Fl.	1	1	15	N	24	365	2	17	145	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	96	0	96
138	1	Cafeteria	Ceiling Mounted	M	4'T12	48	2	40	Sw	9	261	12	4,416	10,373	T8	Ceiling Mounted	4'T8	E	Sw	48	2	32	9	261	5	3312	7780	2593	0	2593
139	1	Cafeteria	Exit Sign	E	Fl.	4	2	15	N	24	365	2	126	1,104	LEDex	Exit Sign	LED	E	N	4	1	5	24	365	1	22	193	911	0	911
140	1	Teachers Lunch Room	Recessed	M	4'T12	3	4	40	Sw	4	190	12	516	392	T8	Recessed	4'T8	E	Sw	3	4	32	4	190	5	399	303	89	0	89
141	1	Teachers Lunch Room	Ceiling Mounted	S	CFL	1	1	13	Sw	4	190	0	13	10	N/A	Ceiling Mounted	CFL	S	Sw	1	1	13	4	190	0	13	10	0	0	0
142	1	Cafeteria	Ceiling Mounted	M	4'T12	18	2	40	Sw	9	261	12	1,656	3,890	T8	Ceiling Mounted	4'T8	E	Sw	18	2	32	9	261	5	1242	2917	972	0	972
143	1	Kitchen	Ceiling Mounted	M	4'T12	24	2	40	Sw	9	190	12	2,208	3,776	T8	Ceiling Mounted	4'T8	E	Sw	24	2	32	9	190	5	1656	2832	944	0	944
144	1	Kitchen Office	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
145	1	Kitchen	Ceiling Mounted	M	4'T12	6	2	40	Sw	9	190	12	552	944	T8	Ceiling Mounted	4'T8	E	Sw	6	2	32	9	190	5	414	708	236	0	236
146	1	Kitchen	Ceiling Mounted	M	4'T12	4	2	40	Sw	9	190	12	368	629	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	9	190	5	276	472	157	0	157
147	1	Walk-in Refrigerator #1	Wall Mounted	S	CFL	1	1	13	Sw	2	190	0	13	5	N/A	Wall Mounted	CFL	S	Sw	1	1	13	2	190	0	13	5	0	0	0
148	1	Walk-in Refrigerator #2	Wall Mounted	S	CFL	1	1	13	Sw	2	190	0	13	5	N/A	Wall Mounted	CFL	S	Sw	1	1	13	2	190	0	13	5	0	0	0
149	1	Bathroom Women	Ceiling Mounted	M	4'T12	1	2	40	Sw	4	190	12	92	70	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	4	190	5	69	52	17	0	17
150	1	Corridor	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
151	1	Pantry	Ceiling Suspended	M	8'T12	3	2	80	Sw	4	190	20	540	410	T8	Ceiling Suspended	8'T8	E	Sw	3	2	59	4	190	7	375	285	125	0	125
152	1	Storage Room	Ceiling Suspended	M	8'T12	2	2	80	Sw	2	261	20	360	188	T8	Ceiling Suspended	8'T8	E	Sw	2	2	59	2	261	7	250	131	57	0	57
153	1	Storage Room (119)	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	261	12	92	48	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	261	5	69	36	12	0	12
154	1	Bathroom	Ceiling Mounted	M	4'T12	1	2	40	Sw	4	190	12	92	70	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	4	190	5	69	52	17	0	17
155	1	Hallway	Ceiling Suspended	M	4'T12	4	2	40	Sw	12	261	12	368	1,153	T8	Ceiling Suspended	4'T8	E	Sw	4	2	32	12	261	5	276	864	288	0	288
156	1	Hallway	Exit Sign	E	Fl.	1	2	15	Sw	24	365	2	32	276	LEDex	Exit Sign	LED	E	Sw	1	1	5	24	365	1	6	48	228	0	228
157	1	Loading Dock	Ceiling Mounted	M	8'T12	1	2	80	Sw	12	261	20	180	564	T8	Ceiling Mounted	8'T8	E	Sw	1	2	59	12	261	7	125	392	172	0	172
158	1	Mechanical Room	Ceiling Mounted	S	CFL	1	1	23	Sw	2	261	0	23	12	N/A	Ceiling Mounted	CFL	S	Sw	1	1	23	2	261	0	23	12	0	0	0
159	1	Boiler Room (118)	Parabolic Ceiling Suspended	M	4'T12	7	2	40	Sw	2	261	12	644	336	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	7	2	32	2	261	5	483	252	84	0	84
160	1	Boiler Room (118)	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
161	Bsmt	Elevator Mechanical Room	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	261	12	92	48	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	261	5	69	36	12	0	12
162	Bsmt	Boiler Room	Parabolic Ceiling Suspended	M	4'T12	8	2	40	Sw	2	261	12	736	384	T8	Parabolic Ceiling Suspended	4'T8	E	Sw	8	2	32	2	261	5	552	288	96	0	96
163	Bsmt	Boiler Room	Parabolic Ceiling Suspended	M	8'T12	6	2	80	Sw	2	261	20	1,080	564	T8	Parabolic Ceiling Suspended	8'T8	E	Sw	6	2	59	2	261	7	750	392	172	0	172
164	Bsmt	Boiler Room	Exit Sign	E	Fl.	1	2	15	Sw	24	365	2	32	276	LEDex	Exit Sign	LED	E	Sw	1	1	5	24	365	1	6	48	228	0	228
165	2	Classroom (217)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
166	2	Classroom (218)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
167	2	Office	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
168	2	Bathroom Men	Ceiling Mounted	M	4'T12	2	2	40	Sw	4	190	12	184	140	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	4	190	5	138	105	35	0	35
169	2	Bathroom Women	Ceiling Mounted	M	4'T12	2	2	40	Sw	4	190	12	184	140	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	4	190	5	138	105	35	0	35
170	2	Storage Room	Ceiling Suspended	S	CFL	1	1	23	Sw	2	261	0	23	12	N/A	Ceiling Suspended	CFL	S	Sw	1	1	23	2	261	0	23	12	0	0	0
171	2	Storage Room	Ceiling Suspended	S	CFL	1	1	23	Sw	2	261	0	23	12	N/A	Ceiling Suspended	CFL	S	Sw	1	1	23	2	261	0	23	12	0	0	0
172	2	Hallway	Recessed	M	4'T12	10	2	40	Sw	12	261	12	920	2,881	T8	Recessed	4'T8	E	Sw	10	2	32	12	261	5	690	2161	720	0	720
173	2	Hallway	Recessed	S	CFL	1	1	23	Sw	12	261	0	23	72	N/A	Recessed	CFL	S	Sw	1	1	23	12	261	0	23	72	0	0	0
174	2	Hallway	Recessed	E	4'T8	2	4	32	Sw	12	261	5	266	833	N/A	Recessed	4'T8	E	Sw	2	4	32	12	261	5	266	833	0	0	0
175	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
176	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
177	2	Hallway	Recessed	E	4'T8	8	4	32	Sw	12	261	5	1,064	3,332	N/A	Recessed	4'T8	E	Sw	8	4	32	12	261	5	1064	3332	0	0	0
178	2	Classroom (219)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
179	2	Classroom (221)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
180	2	Bathroom Women	Ceiling Mounted	M	4'T12	4	2	40	Sw	4	190	12	368	280	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	4	190	5	276	210	70	0	70

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)
181	2	Hallway	Recessed	E	4'T8	12	4	32	Sw	12	190	5	1,596	3,639	N/A	Recessed	4'T8	E	Sw	12	4	32	12	190	5	1596	3639	0	0	0
182	2	Classroom (223)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
183	2	Classroom (224)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
184	2	Classroom (225)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
185	2	Library	Parabolic Ceiling Suspended	E	4'T8	96	2	32	Sw	9	190	5	6,624	11,327	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	96	2	32	9	190	5	6624	11327	0	0	0
186	2	Library - Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
187	2	Library - Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
188	2	Library - Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
189	2	Library - Office	Ceiling Mounted	M	4'T12	8	2	40	Sw	9	190	12	736	1,259	T8	Ceiling Mounted	4'T8	E	OS	8	2	32	7	190	5	552	708	315	236	551
190	2	Library	Exit Sign	E	Fl.	2	2	15	N	24	365	2	63	552	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	456	0	456
191	2	Library - Office	Ceiling Mounted	M	4'T12	2	2	40	N	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	N	2	2	32	9	190	5	138	236	79	0	79
192	2	Library - Office	Ceiling Mounted	M	4'T12	4	2	40	N	9	190	12	368	629	T8	Ceiling Mounted	4'T8	E	N	4	2	32	9	190	5	276	472	157	0	157
193	2	Library - Office	Ceiling Mounted	M	4'T12	4	2	40	N	9	190	12	368	629	T8	Ceiling Mounted	4'T8	E	N	4	2	32	9	190	5	276	472	157	0	157
194	2	Library - Office	Ceiling Mounted	M	4'T12	4	2	40	N	9	190	12	368	629	T8	Ceiling Mounted	4'T8	E	N	4	2	32	9	190	5	276	472	157	0	157
195	2	Hallway	Exit Sign	E	Fl.	2	2	15	N	24	365	2	63	552	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	456	0	456
196	2	Classroom (226)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
197	2	Classroom (227)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
198	2	Classroom (228)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
199	2	Office (228A)	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
200	2	Storage Room	Ceiling Mounted	M	4'T12	1	2	40	Sw	2	261	12	92	48	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	2	261	5	69	36	12	0	12
201	2	Storage Room	Parabolic Ceiling Suspended	E	4'T8	12	3	32	Sw	2	261	5	1,212	633	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	3	32	2	261	5	1212	633	0	0	0
202	2	Hallway	Recessed	E	4'T8	3	2	32	Sw	12	261	5	207	648	N/A	Recessed	4'T8	E	Sw	3	2	32	12	261	5	207	648	0	0	0
203	2	Hallway	Recessed	E	4'T8	10	4	32	Sw	12	261	5	1,330	4,166	N/A	Recessed	4'T8	E	Sw	10	4	32	12	261	5	1330	4166	0	0	0
204	2	Hallway	Exit Sign	S	LED	2	1	5	Sw	24	365	1	11	96	N/A	Exit Sign	LED	S	Sw	2	1	5	24	365	1	11	96	0	0	0
205	2	Classroom (229)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
206	2	Classroom (230)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
207	2	Classroom (231)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
208	2	Computer Lab (232)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	OS	15	2	32	7	190	5	1035	1327	590	442	1032
209	2	Bathroom Men	Ceiling Mounted	M	4'T12	4	2	40	Sw	4	190	12	368	280	T8	Ceiling Mounted	4'T8	E	Sw	4	2	32	4	190	5	276	210	70	0	70
210	2	Office (211)	Ceiling Mounted	M	4'T12	8	2	40	Sw	9	190	12	736	1,259	T8	Ceiling Mounted	4'T8	E	OS	8	2	32	7	190	5	552	708	315	236	551
211	2	Hallway	Recessed	E	4'T8	10	4	32	Sw	12	261	5	1,330	4,166	N/A	Recessed	4'T8	E	Sw	10	4	32	12	261	5	1330	4166	0	0	0
212	2	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
213	2	Hallway	Exit Sign	E	Fl.	2	2	15	N	24	365	2	63	552	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	456	0	456
214	2	Hallway	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Exit Sign	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
215	2	Hallway	Recessed	E	4'T8	8	4	32	Sw	12	261	5	1,064	3,332	N/A	Recessed	4'T8	E	Sw	8	4	32	12	261	5	1064	3332	0	0	0
216	2	Janitor's Closet	Recessed	E	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Recessed	4'T8	E	Sw	2	2	32	2	261	5	138	72	0	0	0
217	2	Hallway	Recessed	E	2'T8	2	4	17	Sw	12	261	2	140	438	N/A	Recessed	2'T8	E	Sw	2	4	17	12	261	2	140	438	0	0	0
218	2	Hallway	Recessed	E	4'T8	3	4	32	Sw	12	261	5	399	1,250	N/A	Recessed	4'T8	E	Sw	3	4	32	12	261	5	399	1250	0	0	0
219	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
220	2	Classroom	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
221	2	Classroom (209)	Parabolic Ceiling Suspended	E	4'T8	24	3	32	Sw	9	190	5	2,424	4,145	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	24	3	32	9	190	5	2424	4145	0	0	0
222	2	Classroom (209)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
223	2	Darkroom (209A)	Wall Mounted	S	Inc	2	1	60	Sw	2	190	0	120	46	CFL	Wall Mounted	CFL	S	Sw	2	1	20	2	190	0	40	15	30	0	30
224	Str	Bathroom Men	Recessed	E	4'T8	2	2	32	Sw	4	190	5	138	105	N/A	Recessed	4'T8	E	Sw	2	2	32	4	190	5	138	105	0	0	0
225	Str	Bathroom Women	Recessed	E	4'T8	2	2	32	Sw	4	190	5	138	105	N/A	Recessed	4'T8	E	Sw	2	2	32	4	190	5	138	105	0	0	0
226	Str	Classroom (207)	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
227	2	Bathroom Men	Recessed	E	4'T8	3	2	32	Sw	4	190	5	207	157	N/A	Recessed	4'T8	E	Sw	3	2	32	4	190	5	207	157	0	0	0
228	2	Bathroom Women	Recessed	E	4'T8	3	2	32	Sw	4	190	5	207	157	N/A	Recessed	4'T8	E	Sw	3	2	32	4	190	5	207	157	0	0	0
229	2	Classroom (205)	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
230	2	Classroom (206)	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
231	2	Classroom (202)	Parabolic Ceiling Suspended	E	4'T8	10	3	32	Sw	9	190	5	1,010	1,727	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	10	3	32	9	190	5	1010	1727	0	0	0
232	2	Classroom (202)	Parabolic Ceiling Suspended	E	4'T8	13	2	32	Sw	9	190	5	897	1,534	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	13	2	32	9	190	5	897	1534	0	0	0
233	2	Classroom (204)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
234	2	Classroom (204)	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	9	190	5	828	1,416	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	2	32	9	190	5	828	1416	0	0	0
235	2	Office (203)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	C	Parabolic Ceiling Suspended	4'T8	E	OS	6	3	32	7	190	5	606	777	0	259	259
236	2	Office (203)	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	9	190	5	828	1,416	C	Parabolic Ceiling Suspended	4'T8	E	OS	12	2	32	7	190	5	828	1062	0	354	354
237	2	Classroom (201)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
238	2	Classroom (201)	Parabolic Ceiling Suspended	E	4'T8	3	2	32	Sw	9	190	5	207	354	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	2	32	9	190	5	207	354	0	0	0
239	2	Office (200)	Recessed	E	4'T8 U-Shaped	16	2	32	Sw	9	190	5	1,104	1,888	C	Recessed	4'T8 U-Shaped	E	OS	16	2	32	7	190	5	1104	1416	0	472	472
240	2	Office	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	190	5	276	472	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	190	5	276	472	0	0	0
241	2	Office	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	190	5	276	472	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	190	5	276	472	0	0	0
242	2	Office	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	9	190	5	276	472	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	9	190	5	276	472	0	0	0
243	2	Storage Room	Recessed	E	4'T8 U-Shaped	1	2	32	Sw	2	261	5	69	36	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	2	261	5	69	36	0	0	0
244	2	Hallway	Recessed	E	4'T8	12	4	32	Sw	12	261	5	1,596	4,999	N/A	Recessed	4'T8	E	Sw	12	4	32	12	261	5	1596	4999	0	0	0
245	2	Hallway	Recessed	E	2'T8	8	1	17	Sw	12	261	2	152	476	N/A	Recessed	2'T8	E	Sw	8	1	17	12	261	2	152	476	0	0	0
246	2	Hallway	Exit Sign	S	LED	4	1	5	N	24	365	1	22	193	N/A	Exit Sign	LED	S	N	4	1	5	24	365	1	22	193	0	0	0
247	2	TV Studio	Track	S	Inc	9	1	65	Sw	4	190	0	585	445	CFL	Track	CFL	S	Sw	9	1	20	4	190	0	180	137	308	0	308
248	2	TV Studio	Recessed	E	4'T8	4	2	32	Sw	4	190	5	276	210	N/A	Recessed	4'T8	E	Sw	4	2	32	4	190	5	276	210	0	0	0
249	2	TV Studio	Recessed	E	4'T8	2	2	32	Sw	4	190	5	138	105	N/A	Recessed	4'T8	E	Sw	2	2	32	4	190	5	138	105	0	0	0
250	2	Storage Room	Ceiling Mounted	E	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	2	261	5	138	72	0	0	0
251	2	Classroom (210)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
252	2	Classroom (212)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
253	2	Classroom (213)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
254	2	Classroom (214)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
255	2	Classroom (215)	Ceiling Mounted	M	4'T12	15	2	40	Sw	9	190	12	1,380	2,360	T8	Ceiling Mounted	4'T8	E	Sw	15	2	32	9	190	5	1035	1770	590	0	590
256	2	Meeting Room (216)	Recessed	E	4'T8	4	2	32	Sw	2	190	5	276	105	N/A	Recessed	4'T8	E	Sw	4	2	32	2	190	5	276	105	0	0	0
257	2	Meeting Room (216)	Recessed	E	4'T8 U-Shaped	1	2	32	Sw	2	190	5	69	26	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	2	190	5	69	26	0	0	0
258	2	Vestibule	Recessed	E	4'T8	6	4	32	Sw	24	365	5	798	6,990	N/A	Recessed	4'T8	E	Sw	6	4	32	24	365	5	798	6990	0	0	0
259	2	Vestibule	Exit Sign	S	LED	2	1	5	Sw	24	365	1	11	96	N/A	Exit Sign	LED	S	Sw	2	1	5	24	365	1	11	96	0	0	0
260	2	Hallway	Recessed	E	4'T8 U-Shaped	1	2	32	Sw	12	261	5	69	216	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	12	261	5	69	216	0	0	0
261	2	Gymnasium (235)	High Bay	S	MH	12	1	250	Sw	12	261	70	3,840	12,027	T5	High Bay	4'T5	E	Sw	12	6	28	12	261	4	2064	6464	5563	0	5563
262	2	Gymnasium (235)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
263	2	Gymnasium (235)	Recessed	E	4'T8	2	2	32	Sw	12	261	5	138	432	N/A	Recessed	4'T8	E	Sw	2	2	32	12	261	5	138	432	0	0	0
264	2	Hallway	Recessed	E	4'T8	8	4	32	Sw	12	261	5	1,064	3,332	N/A	Recessed	4'T8	E	Sw	8	4	32	12	261	5	1064	3332	0	0	0
265	2	Hallway	Recessed	S	CFL	8	1	23	Sw	12	261	0	184	576	N/A	Recessed	CFL	S	Sw	8	1	23	12	261	0	184	576	0	0	0
266	2	Hallway	Recessed	E	4'T8	16	1	32	Sw	12	261	5	592	1,854	N/A	Recessed	4'T8	E	Sw	16	1	32	12	261	5	592	1854	0	0	0
267	2	Gymnasium (235B)	High Bay	S	MH	12	1	250	Sw	12	261	70	3,840	12,027	T5	High Bay	4'T5	E	Sw	12	6	28	12	261	4	2064	6464	5563	0	5563
268	2	Gymnasium (235B)	Recessed	E	4'T8	2	2	32	Sw	12	261	5	138	432	N/A	Recessed	4'T8	E	Sw	2	2	32	12	261	5	138	432	0	0	0
269	2	Gymnasium (235B)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
270	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	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)
271	2	Fitness Center (238)	Recessed	E	4'T8	14	4	32	Sw	12	261	5	1,862	5,832	C	Recessed	4'T8	E	OS	14	4	32	9	261	5	1862	4374	0	1458	1458
272	2	Gymnasium (234)	High Bay	S	MH	24	1	150	Sw	12	261	42	4,608	14,432	T5	High Bay	4'T5	E	Sw	24	4	28	12	261	4	2784	8719	5713	0	5713
273	2	Gymnasium (234)	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
274	2	Locker Room Men (237)	Recessed	E	4'T8	8	4	32	Sw	9	261	5	1,064	2,499	C	Recessed	4'T8	E	OS	8	4	32	7	261	5	1064	1875	0	625	625
275	2	Locker Room Men (237)	Recessed	E	4'T8 U-Shaped	5	2	32	Sw	9	261	5	345	810	C	Recessed	4'T8 U-Shaped	E	OS	5	2	32	7	261	5	345	608	0	203	203
276	2	Locker Room Men (237)	Exit Sign	S	LED	2	1	5	Sw	24	365	1	11	96	N/A	Exit Sign	LED	S	Sw	2	1	5	24	365	1	11	96	0	0	0
277	2	Bathroom Men	Recessed	E	4'T8	1	2	32	Sw	4	261	5	69	72	N/A	Recessed	4'T8	E	Sw	1	2	32	4	261	5	69	72	0	0	0
278	2	Bathroom Women	Recessed	E	4'T8	1	2	32	Sw	4	261	5	69	72	N/A	Recessed	4'T8	E	Sw	1	2	32	4	261	5	69	72	0	0	0
279	2	Locker Room Women (236)	Recessed	E	4'T8	8	4	32	Sw	9	261	5	1,064	2,499	C	Recessed	4'T8	E	OS	8	4	32	7	261	5	1064	1875	0	625	625
280	2	Locker Room Women (236)	Recessed	E	4'T8 U-Shaped	5	2	32	Sw	9	261	5	345	810	C	Recessed	4'T8 U-Shaped	E	OS	5	2	32	7	261	5	345	608	0	203	203
281	2	Locker Room Women (236)	Exit Sign	S	LED	2	1	5	Sw	24	365	1	11	96	N/A	Exit Sign	LED	S	Sw	2	1	5	24	365	1	11	96	0	0	0
282	2	Office (235A)	Recessed	E	4'T8	2	2	32	Sw	9	190	5	138	236	N/A	Recessed	4'T8	E	Sw	2	2	32	9	190	5	138	236	0	0	0
283	2	Gymnasium (234)	Recessed	E	4'T8	4	4	32	Sw	9	261	5	532	1,250	N/A	Recessed	4'T8	E	Sw	4	4	32	9	261	5	532	1250	0	0	0
284	2	Gymnasium (234B)	High Bay	S	MH	24	1	250	Sw	9	261	70	7,680	18,040	T5	High Bay	4'T5	E	Sw	24	6	28	9	261	4	4128	9696	8344	0	8344
285	2	Gymnasium (234B)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
286	2	Locker Room Women	Ceiling Mounted	M	4'T12	18	2	40	Sw	9	190	12	1,656	2,832	T8	Ceiling Mounted	4'T8	E	OS	18	2	32	7	190	5	1242	1593	708	531	1239
287	2	Locker Room Women	Recessed	S	Inc	6	1	60	Sw	9	190	0	360	616	CFL	Recessed	CFL	S	Sw	6	1	20	9	190	0	120	205	410	0	410
288	2	Locker Room Women	Exit Sign	E	Fl.	2	1	15	N	24	365	2	33	289	LEDex	Exit Sign	LED	E	N	2	1	5	24	365	1	11	96	193	0	193
289	2	Locker Room Women	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
290	2	Locker Room Women	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
291	2	Locker Room Women	Ceiling Mounted	S	Inc	1	1	60	Sw	9	190	0	60	103	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	9	190	0	20	34	68	0	68
292	Str	Classroom (311)	Parabolic Ceiling Suspended	E	4'T8	1	3	32	N	9	190	5	101	173	N/A	Parabolic Ceiling Suspended	4'T8	E	N	1	3	32	9	190	5	101	173	0	0	0
293	Str	Classroom (311)	Parabolic Ceiling Suspended	E	4'T8	5	3	32	N	9	190	5	505	864	N/A	Parabolic Ceiling Suspended	4'T8	E	N	5	3	32	9	190	5	505	864	0	0	0
294	Str	Classroom (311)	Parabolic Ceiling Suspended	E	4'T8	2	2	32	Sw	9	190	5	138	236	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	2	32	9	190	5	138	236	0	0	0
295	3	Science Room / Laboratory (310)	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
296	3	Classroom (310A)	Recessed	E	4'T8	8	2	32	Sw	9	190	5	552	944	N/A	Recessed	4'T8	E	Sw	8	2	32	9	190	5	552	944	0	0	0
297	3	Science Room / Laboratory (310)	Exit Sign	S	LED	1	1	5	Sw	24	365	1	6	48	N/A	Exit Sign	LED	S	Sw	1	1	5	24	365	1	6	48	0	0	0
298	3	Science Room / Laboratory (309)	Exit Sign	S	LED	1	1	5	Sw	24	365	1	6	48	N/A	Exit Sign	LED	S	Sw	1	1	5	24	365	1	6	48	0	0	0
299	3	Science Room / Laboratory (309)	Parabolic Ceiling Suspended	E	4'T8	18	3	32	Sw	9	190	5	1,818	3,109	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	18	3	32	9	190	5	1818	3109	0	0	0
300	3	Classroom (300)	Recessed	E	4'T8	10	4	32	Sw	9	190	5	1,330	2,274	N/A	Recessed	4'T8	E	Sw	10	4	32	9	190	5	1330	2274	0	0	0
301	3	Classroom (301)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
302	3	Classroom (301)	Parabolic Ceiling Suspended	E	4'T8	10	2	32	Sw	9	190	5	690	1,180	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	10	2	32	9	190	5	690	1180	0	0	0
303	3	Classroom (303)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
304	3	Classroom (303)	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	9	190	5	828	1,416	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	2	32	9	190	5	828	1416	0	0	0
305	3	Classroom (302)	Recessed	E	4'T8	8	4	32	Sw	9	190	5	1,064	1,819	N/A	Recessed	4'T8	E	Sw	8	4	32	9	190	5	1064	1819	0	0	0
306	3	Classroom (305)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
307	3	Classroom (305)	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	9	190	5	828	1,416	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	2	32	9	190	5	828	1416	0	0	0
308	3	Science Room / Laboratory (304)	Parabolic Ceiling Suspended	E	4'T8	8	3	32	Sw	9	190	5	808	1,382	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	8	3	32	9	190	5	808	1382	0	0	0
309	3	Science Room / Laboratory (304)	Parabolic Ceiling Suspended	E	4'T8	14	2	32	Sw	9	190	5	966	1,652	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	14	2	32	9	190	5	966	1652	0	0	0
310	3	Classroom (304)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
311	3	Prep Room (304A)	Recessed	E	4'T8	10	4	32	Sw	9	190	5	1,330	2,274	N/A	Recessed	4'T8	E	Sw	10	4	32	9	190	5	1330	2274	0	0	0
312	3	Prep Room (307)	Parabolic Ceiling Suspended	E	4'T8	8	3	32	Sw	9	190	5	808	1,382	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	8	3	32	9	190	5	808	1382	0	0	0
313	3	Prep Room (307)	Parabolic Ceiling Suspended	E	4'T8	14	2	32	Sw	9	190	5	966	1,652	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	14	2	32	9	190	5	966	1652	0	0	0
314	3	Science Room / Laboratory (307)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
315	3	Classroom (306)	Parabolic Ceiling Suspended	E	4'T8	6	3	32	Sw	9	190	5	606	1,036	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	6	3	32	9	190	5	606	1036	0	0	0
316	3	Classroom (306)	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	9	190	5	828	1,416	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	2	32	9	190	5	828	1416	0	0	0
317	3	Hallway	Recessed	E	4'T8	11	3	32	Sw	12	261	5	1,111	3,480	N/A	Recessed	4'T8	E	Sw	11	3	32	12	261	5	1111	3480	0	0	0
318	3	Hallway	Recessed	E	2'T8	12	1	17	Sw	12	261	2	228	714	N/A	Recessed	2'T8	E	Sw	12	1	17	12	261	2	228	714	0	0	0
319	3	Hallway	Exit Sign	S	LED	5	1	5	N	24	365	1	28	241	N/A	Exit Sign	LED	S	N	5	1	5	24	365	1	28	241	0	0	0
320	3	Bathroom Men	Recessed	E	4'T8	3	2	32	Sw	4	190	5	207	157	N/A	Recessed	4'T8	E	Sw	3	2	32	4	190	5	207	157	0	0	0
321	3	Bathroom Women	Recessed	E	4'T8	3	2	32	Sw	4	190	5	207	157	N/A	Recessed	4'T8	E	Sw	3	2	32	4	190	5	207	157	0	0	0
322	3	Electrical Room (308)	Recessed	E	4'T8	3	3	32	Sw	2	261	5	303	158	N/A	Recessed	4'T8	E	Sw	3	3	32	2	261	5	303	158	0	0	0
323	3	Janitor's Closet	Recessed	E	4'T8	1	4	32	Sw	2	261	5	133	69	N/A	Recessed	4'T8	E	Sw	1	4	32	2	261	5	133	69	0	0	0
324	3	Hallway	Recessed	E	4'T8	6	3	32	Sw	12	261	5	606	1,898	N/A	Recessed	4'T8	E	Sw	6	3	32	12	261	5	606	1898	0	0	0
325	3	Hallway	Recessed	E	2'T8	4	1	17	Sw	12	261	2	76	238	N/A	Recessed	2'T8	E	Sw	4	1	17	12	261	2	76	238	0	0	0
326	3	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
327	Bsmt	Hallway	Ceiling Mounted	M	4'T12	1	2	40	Sw	12	261	12	92	288	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	12	261	5	69	216	72	0	72
328	Bsmt	Hallway	Exit Sign	E	Fl.	1	1	15	N	24	365	2	17	145	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	96	0	96
329	Bsmt	Classroom (1)	Ceiling Suspended	M	4'T12	32	2	40	Sw	9	190	12	2,944	5,034	T8	Ceiling Suspended	4'T8	E	Sw	32	2	32	9	190	5	2208	3776	1259	0	1259
330	Bsmt	Classroom (1)	Exit Sign	E	Fl.	1	1	15	N	24	365	2	17	145	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	96	0	96
331	Bsmt	Office (1)	Ceiling Suspended	M	4'T12	3	2	40	Sw	9	190	12	276	472	T8	Ceiling Suspended	4'T8	E	Sw	3	2	32	9	190	5	207	354	118	0	118
332	Bsmt	Storage Room (1)	Ceiling Mounted	M	4'T12	2	2	40	Sw	2	190	12	184	70	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	2	190	5	138	52	17	0	17
333	Bsmt	Storage Room (1)	Ceiling Suspended	E	Inc	2	1	60	N	2	190	0	120	46	CFL	Ceiling Suspended	CFL	E	N	2	1	20	2	190	0	40	15	30	0	30
334	Bsmt	Corridor (1)	Ceiling Mounted	M	4'T12	1	2	40	Sw	9	190	12	92	157	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	9	190	5	69	118	39	0	39
335	Bsmt	Bathroom Men (1)	Recessed	M	4'T12	1	4	40	Sw	4	190	12	172	131	T8	Recessed	4'T8	E	Sw	1	4	32	4	190	5	133	101	30	0	30
336	Bsmt	Bathroom Women	Recessed	M	4'T12	1	4	40	Sw	4	190	12	172	131	T8	Recessed	4'T8	E	Sw	1	4	32	4	190	5	133	101	30	0	30
337	Bsmt	Hallway	Recessed	E	4'T8	2	3	32	Sw	9	190	5	202	345	N/A	Recessed	4'T8	E	Sw	2	3	32	9	190	5	202	345	0	0	0
338	Bsmt	Classroom (2)	Ceiling Suspended	M	8'T12	17	2	80	Sw	9	190	20	3,060	5,233	T8	Ceiling Suspended	8'T8	E	Sw	17	2	59	9	190	7	2125	3634	1599	0	1599
339	Bsmt	Classroom (2)	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
340	Bsmt	Storage Room	Ceiling Suspended	M	4'T12	1	2	40	Sw	2	190	12	92	35	T8	Ceiling Suspended	4'T8	E	Sw	1	2	32	2	190	5	69	26	9	0	9
341	Bsmt	Storage Room	Ceiling Suspended	M	8'T12	1	2	80	Sw	2	190	20	180	68	T8	Ceiling Suspended	8'T8	E	Sw	1	2	59	2	190	7	125	48	21	0	21
342	Bsmt	Office	Ceiling Mounted	M	4'T12	2	2	40	Sw	9	190	12	184	315	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	79	0	79
343	Bsmt	Classroom (3)	Ceiling Suspended	M	4'T12	27	2	40	Sw	9	190	12	2,484	4,248	T8	Ceiling Suspended	4'T8	E	Sw	27	2	32	9	190	5	1863	3186	1062	0	1062
344	Bsmt	Classroom (3)	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
345	Bsmt	Storage Room	Ceiling Suspended	M	8'T12	1	2	80	Sw	2	190	20	180	68	T8	Ceiling Suspended	8'T8	E	Sw	1	2	59	2	190	7	125	48	21	0	21
346	Str	Staircase	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
347	Str	Staircase	Ceiling Mounted	M	8'T12	1	2	80	N	12	261	20	180	564	T8	Ceiling Mounted	8'T8	E	N	1	2	59	12	261	7	125	392	172	0	172
348	Str	Staircase	Wall Mounted	S	Inc	2	1	60	Sw	12	261	0	120	376	CFL	Wall Mounted	CFL	S	Sw	2	1	20	12	261	0	40	125	251	0	251
349	Str	Staircase	Recessed	E	4'T8	2	4	32	Sw	12	261	5	266	833	N/A	Recessed	4'T8	E	Sw	2	4	32	12	261	5	266	833	0	0	0
350	Str	Staircase	Wall Mounted	E	4'T8	1	2	32	Sw	12	261	5	69	216	N/A	Wall Mounted	4'T8	E	Sw	1	2	32	12	261	5	69	216	0	0	0
351	Str	Staircase	Exit Sign	S	LED	1	1	5	Sw	24	365	1	6	48	N/A	Exit Sign	LED	S	Sw	1	1	5	24	365	1	6	48	0	0	0
352	Str	Staircase	Ceiling Mounted	M	4'T12	2	2	40	Sw	12	261	12	184	576	T8	Ceiling Mounted	4'T8	E	Sw	2	2	32	12	261	5	138	432	144	0	144
353	Str	Staircase	Recessed	E	4'T8 U-Shaped	12	2	32	Sw	12	261	5	828	2,593	N/A	Recessed	4'T8 U-Shaped	E	Sw	12	2	32	12	261	5	828	2593	0	0	0
354	Str	Staircase	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
355	Str	Staircase	Recessed	E	4'T8 U-Shaped	10	2	32	Sw	12	261	5	690	2,161	N/A	Recessed	4'T8 U-Shaped	E	Sw	10	2	32	12	261	5	690	2161	0	0	0
356	Str	Staircase	Recessed	E	4'T8	1	4	32	Sw	12	261	5	133	417	N/A	Recessed	4'T8	E	Sw	1	4	32	12	261	5	133	417	0	0	0
357	Str	Staircase	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
358	Ext	Exterior	Wall Mounted	E	HPS	16	1	250	PC	12	365	50	4,800	21,024	PSMH	Wall Mounted	PSMH	E	PC	16	1	150	12	365	30	2880	12614	8410	0	8410
359	Ext	Exterior	Wall Mounted	E	MH	5	1	75	PC	12	365	21	480	2,102	PSMH	Wall Mounted	PSMH	E	PC	5	1	50	12	365	10	300	1314	788	0	788
360	Ext	Exterior	Flood	E	MH	22	1	150	PC	12	365	42	4,224	18,501	PSMH	Flood	PSMH	E	PC	22	1	100	12	365	20	2640	11563	6938	0	6938
361	Ext	Exterior	Pole Mounted Off Building	S	MH	6	1	150	PC	12	365	42	1,152	5,046	PSMH	Pole Mounted Off Building	PSMH	S	PC	6	1	100	12	365	20	720	3154	1892	0	1892
362	Ext	Exterior	Wall Mounted	S	MH	2	1	250	PC	12	365	70	640	2,803	PSMH	Wall Mounted	PSMH	S	PC	2	1	150	12	365	30	360	1577	1226	0	1226
363	Park	Exterior	Wall Mounted	S	MH	12	1	150	PC	12	365	42	2,304	10,092	PSMH	Wall Mounted	PSMH	S	PC	12	1	100	12	365	20	1440	6307	3784	0	3784
364	Ext	Exterior	Recessed	S	CFL	15	1	23	PC	12	365	0	345	1,511	N/A	Recessed	CFL	S	PC	15	1	23	12	365	0	345	1511	0	0	0
		Totals:				2,208	759	13,472				2,858	216,070	481,250						2,208	756	10,332			1,496	176,212	375,988	98,325	6,938	105,263

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

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	160,000		
Average Power Cost ($/kWh)	0.1630		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	50,988	31,733	**19,254**
Exterior Power (watts)	11,641	7,245	**4,396**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	430,263	344,254	**86,008**
Lighting Power (watts)	204,429	168,967	**35,461**
Lighting Power Density (watts/SF)	1.28	1.06	**0.22**
Estimated Cost of Fixture Replacement ($)	188,034		
Estimated Cost of Controls Improvements ($)	4,499		
Total Consumption Cost Savings ($)	**25,026**		

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

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

Third Party Gas Suppliers for 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

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

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

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

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

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

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

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

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

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

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

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

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

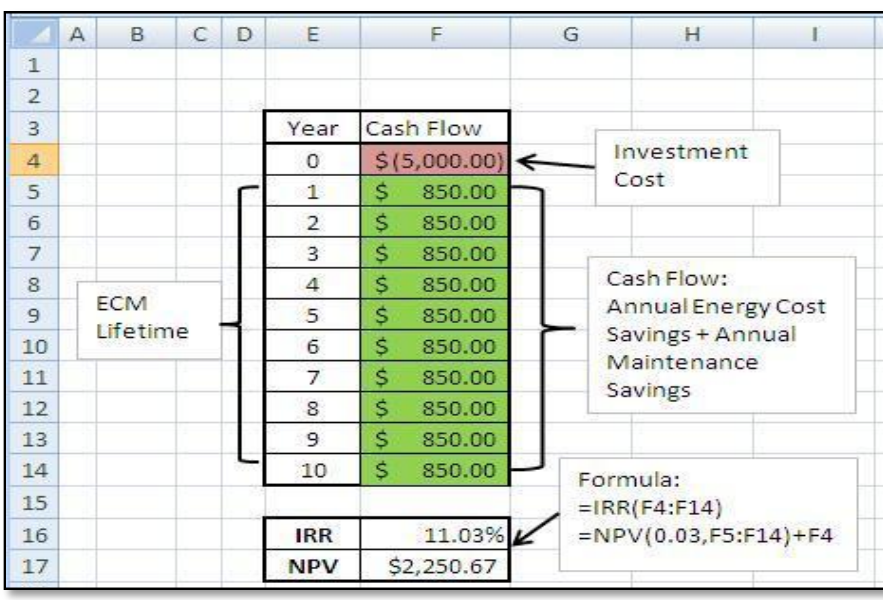
Calculation References

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

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

Excel NPV and IRR Calculation

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



Solar PV ECM Calculation

There are several components to the calculation:

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

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

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

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

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Glen Ridge High School

Building ID: 2444491
For 12-month Period Ending: June 30, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: September 20, 2010

Facility	**Facility Owner**	**Primary Contact for this Facility**
Glen Ridge High School	Glen Ridge Public School	John Mucciolo
200 Ridgewood Avenue	12 High Street	12 High Street
Glen Ridge, NJ 07028	Glen Ridge, NJ 07028	Glen Ridge, NJ 07028

Year Built: 1968
Gross Floor Area (ft²): 160,000

Energy Performance Rating[2] (1-100) 69

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	4,213,754
Natural Gas (kBtu)[4]	5,975,372
Total Energy (kBtu)	10,189,126
Energy Intensity[5]	
Site (kBtu/ft²/yr)	64
Source (kBtu/ft²/yr)	127
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	960
Electric Distribution Utility	
Public Service Elec & Gas Co	
National Average Comparison	
National Average Site EUI	77
National Average Source EUI	153
% Difference from National Average Source EUI	-17%
Building Type	K-12 School

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

New Jersey Clean Energy Pay for Performance

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

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

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

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

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

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

Smart Start

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

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

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

Renewable Energy Incentive Program*

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

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

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

Utility Sponsored Programs

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

Energy Efficiency and Conservation Block Grant Rebate Program

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

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

Other Federal and State Sponsored Programs

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

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

APPENDIX G: ENERGY CONSERVATION MEASURES

	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 thirty-five (35) new CFL fixtures**	0	315	1,720	0.4	0	0.0	246	527	5	2,634	0.6	736	147	166	2,084	3,080
	2	**Install two (2) VendingMiser™ devices on refrigerated vending machines**	0	398	1,109	0.2	0	0.0	0	181	5	904	2.2	127	25	35	425	1,986
	3	**Install one (1) SnackMiser™ device on a vending machine**	0	99	266	0.1	0	0.0	0	43	5	217	2.3	119	24	33	98	476
	4	**Install thirty-five (35) new LED exit signs**	700	4,568	6,948	1.4	0	0.1	145	1,277	15	19,159	3.6	319	21	27	10,462	12,440
	5	**Install seventy-two (72) new T5 fluorescent fixtures**	1,152	15,888	25,182	5.2	0	0.5	246	4,350	15	65,254	3.7	311	21	27	35,302	45,089
	6	**Install twenty-two (22) new occupancy sensors**	660	4,400	6,938	1.4	0	0.1	0	1,131	15	16,964	3.9	286	1	25	8,908	12,423

	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
5-10 Year Payback	7	**Install two (2) 7.5 HP NEMA premium efficiency motors**	90	1,258	1,466	0.3	0	0.0	0	239	20	4,779	5.3	280	14	18	2,232	2,625
	8	**Install a five (5) HP NEMA premium efficiency motor**	0	525	587	0.1	0	0.0	0	96	20	1,914	5.5	264	13	18	873	1,051
	9	**Install two (2) 7.5 HP NEMA premium efficiency motors**	90	1,258	1,372	0.3	0	0.0	0	224	20	4,473	5.6	256	13	17	2,008	2,457
	10	**Install four new demand control ventilation systems**	0	4,800	3,342	0.7	182	0.2	0	773	12	9,278	6.2	93	8	12	2,805	7,990
	11	**Replace seven (7) large refrigerators with 17 cu. ft. ENERGY STAR® models**	0	3,675	2,975	0.6	0	0.1	0	485	12	5,819	7.6	58	5	10	2,031	5,327
	12	**Replace eight (8) compact refrigerators with 2.7 cu. ft. ENERGY STAR® models**	0	792	640	0.1	0	0.0	0	104	12	1,252	7.6	58	5	10	436	1,146

13	**Install sixty-three (63) new pulse start metal halide fixtures**	1,575	39,200	23,039	4.8	0	0.5	529	4,285	15	64,271	9.1	64	4	7	11,218	41,251
14	**Install nine hundred and fifty-five (955) new T8 fluorescent fixtures**	14,325	128,064	41,436	8.6	0	0.9	6,659	13,413	15	201,194	9.5	57	4	6	29,767	74,190
15	**Install one new ENERGY STAR® label washing machines**	0	550	350	0.1	0	0.0	0	57	12	685	9.6	24	2	6	121	627

	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
Renewable ECMs	16	**Install a 49.9 kW solar photovoltaic rooftop system**	22,500	327,500	61,876	49.9	0	1.3	0	30,622	25	765,540	10.7	134	5.4	6	\$80,889	110,789

APPENDIX H: VendingMiser™ Device Energy Savings Calculations

EnergyMisers

VendingMiser® CoolerMiser™ SnackMiser™ PlugMiser™ VM2iQ® CM2iQ®

Savings Calculator

Please replace the default values in the table below with your location's unique information and then click on the "calculate savings" button.
Note: To calculate for CoolerMiser, use the equivalent VendingMiser results. To calculate for PlugMiser, use the equivalent SnackMiser results.

Energy Costs ($0.000 per kWh)	.163
Facility Occupied Hours per Week	40
Number of Cold Drink Vending Machines	2
Number of Non-refrigerated Snack Machines	1
Power Requirements of Cold Drink Machine (Watts; 400 typical)	100
Power Requirements of Snack Machine (Watts; 80 typical)	40
VendingMiser® Sale Price (for cold drink machines)	199
SnackMiser™ Sale Price (for snack machines)	99

Calculate Savings!

Results of your location's projected savings with VendingMiser® installed:

COLD DRINK MACHINES	Current	Projected	Total Savings	% Savings
kWh	1747	638	1109	63%
Cost of Operation	$284.79	$103.97	$180.82	63%

SNACK MACHINES	Current	Projected	Total Savings	% Savings
kWh	349	83	266	76%
Cost of Operation	$56.96	$13.56	$43.40	76%

Location's Total Annual Savings

	Current	Projected	Total Savings	% Savings
kWh	2097	721	1376	66%
Cost of Operation	$341.75	$117.53	$224.22	66%

Total Project Cost	Break Even (Months)
$497	26.60

Estimated Five Year Savings on ALL Machines = $1,121.09

APPENDIX I: 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 high school 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 high school(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.