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September 18, 2010

Local Government Energy Program
Energy Audit Final Report

Freehold Regional High School District

Colts Neck High School
59 Five Points Road
Colts Neck, NJ 07722

Project Number: LGEA65

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EXECUTIVE SUMMARY

The Freehold RHSD (Regional High School District) Colts Neck High School is a two-story building slab on grade comprising a total conditioned floor area of 220,000 square feet. The original structure was built in 1995, with an addition completed in 2009. The following chart provides an overview of current energy usage in the building based on the analysis period of January 2009 through January 2010:

Table 1: State of Building-Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Other fuel usage	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	3,635,786	143,801	N/A	775,865	122.0	26,786
Proposed	3,464,183	143,801	N/A	$749,156	119.0	26,200
Savings	171,603	0	N/A	$26,709*	3.0	586
% Savings	5%	0%	N/A	3%	2%	2%
Renewables	227,895	Includes SRECs		171,296	3.5	778
*Includes operation and maintenance savings						

There may be energy procurement opportunities for the Freehold RHSD Colts Neck High School to reduce annual utility costs, which are $13,306 higher, when compared to the average estimated NJ commercial utility rates.

SWA has also entered energy information about the Colts Neck High School in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This high school is comprised of K-12 School space type. The Colts Neck High School received a national energy performance rating of 2, which indicates that this building is in the 2nd percentile when compared to other buildings that are eligible for a national energy performance rating. This school is consuming energy at a far greater rate than almost all other benchmarked high schools across the nation. Its low score is primarily the result of the building's cooling system. The schools cooling system which conditions one hundred percent of the building area is atypical for a high school. There is also additional consumption due to unnecessary summer time cooling of unoccupied areas.

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	22,123	2.7	59,346	203,537
5-10 Year	4,586	6.8	31,201	43,457
>10 year	0	N/A	0	0
Total	26,709	3.4	91,165	246,994
Renewables	171,296	8.1	1,383,375	312,217

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 21 cars from the roads each year or avoiding the need of 601 trees to absorb the annual CO_2 generated.

Other recommendations to increase building efficiency pertaining to operations and maintenance and capital improvements are below. This is an abbreviated list with only a few select highly recommended improvements. For the full list see the Proposed Further Recommendations section.

Further Recommendations:

- Capital Improvements
  - Replace domestic water heaters
  - Replace Hot and Chilled Water Fan Coil Rooftop Units
  - Provide dedicated makeup air unit for kitchen hood
- Operations and Maintenance
  - Provide weather-stripping/air-sealing
  - Repair/seal wall cracks and penetrations
  - Insulate uninsulated hot water and chilled water piping
  - Reevaluate and optimize the building occupancy schedule for the cooling system

Based on the requirements of the LGEA program, the Freehold RHSD 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 Colts Neck High School should spend a minimum of $4,566 (or 25% of $18,262) worth of ECMs, net of other NJCEP incentives, to fulfill the obligations.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that Freehold RHSD can take to achieve greater energy efficiency, reduce operating costs and exceed the 25% expenditure requirement (see Appendix H for more ECMs and details).

Table 3: Next Steps for the Colts Neck High School

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install thirty (30) new occupancy sensors	Smart Start, Direct Install
Install (27) new bi-level T8 fluorescent fixtures in stairwells	Smart Start, Direct Install
Install fifteen (15) new CFL fixtures	N/A

There are various incentive programs that the Freehold RHSD could apply for that could help lower the cost of installing the ECMs. For the Colts Neck High School, and contingent upon available funding, SWA recommends the following incentive programs:

Direct Install 2010 Program: Buildings can receive up to 60% of the installed cost of energy saving upgrades. The 200 kW peak demand threshold has been waived for local government entities who receive their Energy Efficiency and Conservation Block Grant in conjunction with Direct Install

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

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 JCP&L.
https://www.firstenergycorp.com/JCP_L/index.html New Jersey Natural Gas http://www.njng.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 Colts Neck High School at 59 Five Points Road, Colts Neck, NJ 07722. The process of the audit included facility visits on April 19, May 6, June 28 and June 30, 2010 benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Freehold RHSD to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Colts Neck High School.

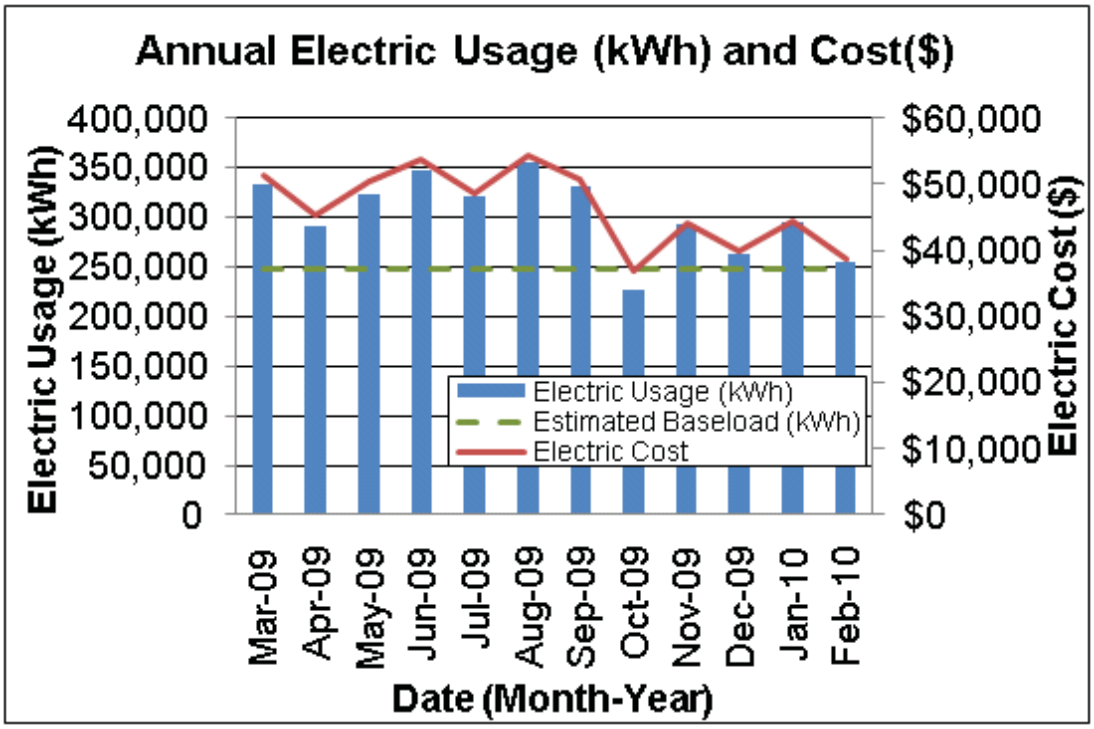
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from March 2008 through February 2010 that were received from the utility companies supplying the Colts Neck High School with electricity and natural gas. A 12 month period of analysis from March 2009 through February 2010 was used for all calculations and for purposes of benchmarking the building.

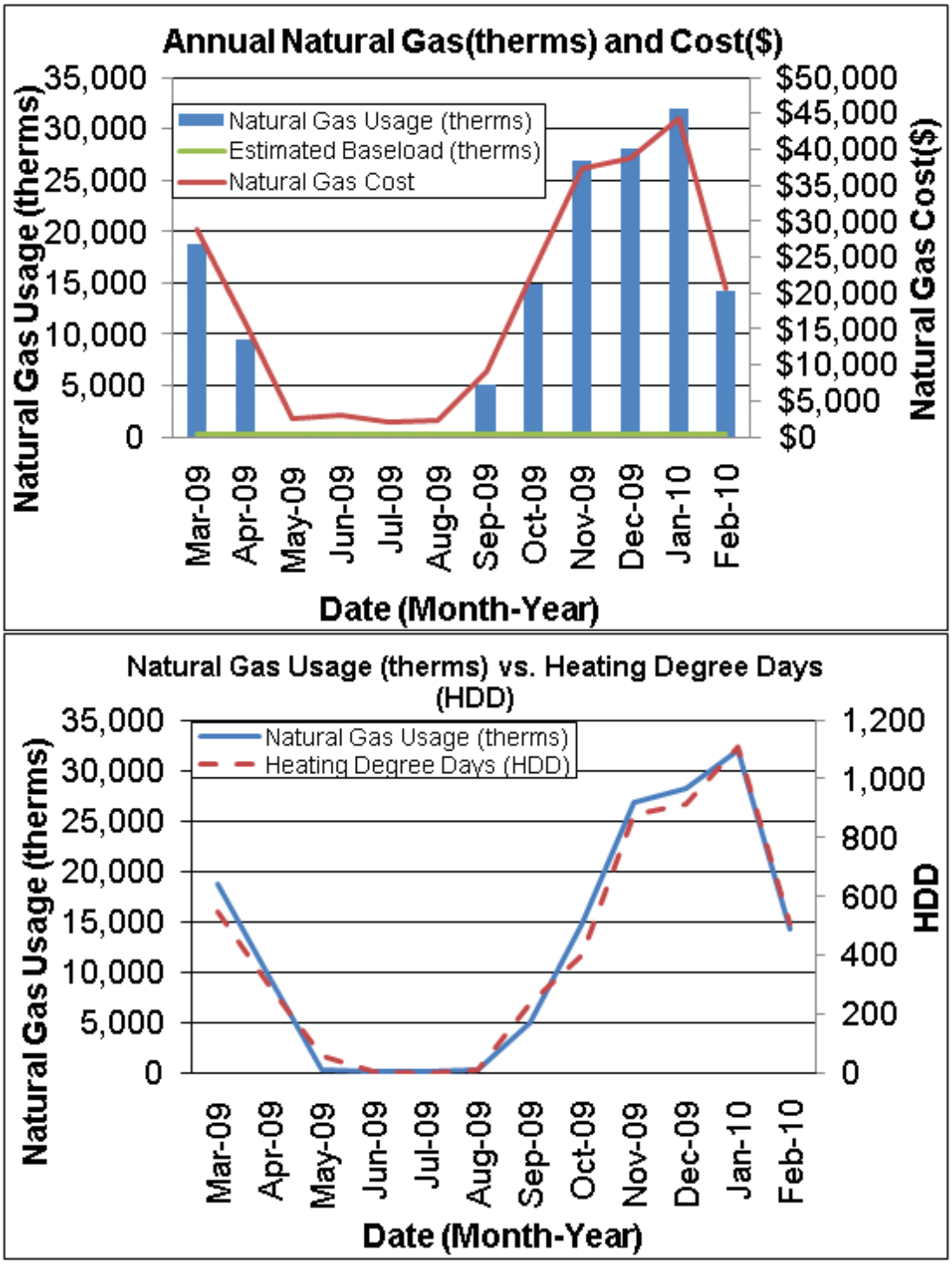
Electricity - The Colts Neck High School is currently served by one electric meter. The Colts Neck High School currently buys electricity from JCP&L at **an average aggregated rate of $0.154/kWh**. The Colts Neck High School purchased **approximately 3,635,786 kWh, or $558,674 worth of electricity,** in the previous year. The average monthly demand was 777.6 kW and the annual peak demand was 932.6 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 Colts Neck High School.



Natural gas - The Colts Neck High School is currently served by one meter for natural gas. The Colts Neck High School currently buys natural gas from Pepco Energy Services (commodity gas) and NJ Natural Gas (transportation) at **an average aggregated rate of $1.510/therm**. The Colts Neck High School purchased **approximately 143,801 therms, or $217,191 worth of natural gas,** in the previous year.

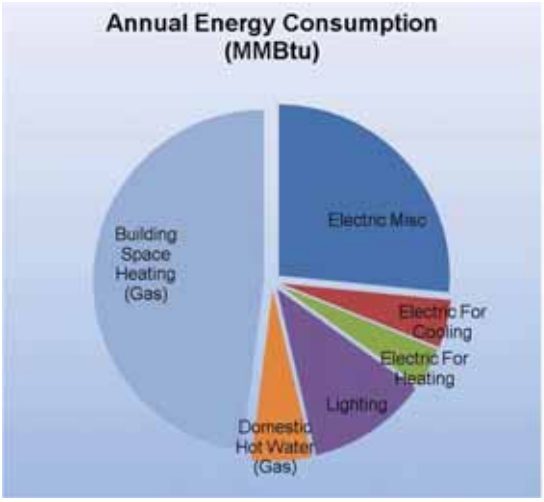
The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the Colts Neck High School.

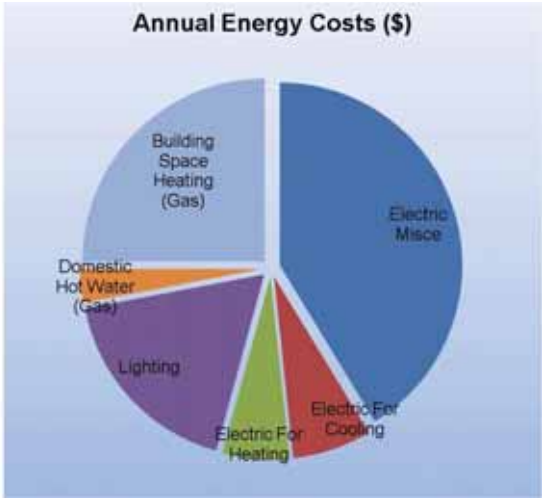


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base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

The following table and pie charts show energy use for the Colts Neck High School based on utility bills for the 12 month period. Note: electrical cost at $45/MMBtu of energy is 3 times as expensive as natural gas at $15/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	7,115	27%	$320,393	41%	45
Electric For Cooling	1,210	5%	$54,472	7%	45
Electric For Heating	1,023	4%	$46,080	6%	45
Lighting	3,059	11%	$137,729	18%	45
Domestic Hot Water (Gas)	1,527	6%	$23,062	3%	15
Building Space Heating (Gas)	12,853	48%	$194,130	25%	15
Totals	26,786	100%	$775,865	100%	---
Total Electric Usage	12,406	46%	$558,674	72%	45
Total Gas Usage	14,380	54%	$217,191	28%	15
Totals	26,786	100%	$775,865	100%	---

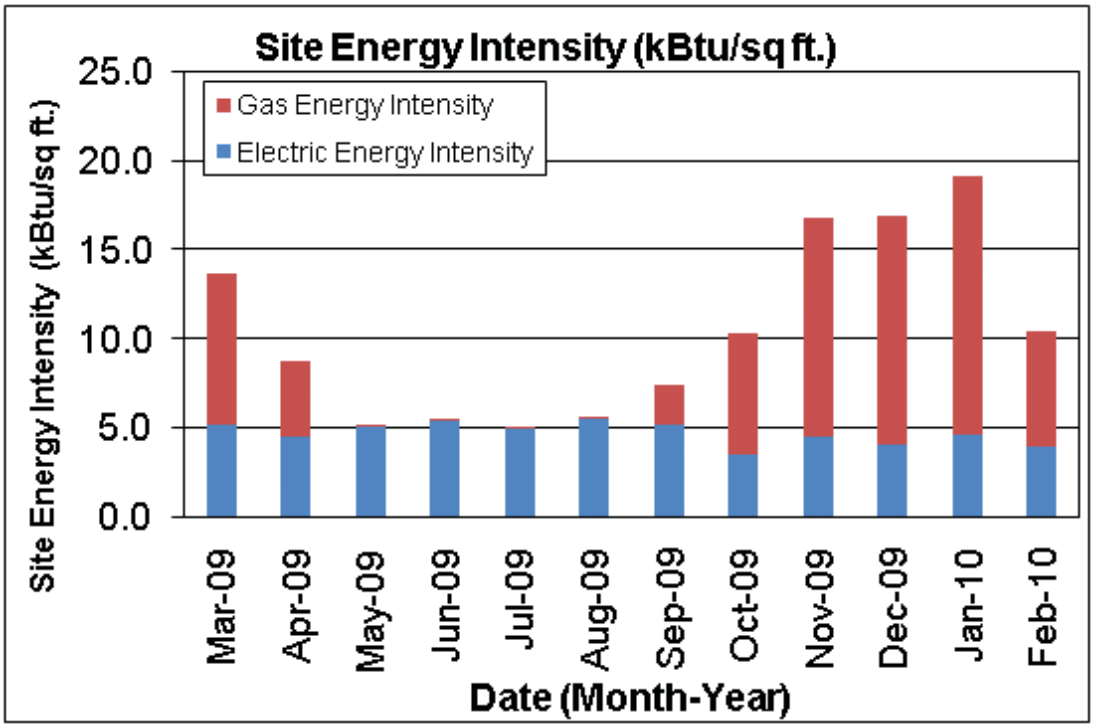




Energy benchmarking

SWA has entered energy information about the Colts Neck High School in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This high school is categorized as a K-12 School space type. The Colts Neck High School received a national energy performance rating of 2. The Site Energy Use Intensity is 122.0 kBtu/ft^2-yr compared to the national average of a school building consuming 63.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating. This school is consuming energy at a far greater rate than almost all other benchmarked high schools. Its low score is primarily the result of the building's cooling system. The schools cooling system which conditions one hundred percent of the building area is atypical for a high school. There is also additional consumption due to unnecessary summer time cooling of unoccupied areas.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for "School" space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the Freehold RHSD desire to reach this average there are other large scale and financially less advantageous improvements that can be made, such as envelope window, door and insulation upgrades that would help the building reach this goal.



Per the LGEA program requirements, SWA has assisted the Freehold RHSD to create an *ENERGY STAR® Portfolio Manager* account and share the Colts Neck 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 Freehold RHSD (user name of "frhsd8579" with a password of "frhsd8579") 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.

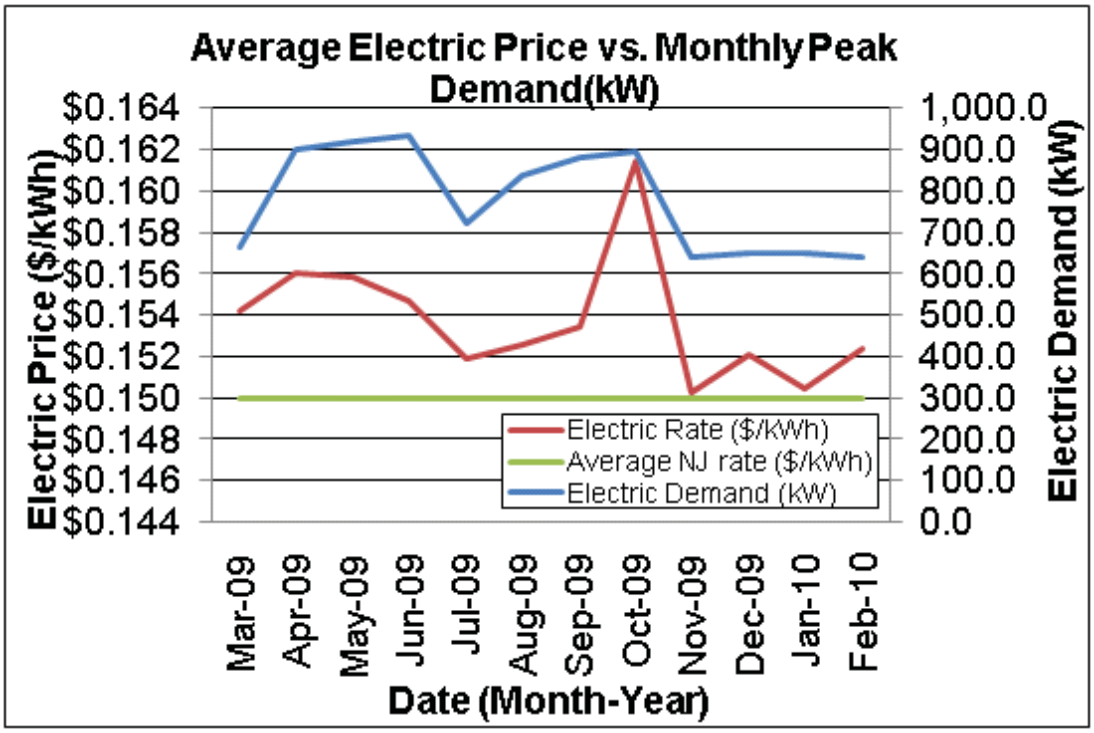
Tariff analysis is performed to determine if the rate that a Freehold RHSD is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used 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 Freehold RHSD is paying a general service rate for natural gas. Demand is 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.

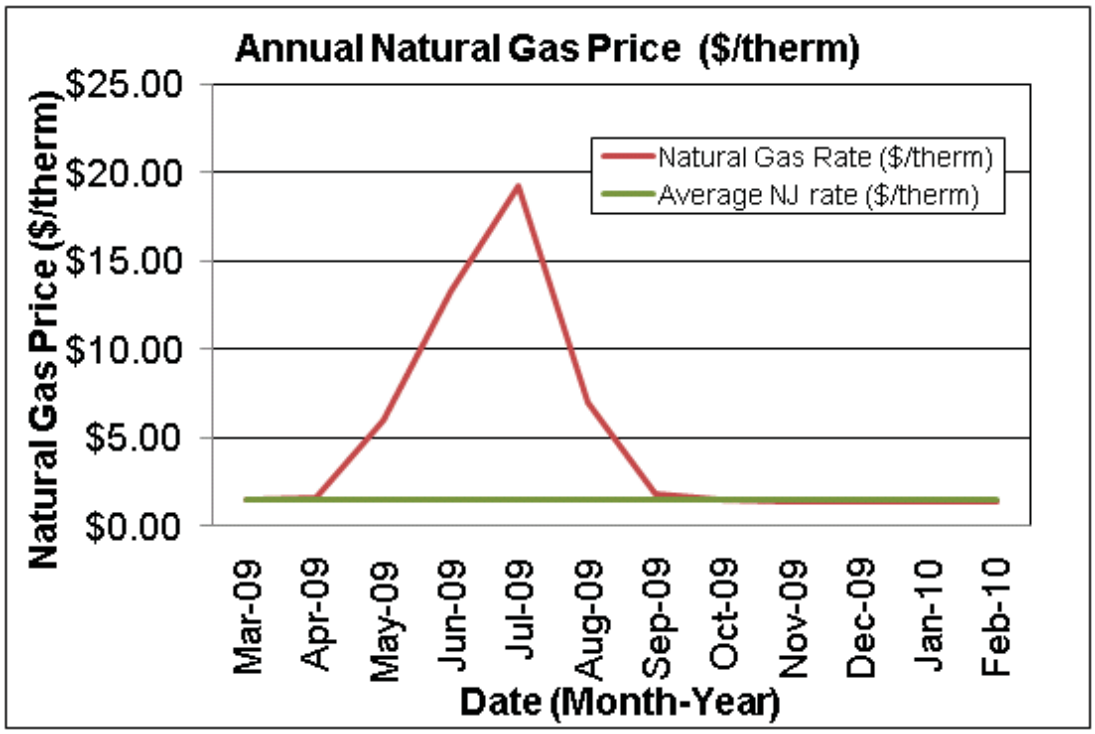
Energy Procurement strategies

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 Colts Neck High School pays a rate of $0.154/kWh. The Colts Neck High School annual electric utility costs are $13,306 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 7% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while Colts Neck High School pays a rate of $1.51/therm. Natural gas bill analysis shows fluctuations up to 93% 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 and the building paying for fixed costs such as meter reading charges during the summer months.

SWA recommends that the Colts Neck 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 Colts Neck High School. Appendix C contains a complete list of third-party energy suppliers for the Freehold RHSD 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 April 19, May 6, June 28 and June 30, 2010 the following data was collected and analyzed.

Building Characteristics

The two-story, (slab on grade), 220,000 square feet Colts Neck High School building was originally constructed in 1995 with an addition completed in 2009. It houses administrative offices, gymnasiums, a cafeteria, an auditorium and classrooms.

Partial Front Façade (typ.)

Partial Side Façade (typ.)

Partial Side Façade (typ.)

Partial Rear Façade (typ.)

Building Occupancy Profiles

Its occupancy is approximately 1,700 students and 142 faculty and staff from 7:30am until 3:30pm, extra-curricular activities continuing to 6:00pm and cleaning activities completed by midnight Monday through Friday. Saturday activities are 7:00am until 2:30pm and Sunday activities are sporadic and driven by sport events. Summer school occupancy is approximately 300 students and 30 faculty and staff.

Building Envelope

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

Exterior Walls

The exterior wall envelope is mostly constructed of brick veneer and some EIFS (Exterior Insulation Finishing System) accents, over concrete block with 1-1/2 inches of foam board insulation.

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 acceptable, age-appropriate condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues.

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

Signs of water damage at perimeter walls due to damage roof flashing or gutters

Delaminating or deteriorating caulk

Damaged EIFS through baseball or tennis ball impacts

Roof

The building's roof is predominantly a flat and parapet type over steel decking with a built-up asphalt finish and reflective stone coating. It is original. Two and a half inches of foam board roof insulation are assumed.

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

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

Base

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

Slab/perimeter insulation levels could not be verified in the field and the lack of existing insulation is 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 acceptable condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues except for reports of condensation on ground floor finishes during hot and humid outside conditions.

Windows

The building contains basically two different types of windows.

Casement type windows with a non-insulated aluminum frame, tinted double glazing and some interior shading devices. The windows are located throughout the building and are original and have never been replaced

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 acceptable condition with no signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

Exterior doors

The building contains only one type of exterior door.

Aluminum/steel frame with safety glass type exterior doors. They are located throughout the building and are original.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in acceptable, age appropriate condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

Building air-tightness

Overall the field auditors found the building to be reasonably air-tight with only a few areas of suggested improvements, as described in more detail earlier in this chapter.

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

Mechanical Systems

Heating Ventilation Air Conditioning

The original building is heated and cooled by one boiler and chiller plant located in 'D' Wing behind the Cafeteria. The 2003 additions are also heated by the original boiler plant, and cooled by a supplemental air-cooled chiller located on grade outside the D Wing and adjacent to some athletic fields. Space conditioning and ventilation is provided by a combination of rooftop fan coil units, exhaust fans and unit ventilators. It should be noted that both the original building and the additions are controlled by a Johnson Metasys Automatic Temperature Controls (ATC) system, and that there were no complaints about the comfort provided by the mechanical systems. Temperature control appeared to be very good on the days of our site visits.

Equipment

The various spaces in Colts Neck High School are heated/cooled by multiple roof mounted, floor-mounted and ceiling mounted fan coil units, as well as classroom unit ventilators, and several hot water perimeter radiators and cabinet unit heaters. The following paragraphs contain a summary of the systems in the various portions of the building. A comprehensive Equipment List can be found in Appendix A.

The Auditorium is conditioned by one (1) large fan coil air handling unit suspended from the roof deck above the Stage. This unit provides heating, cooling and ventilation. Heating is provided by a hot water coil in the unit that is fed by the building's original boiler plant. The air handling unit also contains a cooling coil that receives chilled water from the original chiller plant. The fan coil unit was installed in 1998, is in good condition and should be retained.

The Media Center and Room A125 are conditioned by hot and chilled water fan coil units located above the ceiling within the space. This equipment was installed in 1998 and 2001 respectively and is in very good condition.

Hot and chilled water air handling unit suspended from roof deck

Classrooms A110-A124, A126, A129-A136, A208, A210, A216, A218, A220, A222, and A224-A228 are heated, cooled and ventilated by four-pipe hot and chilled water floor-mounted unit ventilators. The unit ventilators were installed in 1998 or 2001, depending on

when the particular wing in which they are located was constructed. All units are more or less halfway through their expected service lives and are in good condition.

The remainder of the classrooms, the Main Offices, the Cafeteria and Faculty Dining Lounge are served by rooftop hot and chilled water air handling units and exhaust fans. The units were installed in 1998 or 2001, depending on when the particular wing in which they are located was constructed. Additionally, the return air ductwork of the Cafeteria and Faculty Dining Lounge rooftop units are provided with fresh air by two (2) rooftop energy recovery units (ERUs). The ERUs are connected via ductwork below the roof deck that ties into the return duct of the affected fan coil unit. All units are more or less halfway through their expected service lives and are in good condition.

Energy recovery unit above cafeteria

The Kitchen hood receives makeup air the rooftop air handling units serving the kitchen via air transfer through wall openings. This practice leads to heated air from the Cafeteria being lost out through the hood, making the boiler produce more hot water than necessary to keep the Cafeteria heated when the kitchen hood is running. SWA recommends that a gas-fired heated makeup air unit be installed above the Kitchen and ducted into the Kitchen ceiling to provide adequate makeup air for the kitchen hood.

The Main Gymnasium and adjacent locker rooms, Team Rooms, Trainer's Office, etc. are heated, cooled and ventilated by a total of six (6) hot and chilled water fan coil units located on a second level mezzanine adjacent to the Gymnasium. All units appear to be in very good condition and should be retained.

The Auxiliary Gym is served by a rooftop hot and chilled water unit on a low roof above a storage room that is adjacent to the Auxiliary Gym.

Rooms A202, A204, A206, A229, A217, A219, A221 and A223 contain laboratory fume hoods with corresponding rooftop exhaust fans. All equipment is in good condition and can be retained.

In general, the rooftop units serving this building contain a chilled water coil for cooling, hot water coil for heating, supply fan and return fan. In cooling mode, the chilled water absorbs heat from the passing air in the evaporator coil and transfers the heat to the refrigerant in the chiller. There are two chillers serving the building, one water-cooled chiller and one air-cooled chiller. In the case of the water-cooled chiller, the heat is then transferred from the chiller to a separate water loop and rejected at an exterior cooling tower. In the case of the

air-cooled chiller, the chilled water is pumped to the external air-cooled chiller and the heat is transferred to refrigerant and then rejected to the atmosphere.

The rooftop units draw in outside air directly, providing a means of ventilation without an additional building penetration above that required for the distribution ductwork.

The air-cooled chiller uses refrigerant R-22, which contains CFCs and is being phased out of production for environmental reasons. Newer equipment will contain refrigerant R-410A, which is more environmentally-friendly than R-22. The liquid cooled chiller contains R-134a, which is more environmentally friendly than R-22.

The air handling unit heating coils, unit ventilators, hydronic unit heaters and finned-tube radiation located in the original building are provided with hot water by three (3) HB Smith cast iron sectional boilers located in the mechanical room across from D103. These boilers were installed in 1998 and are in very good condition. This equipment is about 40% of the way through its expected service life of 30 years per the 2007 ASHRAE Applications Handbook. The thermal efficiency of this equipment can be expected to be approximately 80%.

One of three cast iron boilers (l.) and condensing boiler (r.)

The heating loads in the additions are served by one (1) Aerco Benchmark condensing boiler also located in the original boiler room. The boilers was installed in 2001 and is in very good condition. This equipment is about one third of its way through its expected service life of 30 years. The efficiency of this equipment can range from about 80-93%. In general, condensing boilers are most efficient when operating at temperatures that are lower than non-condensing or cast iron boilers. No operational problems were reported with these boilers.

The air handling unit and unit ventilator cooling coils in the original building are served by a water-cooled chiller as mentioned above. This chiller is piped to a cooling tower located outside for heat rejection. The chiller and cooling tower were installed in 1998 and are in very good condition. The chiller is about halfway through its expected service life of 25 years, and the cooling tower is slightly over its expected service life of 20 years.

The cooling loads in the additions are served by an air-cooled chiller located on grade outside the ‘D’ Wing. This equipment was installed in 2001 and is less halfway through its expected service life of 25 years. The chiller appears to be in very good condition.

Water-cooled chiller (l.) and air –cooled chiller (r.)

There are several exhaust fans located on the roof, which serve the bathrooms, kitchen hood and general exhaust. The fans are in generally good condition and were all operating at the time of the field visit. In general, most of the building exhaust fans have an estimated 50% useful operating life left.

Distribution Systems

The heating hot water is pumped to the original building loads by one pair of pumps, and to the loads in the 2001 additions by another pair of pumps. One of each pair of pumps runs at a time, in lead-lag fashion. The original building pump motors are labeled as premium efficiency, however, the newer pumps are standard efficiency. The standard efficiency motors are recommended for replacement with premium efficiency motors in the ECM section of this report.

The chilled water is pumped to the original building loads by one pair of pumps, and to the loads in the 2001 additions by another pair of pumps. One of each pair of pumps runs at a time, in lead-lag fashion. It appears that one set of pumps is standard efficiency and one set is premium efficiency. The standard efficiency motors are recommended for replacement with premium efficiency motors in the ECM section of this report.

In general, the air distribution in the school is via ducted constant volume systems, where the air handling equipment delivers the same volume of air to the conditioned space at all occupied times. Upon a call for cooling, the chilled water coil valve opens to allow chilled water into the cooling coil until the space thermostat is satisfied. Similarly, upon a call for heating, the hot water coil valve is opened to allow hot water to flow through the heating coil until the space thermostat is satisfied.

It should be noted that in some instances, ductwork insulation was not observed. Since it is possible that the ductwork is internally lined, SWA recommends that the ductwork is inspected and insulated if required.

Controls

The original building and the additions are controlled by a Johnson Metasys Automatic Temperature Controls (ATC) system, and that there were no complaints about the comfort

provided by the mechanical systems. Temperature control appeared to be very good on the days of our site visits.

Johnson Metasys control panel (l.) and typical thermostat (r.)

Domestic Hot Water

The domestic hot water (DHW) for Colts Neck High School is provided by two (2) A.O. Smith Legend gas-fired water heaters located in the original mechanical room. These boilers have a 90% nominal efficiency and are in fair condition. These heaters are almost at the end of there expected service life of 15 years and should be considered for replacement. However, due to their nominal efficiency, this replacement cannot be justified by energy savings alone, and will be listed in the Capital Improvements section of this report.

Domestic water heaters

Commercial Refrigeration

The school also has an approximately 16’ x 16’ walk-in cooler and freezer inside the kitchen. This cooler was manufactured by Tafco and is original to the building (1998). The equipment is in good condition. Although nameplate data was not found, it is estimated that there may be an opportunity for energy savings by replacing the evaporator fans.

Both the cooler and freezer utilize remote condensing units for heat rejection that located on the roof. SWA recommends that this equipment is replaced as part of a capital improvement project within the district. The condensing units are labeled as using R-22 refrigerant, which is not as environmentally friendly as R-404a that would be used in a replacement unit by the same manufacturer.

Condensing Units for Walk-in Boxes

The kitchen contained three (3) stainless steel refrigerators, one (1) stainless steel refrigerator/freezer and one (1) ice machine, and the servery contained one glass door merchandiser. All equipment appears to be in very good condition.

The Nurse's Office contains one (1) ice machine and the Main Gymnasium Trainer's Room contains two (2) ice machines. This equipment was installed in the last 5-10 years and is 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 Colts Neck High School currently contains mostly fixtures with electronically ballasted T8 lamps. There are also incandescent, CFL, pulse start metal halide and high pressure sodium lamps installed on the premises. 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 type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of metal halide and high pressure sodium fixtures as well as fixtures with electronically ballasted T8 lamps and CFL's. Exterior lighting is controlled by a combination of photocells, switches and timers.

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.

There are three dishwashers installed at the school. All of them are manufactured by Maytag and are model # MDC5100AWW. Also installed at the school are two old washing machines and two old dryers. All four laundry units are manufactured by Estate, and both dryers are electric. The model numbers for the dryers are TEDS840PQ0 and TEDX540JQ1. The washing machines are older inefficient models and are not ENERGY STAR® qualified.

Installed at the school are eight refrigerated vending machines and four non-refrigerated vending machines. While six of the refrigerated vending machines are new energy efficient and or ENERGY STAR® qualified, there are still two machines that are old and could benefit from a retrofit with a VendingMiser™ device. Four vending machines are also installed and two of them are new energy efficient and or ENERGY STAR® qualified while the other two are older and could benefit from a retrofit with a SnackMiser™ device. There are twenty five refrigerators installed throughout the school. Of these units only one is a new full size residential ENERGY STAR® qualified refrigerator while the others are older, less efficient models that should be replaced with ENERGY STAR® qualified devices. Of the twenty-four non ENERGY STAR® qualified refrigerators, seven are compact units while seventeen are larger full size residential units. Also present in the building is an ice machine and several pieces of commercial kitchen equipment which include six commercial refrigerators, two commercial freezers and two walk in refrigerator / freezer combination units.

Elevators

The Colts Neck High School has one installed 20 horsepower elevator manufactured by Schindler with a capacity of 2,500 lbs. The unit was installed in 1998 and is in very good condition.

Generator

There is one (1) Detroit Diesel 100 KW diesel emergency generator located in a dedicated room just off the original boiler room. This generator was installed in 1998. This generator is in good condition.

Emergency Generator

Other electrical systems

There are currently energy-impacting electrical systems installed at the Colts Neck High School in the form of three transformers. All three are manufactured by General Electric and are sized at 150 kVA, 112.5 kVA, and 30 kVA and are in good working condition.

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 Colts Neck High School is a good candidate for a 47.38 kW or 140.07 kW Solar Panel installation. See ECM's# 11 & 13 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 Colts Neck High School is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The Colts Neck 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 40% and 60% remaining useful life.

Combined Heat and Power

The Colts Neck 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 Recommended 0-5 Year Payback ECMs
1	Install Fifteen (15) New CFL Fixtures
2	Install Variable Frequency Drives on Motors of Heating Hot Water Circulators
3	Retrofit Two (2) Refrigerated Vending Machines with VendingMiser™ Devices
4	Retrofit Two (2) Existing Vending Machines with SnackMiser™ Devices
5	Install Variable Frequency Drives on Motors of Heating Hot Water Circulators
6	Install Thirty (30) New Occupancy Sensors
7	Install (27) New Bi-level T8 Fluorescent Fixtures in Stairwells
8	Install Variable Frequency Drives on Motors of Chilled Water Circulators
ECM#	**Description of Recommended 5-10 Year Payback ECMs**
9	Install Premium Efficiency Motors on (2) Heating Hot Water Circulators
10	Install Variable Frequency Drives on Motors of Chilled Water Circulators
12	Replace Seven (7) Compact Refrigerators with 2.7 Cu. Ft. ENERGY STAR® Models
14	Replace Two (2) Washing Machines with ENERGY STAR® Units
15	Replace Seventeen (17) Large Refrigerators with ENERGY STAR® Units
16	Install Premium Efficiency Motors on Walk-In Box Evaporator Fans
ECM#	**Description of Recommended Renewable Energy ECMs**
11	Install 49.68 kW PV Rooftop System with Incentives
13	Install 190.90 kW PV Rooftop System without Incentives

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

ECM#1: Install Fifteen (15) New CFL Fixtures

On the day of the site visit, SWA completed a lighting inventory of Colts Neck High School (see Appendix B). The existing lighting inventory contained a total of 15 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: $135 (includes $75 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

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
135	0	135	904	0.2	0	0.0	265	405	5	2,023	0.3	1398	280	299	1,707	1,619

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the observed occupancy assumptions.

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#2: Install Variable Frequency Drives on Motors of Heating Hot Water Circulators

The Mechanical Room houses two (2) pairs of floor-mounted circulator pumps as part of the hot water heating system to serve the hot water coils in the air handling units and other hot water terminal units listed in this report. The pumps that serve the 2001 additions are rated at 40 Hp each. Adding variable frequency drives (VFDs) to these two pumps will vary the flow according to the required heating capacity to better meet the load of the building. This set of pumps operates in a lead-lag fashion. The pump motors are on-off operation. Colts Neck High School will realize energy savings by utilizing variable frequency drives for the pump motors, and incorporating this new motor control method into the BMS programming.

Installation cost:

Estimated installed cost: $20,000 (includes $4,800 labor)
Source of cost estimate: RS Means Cost Data and Honeywell VFD Quick Savings Estimator

Economics (with no incentives):

Install VFDs on 40 Hp Hot Water Heating Pump Motors

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
20,000	0	20,000	64,000	13.3	0	1.0	0	9,856	15	147,840	2.0	639	43	49	97,660	87,680

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The Honeywell VFD Quick Savings Estimator was used with the assumption that one of each set of heating water pumps operates for the heating season. According to weather bin data for McGuire AFB, Trenton, NJ, each set of pumps considered should operate for approximately 4,000 hours per year.

Rebates/financial incentives:

NJ Clean Energy – There are no incentives at this time for hot water pump applications, only for chilled water pumps and centrifugal fans.

Please see Appendix F for more information on Incentive Programs.

ECM#3: Retrofit Two (2) Refrigerated Vending Machines with VendingMiser™ Devices

A simple plug and play device the VendingMiser™ device is compatible with refrigerated vending machines. It utilizes Passive Infrared Sensors (PIR) to help the vending machine save power. This unit is to be installed on the existing refrigerated vending machines.

Installation cost:

Estimated installed cost: $398 (Includes $40 of labor)
Source of cost estimate: *Manufacturers info*

Economics:

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
398	0	398	1,109	0.2	N/A	0.1	0	171	5	854	2.3	115	23	43	2,511	1,986

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Average weekly operating hours = 40.

Rebates/financial incentives:

NJ Clean Energy – None available for this ECM

Please see Appendix F for more information on Incentive Programs.

ECM#4: Retrofit Two (2) Existing Vending Machines with SnackMiser™ Devices

A simple plug and play device the VendingMiser™ device is compatible with refrigerated vending machines. It utilizes Passive Infrared Sensors (PIR) to help the vending machine save power. This unit is to be installed on the existing refrigerated vending machines.

Installation cost:

Estimated installed cost: $198 (Includes $40 of labor)
Source of cost estimate: *Manufacturers info*

Economics:

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
198	0	198	532	0.1	N/A	0.1	0	82	5	410	2.4	107	21	41	766	953

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Average weekly operating hours = 40.

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

Please see Appendix F for more information on Incentive Programs.

ECM#5: Install Variable Frequency Drives on Motors of Heating Hot Water Circulators

The Mechanical Room houses two (2) pairs of floor-mounted circulator pumps as part of the hot water heating system to serve the hot water coils in the air handling units and other hot water terminal units listed in this report. The pumps that serve the original building are rated at 20 Hp each. Adding variable frequency drives (VFDs) to these two pumps will vary the flow according to the required heating capacity to better meet the load of the building. This set of pumps operates in a lead-lag fashion. The pump motors are on-off operation. Colts Neck High School will realize energy savings by utilizing variable frequency drives for the pump motors, and incorporating this new motor control method into the BMS programming.

Installation cost:

Estimated installed cost: $13,500 (includes $3,250 labor)
Source of cost estimate: RS Means Cost Data and Honeywell VFD Quick Savings Estimator

Economics (with no incentives):

Install VFDs on 20 Hp Hot Water Heating Pump Motors

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
13,500	0	13,500	32,200	6.7	0	0.5	0	4,959	15	74,382	2.7	451	30	36	45,698	44,114

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The Honeywell VFD Quick Savings Estimator was used with the assumption that one of each set of heating water pumps operates for the heating season. According to weather bin data for McGuire AFB, Trenton, NJ, each set of pumps considered should operate for approximately 4,000 hours per year.

Rebates/financial incentives:
NJ Clean Energy – There are no incentives at this time for hot water pump applications, only for chilled water pumps and centrifugal fans.

Please see Appendix F for more information on Incentive Programs.

ECM#6: Install Thirty (30) New Occupancy Sensors

On the days of the site visits, SWA completed a lighting inventory of Colts Neck High School (see Appendix B). The building contains twenty five areas that could benefit from the installation of thirty occupancy sensors. These areas consisted of various offices, meeting rooms, lounges, and bathrooms that 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: $6,600 (includes $2,400 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

est. installed cost, $	est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 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
6,600	600	6,000	12,460	2.6	0	0.2	0	1,919	15	28,783	3.1	380	25	31	16,579	22,310

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: $600*

Please see Appendix F for more information on Incentive Programs.

ECM#7: Install (27) New Bi-level T8 Fluorescent Fixtures in Stairwells

On the day of the site visit, SWA completed a lighting inventory of Colts Neck High School (see Appendix B). The school currently contains 27 T8 fluorescent lighting fixtures that are operated 16 hours per day in stairwells. New technology called bi-level lighting, combines fluorescent lighting fixtures with an occupancy sensor. These efficient light fixtures operate at a minimal light level in order to meet code and safety requirements and power up to a higher level when any motion is detected in the stairwells. Colts Neck High School would be an appropriate application for these fixtures since there are large periods of time when the stairwells should be unoccupied.

Installation cost:

Estimated installed cost: $3,915 (includes $1,620 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

est. installed cost, $	est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 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
4,590	675	3,915	6,623	1.4	0	0.1	0	1,020	15	15,298	3.8	291	19	25	8,086	11,858

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 – bi-level T8 fluorescent fixtures ($25 per fixture)*
- *Maximum incentive amount: $675*

Please see Appendix F for more information on Incentive Programs

ECM#8: Install Variable Frequency Drives on Motors of Chilled Water Circulators

The Mechanical Room houses two (2) pairs of floor-mounted circulator pumps as part of the chilled water system to serve the cooling coils in the air handling units and other terminal units listed in this report. The pumps that serve the 2001 additions are rated at 40 Hp each. Adding variable frequency drives (VFDs) to these two pumps will vary the flow according to the required cooling capacity to better meet the load of the building. This set of pumps operates in a lead-lag fashion. The pump motors are on-off operation. Colts Neck High School will realize energy savings by utilizing variable frequency drives for the pump motors, and incorporating this new motor control method into the BMS programming.

Installation cost:

Estimated installed cost: $15,200 (includes $4,800 labor)
Source of cost estimate: RS Means Cost Data and Honeywell VFD Quick Savings Estimator

Economics (with no incentives):

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
20,000	4,800	15,200	24,100	5.0	0	0.4	0	3,711	15	55,671	4.1	266	18	23	29,106	33,017

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The Honeywell VFD Quick Savings Estimator was used with the assumption that one of each set of chilled water pumps operates for the cooling season. According to weather bin data for McGuire AFB, Trenton, NJ, each set of pumps considered should operate for approximately 1,500 hours per year.

Rebates/financial incentives:
NJ Clean Energy – For 20 Hp+ Chilled Water Pumps, $60 per VFD rated Hp.
Maximum incentive amount: $4,800

Please see Appendix F for more information on Incentive Programs.

ECM#9: Install Premium Efficiency Motors on (2) Heating Hot Water Circulators

The Mechanical Room houses two pairs of pumps that serve the hot water heating system for the building. One pair of 40 Hp floor-mounted circulator pumps serves the hot water coils and other hot water terminal units in 2001 addition. These pumps are in good condition and are almost halfway through their expected service lives of 20 years. These pumps operate in a lead-lag fashion, and the pump motors are standard efficiency. Colts Neck High School will realize energy savings by utilizing premium efficiency motors for the existing pumps.

Installation cost:

Estimated installed cost: $4,758 (includes $1,270 labor)
Source of cost estimate: Similar projects and DOE Motor Master International selection & savings analysis

Economics (with incentives):

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
5,082	324	4,758	5,632	1.2	0	0.1	0	867	20	17,347	5.5	265	13	18	8,146	7,716

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 with the assumption that one of each set of heating water pumps operates for the heating season.
According to weather bin data for McGuire AFB, Trenton, NJ, each set of pumps considered should operate for approximately 4,000 hours per year.

Rebates/financial incentives:
NJ Clean Energy – Premium motors ($45-$700 per motor)
Maximum incentive amount: $324

Please see Appendix F for more information on Incentive Programs.

ECM#10: Install Variable Frequency Drives on Motors of Chilled Water Circulators

The Mechanical Room houses two (2) pairs of floor-mounted circulator pumps as part of the chilled water system to serve the cooling coils in the air handling units and other terminal units listed in this report. The pumps that serve the original building are rated at 25 Hp each. Adding variable frequency drives (VFDs) to these two pumps will vary the flow according to the required cooling capacity to better meet the load of the building. This set of pumps operates in a lead-lag fashion. The pump motors are on-off operation. Colts Neck High School will realize energy savings by utilizing variable frequency drives for the pump motors, and incorporating this new motor control method into the BMS programming.

Installation cost:

Estimated installed cost: $13,000 (includes $3,850 labor)
Source of cost estimate: RS Means Cost Data and Honeywell VFD Quick Savings Estimator

Economics (with no incentives):

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
16,000	3,000	13,000	15,100	3.1	0	0.2	0	2,325	15	34,881	5.6	168	11	16	14,760	20,687

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. The Honeywell VFD Quick Savings Estimator was used with the assumption that one of each set of chilled water pumps operates for the cooling season. According to weather bin data for McGuire AFB, Trenton, NJ, each set of pumps considered should operate for approximately 1,500 hours per year.

Rebates/financial incentives:
NJ Clean Energy – For 20 Hp+ Chilled Water Pumps, $60 per VFD rated Hp.
Maximum incentive amount: $3,000

Please see Appendix F for more information on Incentive Programs.

ECM's#11 & 13: Install 190.90 kW PV Rooftop System without Incentives or Install 49.68 kW PV Rooftop System with Incentives

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 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 230 watt panel has 17.5 square feet of surface area (providing 13.1 watts per square foot). A 47.38 kW system needs approximately 206 panels which would take up 3,605 square feet. The larger 140.07 kW system would require approximately 609 panels which would take up 10,660 square feet.

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. Colts Neck High School may want to consider applying for a grant and / or 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.

Two different system sizes were proposed due to installation incentives only being offered for systems less than 50kW in size. The first option takes advantage of these incentives by staying below the 50kW system threshold, and the second option takes advantage of the total usable space on the school's roof to install a PV system. SWA recommends installing the larger system; however, if sufficient funding is not available, Colts Neck High School should at least install the 47.38kW system. As mentioned above, these systems are modular and can be expanded in the future.

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that Colts Neck High School 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, Colts Neck High School should include these costs in the financial analysis of the project.

Installation cost:
Estimated installed cost – 47.38 kW system: $332,850 (includes $127,000 of labor)
Estimated installed cost – 140.07 kW system: $1,050,525 (includes $375,425 of labor)
Source of cost estimate: Similar projects.

Economics (with incentives):

ECM#11: Install 49.68 kW PV Rooftop System with Incentives

Install a 47.38 kW PV System with Incentives															
est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime 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
355,350	22,500	332,850	58,007	47	0	0.9	0	43,733	25	223,327	7.6	123.9	5.0	10.6	238,143	79,470

cash flow yr 0	cash flow yr 1	cash flow yr 2	cash flow yr 3	cash flow yr 4	cash flow yr 5	cash flow yr 6	cash flow yr 7	cash flow yr 8	cash flow yr 9	cash flow yr 10	cash flow yr 11
-332,850	43,733	43,733	43,733	43,733	43,733	43,733	43,733	43,733	43,733	43,733	43,733

cash flow yr 12	cash flow yr 13	cash flow yr 14	cash flow yr 15	cash flow yr 16	cash flow yr 17	cash flow yr 18	cash flow yr 19	cash flow yr 20	cash flow yr 21	cash flow yr 22	cash flow yr 23	cash flow yr 24	cash flow yr 25
43,733	43,733	43,733	43,733	8,933	8,933	8,933	8,933	8,933	8,933	8,933	8,933	8,933	8,933

ECM's#13: Install 190.90 kW PV Rooftop System without Incentives

Install a 140.07 kW PV System with Incentives															
est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime 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	estimated cost of labor, $
1,050,525	0	1,050,525	169,888	140	0	2.6	0	127,563	25	654,069	8.2	107.0	4.3	9.4	615,557	232,747	375,425

cash flow yr 0	cash flow yr 1	cash flow yr 2	cash flow yr 3	cash flow yr 4	cash flow yr 5	cash flow yr 6	cash flow yr 7	cash flow yr 8	cash flow yr 9
-1, 050,525	127,563	127,563	127,563	127,563	127,563	127,563	127,563	127,563	127,563

cash flow yr 10	cash flow yr 11	cash flow yr 12	cash flow yr 13	cash flow yr 14	cash flow yr 15	cash flow yr 16	cash flow yr 17	cash flow yr 18	cash flow yr 19	cash flow yr 20
127,563	127,563	127,563	127,563	127,563	127,563	26,163	26,163	26,163	26,163	26,163

cash flow yr 21	cash flow yr 22	cash flow yr 23	cash flow yr 24	cash flow yr 25
26,163	26,163	26,163	26,163	26,163

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (230 Watts, model #ND-U230C1). 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 up to the first 30 kW for systems 50 kW or less. Incentive amount for this application is $22,500 for the 47.38 kW proposed option. There are no associated incentives for the larger 140.07 kW system due to the NJ Clean Energy - Renewable Energy Incentive Program's cap on the size of the PV system.
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 $34,800 has been incorporated in the above costs for the 47.38 kW system and an annual SREC credit of $101,400 for the 140.07 kW system; however, it requires proof of performance, application approval and negotiations with the utility.

Please see Appendix F for more information on Incentive Programs.

ECM#12: Replace Seven (7) Compact Refrigerators with 2.7 Cu. Ft. ENERGY STAR® Models

On the day of the site visit, SWA observed that there were seven 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: $693 (Includes $115 in labor cost)
Source of cost estimate: Manufacturer and Store established costs

Economics:

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
693	0	693	560	0.1	0	0.1	0	86	15	1,294	8.0	87	6	9	322	1,003

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#14: Replace Two (2) Washing Machines with ENERGY STAR® Units

On the day of the site visit, SWA observed that there were two older model washing machines installed. SWA recommends replacing these units with two new ENERGY STAR® labeled washing machines.

Installation cost:

Estimated installed cost: $1,600 (includes $100 of labor)
Source of cost estimate: Manufacturer

Economics:

est. installed cost, $	est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 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
1,600	0	1,600	1,000	0.2	0	0.1	17	171	15	2,565	9.4	60	4	7	412	1,791

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:

- *None*

Please see Appendix F for more information on Incentive Programs

ECM#15: Replace Seventeen (17) Large Refrigerators with ENERGY STAR® Units

On the day of the site visit, SWA observed that there were seventeen older 17 cu. ft. model inefficient refrigerators in the apartment units which were not Energy Star rated (using approximately 773 kWh/yr each). 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 older refrigerators with a 17 cu. ft. top freezer refrigerator ENERGY STAR®, 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: $7,650 (includes $1,700 of labor)
Source of cost estimate: Manufacturer

Economics:

est. installed cost, $	est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 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
7,650	0	7,650	5,100	1.1	0	0.1	0	785	15	11,781	9.7	54	4	6	1,592	9,132

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:

- *None*

Please see Appendix F for more information on Incentive Programs

ECM#16: Install Premium Efficiency Motors on Walk-In Box Evaporator Fans

There is one walk-in cooler box and one walk-in freezer box in the Kitchen of Colts Neck High School. Typically, the evaporator and condenser fans of walk-in coolers will run 24 hours per day, 7 days per week for a cooler and 18 hours per day, 7 days per week. The motors on these fans are standard efficiency, shaded pole motors. The freezer fans could not be observed at the time of the survey since the cooler door was locked, but it is assumed that on average for this size box, there will be approximately (3) evaporator motors. It is assumed the motors are fractional horsepower. Colts Neck High School will realize energy savings by utilizing premium efficiency motors for these fans.

Installation cost:

Estimated installed cost: $3,500 (includes $1,300 of labor)
Source of cost estimate: Similar projects and manufacturer's data

Economics (with incentives):

est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
3,500	0	3,500	2,283	0.5	0	0.0	0	352	20	7,032	10.0	101	5	8	1,731	3,128

Assumptions: SWA calculated the savings for this measure using nameplate data taken and using the billing analysis. Calculations were completed with the assumption that all of the cooler fans operate for 8,760 hours per year and all of the freezer fans operate for 6,570 hours per year.

Rebates/financial incentives:

NJ Clean Energy – There are no incentives available since these are single phase, fractional horsepower motors

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 Colts Neck High School:

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

- Install energy efficient clothes dryers when replacements are required – Select the most energy efficient replacement unit since ENERGY STAR® does not qualify clothes dryers.

- Replace Domestic Water Heaters - The domestic water heaters in the boiler room at nearing the end of their expected service life. Since these units were originally very efficient for equipment of its type, replacement cannot be justified by energy savings alone. Based on the capacity of these heaters, a suitable replacement would be similar to the Aerco Model KC-1000. Replacement cost is estimated to be $60,000 and the estimated simple payback is 47 years.

- Replace Hot and Chilled Water Fan Coil Rooftop Units – Various units on the roof are approaching the end of their useful life per 2007 ASHRAE Applications Handbook. Should the maintenance on the units become more frequent, replacement should be considered. This is a replacement in kind measure that offers negligible energy savings. Estimated replacement cost is $20,000-$25,000 per unit.

- Provide dedicated makeup air unit for Kitchen – Per the current system operation, conditioned air from the Cafeteria is transferred to the kitchen and out of the building via the kitchen hood. SWA recommends adding a dedicated makeup air unit to be ducted into the kitchen to greatly reduce the need for conditioned transfer air from the Cafeteria to serve the kitchen hood.

- Consider replacement of the condensing units for the walk-in cooler and walk-in freezer. Both the cooler and freezer utilize remote condensing units for heat rejection that located on the roof. SWA recommends that this equipment is replaced as part of the replacement of the walk-in boxes. The condensing units are labeled as using R-22 refrigerant, which is not as environmentally friendly as R-404a that would be used in a replacement unit by the same manufacturer. Estimated cost to replace both condensing units is $12,000.

Operations and Maintenance

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

- Repair damaged EIFS façade areas.

- Inspect and replace cracked/ineffective caulk.

- Install/repair and maintain flashing to minimize uncontrolled wind-driven and roof water run-off causing exterior wall damage.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.

- 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.

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

- Boilers and building piping insulation - Insulate un-insulated heating piping throughout the building to efficiently deliver heat where required and provide personnel protection.

- Water levels in the expansion tanks and the integrity of the tank bladder should be checked on a regular basis to confirm proper operation.

- For Aerco condensing boiler, inspect the igniter and flame sensor and calibrate combustion every six months per manufacturer’s recommendations.

- Change filters in rooftop units and air handling units monthly to ensure efficient operation of the fan, ensure adequate air delivery to the space.

- Tighten belts on exhaust fans and air handling unit supply fans every three to six months – tightening belts on belt-driven fans can maximize overall efficiency of the equipment.

- Inspect condensate pan and drain line on all RTUs and air handling units. Remove sludge or foreign materials that might obstruct proper drainage.

- Inspect and replace gasketing around door into (2) walk-in refrigeration boxes. Ineffective gasketing allows infiltration of warm air into the walk-in box, which increases the run-time of the compressors.

- Reevaluate and optimize the building occupancy schedule for the cooling system controls - modify the existing building occupancy schedule for the cooling system controls to eliminate cooling of unoccupied areas.

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

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.
  Create an energy educational program - that teaches how to minimize energy use. The U.S.

- Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: http://www1.eere.energy.gov/education/.

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for the Freehold RHSD. Based on the requirements of the LGEA program, the Freehold RHSD 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 Colts Neck High School should spend a minimum of $4,566 (or 25% of $18,262) worth of ECMs, net of other NJCEP incentives, to fulfill the obligations.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	Exhaust Fan “D10”	Penn #LC12A	Electric	Roof	Mech Equip Room	1997	30%
Ventilation	Exhaust Fan	Dayton #4YC86G S/N#05F13910	Electric	Roof	Mech Equip Room	1997	30%
Ventilation	Exhaust Fan	Cook #225ACRU S/N#2145890730 460V-3Ph, 1.5HP	Electric	Roof	Mech Equip Room	2006	70%
Ventilation	Exhaust Fan	Dayton #4YC86G S/N#05E28826	Electric	Roof	Mech Equip Room	1997	30%
Cooling	RTU “D3”	McQuay #RDS800CYY S/N#37H01044 460V-3Ph	Electric	Roof above Faculty/Kitchen	D wing	1997	15%
Ventilation	(2) Exhaust Fans “D9&8”	Penn #LC12A	Electric	Roof above Faculty/Kitchen	D wing	1997	30%
Refrigeration	Condensing Unit	ColdZone #ORE-S30L2-2T S/N#G9714689-061 208-3Ph, 30A, R-22	Electric	Roof above Faculty/Kitchen	D wing	1997	15%
Refrigeration	Condensing Unit	ColdZone #ORE-S15H2-2T S/N#G9714689-011 208V-3PH, 30A, R-22	Electric	Roof above Faculty/Kitchen	D wing	1997	15%
Cooling	RTU “E1”	McQuay #RAH047CLY S/N#37H01046 460V-3Ph, 33MCA	Electric	Roof above Kitchen	D wing	1997	15%
Ventilation	Exhaust Fan “E2”	Penn #LC14A	Electric	Roof above D Corridor	D wing	1997	30%
Ventilation	Exhaust Fan “D7”	Penn #FX30 BFT	Electric	Roof above Kitchen	D wing	1997	30%
Cooling	RTU “D1”	McQuay #RDS800CYY S/N#37H01042 460V-3Ph, 33MCA	Electric	Roof above Cafeteria	D wing	1997	15%
Ventilation	Exhaust Fan “D5”	Penn #FX14B	Electric	Roof above Cafeteria	D wing	1997	30%
Ventilation	Energy Recovery Ventilator	Venmar #ERV1500 S/N#6D8120010901616 460V-3Ph, 3/4HP	Electric	Roof above Cafeteria	RTU D6	2001	50%
Cooling	RTU “D6”	McQuay #RDS708BY S/N#FB0U011100034 460V-3Ph, 6 MCA	Electric	Roof above Faculty	Faculty/Dining Lounge	2001	40%
Cooling	RTU “D4”	McQuay #RDS708BY S/N#37H01045 460V-3Ph, 15 MCA	Electric	Roof above Cafeteria	D wing	1997	15%
Cooling	RTU “D2”	McQuay #RDS800CYY S/N#37H01043 460V-3Ph, 15 MCA	Electric	Roof above Cafeteria	D wing	1997	15%

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Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	Exhaust Fan “D4”	Penn #LC12A	Electric	Roof above Cafeteria	D wing	1997	30%
Ventilation	Energy Recovery Ventilator	Venmar #ERV3000 S/N#6J8120010901622 460V-3Ph, 3 HP	Electric	Roof above Cafeteria	RTU D5	2001	50%
Cooling	RTU “D5”	McQuay #RDS708BY S/N#FB0U011100033 460V-3Ph, 14 MCA	Electric	Roof above Cafeteria	Cafeteria	2001	40%
Ventilation	Exhaust Fan “E1”	Penn #LC16A	Electric	Roof above Student Store	Student Store	1997	30%
Cooling	RTU “E4”	McQuay #RDS708BY S/N#FB0U011100071 460V-3Ph, 4 MCA	Electric	Roof above Art Classrooms	Art Classrooms	2001	40%
Ventilation	(4) Exhaust Fans	No Markings	Electric	Roof above Art Classrooms	Art Classrooms	1997	30%
Cooling	RTU “E2”	McQuay #RDS708BY S/N#37H01047 460V-3Ph, 15 MCA	Electric	Roof above Art Classrooms	Art Classrooms	1997	15%
Cooling	RTU “E3”	McQuay #RDS708BY S/N#37H01048 460V-3Ph, 15 MCA	Electric	Roof above Art Classrooms	Art Classrooms	1997	15%
Ventilation	Exhaust Fan	Penn #LC12A	Electric	Roof above Music	Music Rooms	1997	30%
Ventilation	Exhaust Fan “A5”	Penn #LC14A	Electric	Roof above A wing	A wing rooms	1997	30%
Cooling	RTU “A2”	McQuay #RDS800CYY S/N#37H01040 460V-3Ph, 17 MCA	Electric	Roof above A wing	A wing rooms	1997	15%
Cooling	RTU “A1”	McQuay #RAH047CLY S/N#37H01039 460V-3Ph, 33 MCA	Electric	Roof above A wing	A wing rooms	1997	15%
Ventilation	Exhaust Fan “A4”	Penn #LC14A	Electric	Roof above A wing	A wing rooms	1997	30%
Ventilation	Exhaust Fan “A14”	Penn #LC20A	Electric	Roof above A wing	A wing rooms	1997	30%
Ventilation	(3) Supply Fans “A4”, “A3” & “A1”	Penn #MU3010	Electric	Roof above A wing	A wing rooms	1997	30%
Ventilation	(3) Upblast Fans “A12”, “A13” & “A9”	Penn #FMX12T	Electric	Roof above A wing	A wing rooms	1997	30%
Ventilation	Exhaust Fan	Dayton #4YC676 S/N#11258147 0803	Electric	Roof above A wing	A wing rooms	1997	30%
Ventilation	(7) Exhaust Fans “A1, 2, 3, 6, 7, 10, 11”	Penn	Electric	Roof above A wing	A wing rooms	1997	30%

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Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Ventilation	(2) Exhaust Fans	Carnes #VUDK10J3A1UA14 S/N#313741.008	Electric	Roof above A wing expansion	"2nd Fl Fumehood"	2001	55%
Ventilation	(2) Exhaust Fans "RV-1" & "RV-2"	Greenheck #GRSR-12 S/N#02C22692/91	Electric	Roof above A wing expansion	A wing expansion classrooms	2001	55%
Ventilation	(8) Exhaust Fans	Carnes # varies	Electric	Roof above A wing expansion	A wing expansion classrooms	2001	55%
Cooling	RTU	McQuay #RDS708BY S#37H0068903 460V-3PH, 15A	Electric	Roof above B Classrooms	B rooms and surrounding area	1997	15%
Cooling	RTU	McQuay #RDS708BY S#37H0068803 460V-3PH, 15A	Electric	Roof above Nurse area	Front offices	1997	15%
Cooling	RTU 'B3'	McQuay #RDS800CYY S#37H0104100 460V-3PH, 17A	Electric	Roof above Media Center	Media Center	1997	15%
Cooling	RTU 'B1'	McQuay #RDS708BY S#37H0068703 460V-3PH, 15A	Electric	Roof above Media Center	Main Entrance, A Wing Classrooms	1997	15%
Ventilation	Exhaust Fan 'EF B5'	Penn # LC12A	Electric	Roof above IT room	IT room	1997	30%
Ventilation	Exhaust Fan 'EF B3'	Penn # LC12A	Electric	Roof above office/corridor	Office area	1997	30%
Ventilation	Exhaust Fan 'EF B2'	Penn # LC14A	Electric	Roof above office/corridor	Office area	1997	30%
Ventilation	Exhaust Fan 'EF B4'	Penn # LC12A	Electric	Roof above B101	B101 restrooms	1997	30%
Ventilation	(8) Exhaust Fans (EF C1 thru C8)	Penn #LC40A 3 phase	Electric	Gymnasium Roof	Gymnasium	1997	30%
Cooling	RTU 'C9'	McQuay #RDS802CYY S#FBOUO1110002500 460-3PH, 14 MCA Std Eff. Supply fan 7.5HP	Electric	Roof next to Auxiliary Gym	Auxiliary Gym	2001	55%
Ventilation	Exhaust Fan 'C2'	Carnes M#VEBK10K2A1UA20SPC1 115V, 1/6HP	Electric	Roof next to Auxiliary Gym	Restrooms	2001	55%
Ventilation	Exhaust Fan 'C1'	Carnes M#VEBK10K2A1UA20SPC1 115V, 1/4HP	Electric	Roof next to Auxiliary Gym	C100 thru C102	2001	55%
Ventilation	Exhaust Fan 'B6'	Carnes M#VEBK21W1G1UA20SPC1 480V-3PH, 3HP	Electric	A wing Roof	A wing addition, first floor	2001	55%
Ventilation	(8) Roof Vents	Carnes #GSAA series	Electric	A wing roof	A wing addition	2001	55%

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Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	RTU ‘B5’	McQuay #RDS708BY S#FBOUO1110003203	Electric	A wing roof	A wing addition	2001	55%
Ventilation	Exhaust Fan ‘B2’	Carnes #VEBK12L1AUA20SPC1 S#313741003 115v, 1/4HP	Electric	A wing roof	A Wing addition	2001	55%
Cooling	RTU ‘A5’	McQuay #RDS708BY S#FBOUO1110003103	Electric	A Wing roof	A wing addition	2001	55%
Ventilation	Exhaust Fan	Carnes #VBK12L1A1UA20SPC1 S#313741.002 115V, 1/4HP	Electric	A wing roof	A wing addition	2001	55%
Cooling	RTU ‘A4’	McQuay #RDS708BY S#FBOUO1110007203	Electric	A Wing roof	A wing addition	2001	55%
Cooling	RTU ‘A3’	McQuay #RDS800CYY S#FBOUO1110002400	Electric	A Wing roof	A wing addition	2001	55%
Ventilation	Exhaust Fan ‘A1’	Carnes #VEBK21T1G1UA20SPC1 S#313741.001 480v-3PH, 1.5HP	Electric	A wing roof	A wing addition restrooms	2001	55%
Ventilation	(2) Exhaust Fans	Carnes #VUDK10J3A1UA14SPC1 115V, 1/8HP	Electric	A wing roof	A wing fume hoods	2001	55%
Heating	(3) Boilers 80% Eff.	Smith Cast Iron #M450A, 17 sections, 3849 MBH water 5474 gas MBH	Gas	Mechanical Room	Original Building	1998	60%
Heating	Boiler 90% Eff.	Aerco Benchmark 2.0 S/N# G010762	Gas	Mechanical Room	Additions	2002	70%
Heating	Boiler burner	Powerflame burner #HAC4C-G02 S/N#059779406 480V-3Ph, 5 HP	Gas	Mechanical Room	Original Building Boilers	1998	40%
Domestic Hot Water	(2) Water Heaters 90% Eff.	A.O.Smith Legend 2000 #LW1000 920 1000 MBH S/N#C97 37119 S/N#L96 34717	Gas	Mechanical Room	Entire School	1998	15%
Heating	(2) Boiler Pumps 90% Eff.	Bell & Gossett T661 #D40E20, 40HP, 1760RPM	Electric	Mechanical Room	2001 Additions	1998	40%
Heating	(2) Boiler Pumps 93% Eff.	US Electric #R352B 20HP, 1775RPM “premium efficiency”	Electric	Mechanical Room	Original Building	1998	40%
Cooling	Chiller 9.5 EER	McQuay #ALS270CS27-ER11 S/N#STNU011100066 460V-3Ph, 526 MCA	Electric	Grass area outside mechanical room	2001 Additions	2001	55%

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Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Cooling	Chiller	McQuay #PEH087-ABBB S#57F81016-00	Electric	Mechanical Room	Original Building	1998	40%
Cooling	(2) Chiller Pumps 93% Eff.	US Electric #J364A 25 HP "premium efficiency"	Electric	Mechanical Room	Original Building	1998	40%
Cooling	(2) Chiller Pumps 90% Eff.	Bell & Gossett 1510BF 40HP, 562 GPM	Electric	Mechanical Room	Additions	1998	40%
Power	Generator	M#100GS60 S#382723 100KW, 125 KVA	Diesel	Mechanical Room	Boilers, Em Ltg, Walk In Coolers	1998	40%
Heating / Cooling	(38) Floor Mounted Unit Ventilators	McQuay "AAF" Series	Electric	A Wing	A wing classrooms	1998 & 2001	40% to 55%
Heating / Cooling	Above Ceiling Fan Coil Unit	McQuay (no visible nameplate)	Electric	A Wing	A125	1998	40%
Heating / Cooling	(3) Floor Mounted Unit Ventilators	McQuay "AAF" Series	Electric	C Wing	C wing classrooms	2001	55%
Heating / Cooling	Above Ceiling Fan Coil Unit	McQuay (no visible nameplate)	Electric	Mechanical / Janitor Room	Mechanical / Janitor Room	1998	40%
Heating	HW Unit Heaters	McQuay unit heaters	Electric	Various	Mech Wing, Cafeteria, Gym storage	1998	40%
Heating / Cooling	(2) 45 Ton Air Handling Units	McQuay #LSL137DH S#97B0075000 S#97B0075100	Electric	Gym Mezzanine	Gym	1998	40%
Heating / Cooling	(2) 10 Ton Air Handling Units	McQuay #LSL108CH S#37D00932-06 S#37D00934-06	Electric	Gym Mezzanine	Gym	1998	40%
Heating / Cooling	(2) Air Handling Units	McQuay #LSL106CH S#37D00931-06 Second unit not readable	Electric	Gym Mezzanine	Gym	1998	40%
Heating / Cooling	Air Handling Unit	Large Air handler (no accessible nameplate)	Electric	Auditorium stage ceiling	Auditorium	1998	40%
Heating / Cooling	Above Ceiling Fan Coil Unit	McQuay (no visible nameplate)	Electric	Media Room	Media Room	1998	40%
Heating / Cooling	Ceiling or wall Unit Ventilators	McQuay (no visible nameplate)	Electric	Various	Entrance vestibules, stairwells	1998	40%

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Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Motor	Elevator motor	Schindler 300A, 20HP, 480V	Electric	Elevator Machine Room	Elevator	1998	40%
Refrigeration	Commercial Refrigerator	Traulsen #AHT232WREHHS S#T725420F97 115V-1 Ph, 10.4A	Electric	Kitchen	Kitchen	1998	40%
Refrigeration	(2) Commercial Refrigerators	Traulsen #AHT132WREHHS S#T725410F97 S#T725440F97 115V-1 Ph, 10.4A	Electric	Kitchen	Kitchen	1998	40%
Cooking	(4) Fryers	Wells #F856, 480V, 14A	Electric	Kitchen	Kitchen	1998	30%
Cooking	(2) Griddle	Wells #G136, 208V-3 Ph, 28A	Electric	Kitchen	Kitchen	1998	30%
Cooking	Range & Fryer	Garland #M35, 110 MBH	Natural Gas	Kitchen	Kitchen	1998	30%
Cooking	Steam Generator: Cleveland Steam	Nameplate not accessible	Natural Gas	Kitchen	Kitchen	1998	30%
Cooking	Ovens	Garland 'Master' double oven Nameplate note accessible	Natural Gas	Kitchen	Kitchen	1998	30%
Warming	Heating Cabinet	Traulsen No nameplate	Electric	Kitchen	Kitchen	1998	30%
Warming	Heating wells	Wells No Nameplate	Electric	Kitchen	Kitchen	1998	30%
Misc.	Dishwasher	Hobart #CRS66A S#85-1004678 208-3Ph, 59A	Electric	Kitchen	Kitchen	1998	30%
Refrigeration	Walk-in Cooler / Freezer	Tafco 16'x16' (split in 2 sections) No nameplate data	Electric	Kitchen	Kitchen	1998	40%
Misc	Ice Machine	Hoshizaki #KM-630MAE	Electric	Kitchen	Kitchen	1998	40%
Refrigeration	Fridge/ Freezer	Nortland imperial #U305P-1436 S#98C862198	Electric	Kitchen	Kitchen	1998	40%
Refrigeration	Commercial Refrigerator	Traulsen #ADH132WREHHS S#T25450F97	Electric	Faculty Kitchen	Faculty	1998	40%

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Building System	**Description**	**Model #**	**Fuel**	**Location**	**Space Served**	**Date Installed**	**Estimated Remaining Useful Life %**
Refrigeration	Commercial Refrigerator	Coca Cola True#GDM-26 S#4901254	Electric	Faculty Kitchen	Faculty	1998	40%
Ventilation	(14) Fume Hoods	EnviroAire or Fisher Hamilton	Electric	Various Lab Rooms	Labs	1998 & 2001	40%
Kiln	Kiln	Bailey 24-24-38 Type A-1 240V, 72A	Electric	E101	E101	1998	30%
Lighting	See details - Appendix B	-	Electric	See details - Appendix B	Library	1998 and 2001	varies

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	Vestibule - Exit 71	Recessed	E	4'T8	1	3	32	Sw	24	365	5	101	885	N/A	Recessed	4'T8	E	Sw	1	3	32	24	365	5	101	885	0	0	0
2	1	Mechanical Room	Parabolic Ceiling Suspended	E	4'T8	14	3	32	Sw	9	365	5	1,414	4,645	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	14	3	32	9	365	5	1414	4645	0	0	0
3	1	Mechanical Room	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
4	1	Sewage Treatment	Parabolic Ceiling Suspended	E	4'T8	18	2	32	Sw	4	365	5	1,242	1,913	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	18	2	32	4	365	5	1242	1913	0	0	0
5	1	Electrical Room	Parabolic Ceiling Suspended	E	4'T8	4	2	32	Sw	4	365	5	276	403	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	2	32	4	365	5	276	403	0	0	0
6	1	Sewage Treatment	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
7	1	Storage Room	Parabolic Ceiling Suspended	E	4'T8	1	2	32	Sw	4	365	5	69	101	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	1	2	32	4	365	5	69	101	0	0	0
8	1	Electrical Room	Parabolic Ceiling Suspended	E	4'T8	1	2	32	Sw	4	365	5	69	101	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	1	2	32	4	365	5	69	101	0	0	0
9	1	Hallway	Recessed	E	4'T8	17	3	32	Sw	16	365	5	1,717	10,027	N/A	Recessed	4'T8	E	Sw	17	3	32	16	365	5	1717	10027	0	0	0
10	1	Recieving Area	Recessed	E	4'T8	2	2	32	Sw	9	365	5	138	453	N/A	Recessed	4'T8	E	Sw	2	2	32	9	365	5	138	453	0	0	0
11	1	Recieving Area	Parabolic Ceiling Suspended	E	4'T8	6	2	32	Sw	9	365	5	414	1,360	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	6	2	32	9	365	5	414	1360	0	0	0
12	1	Recieving Area	High Bay	S	LED	2	1	5	N	24	365	1	11	96	N/A	High Bay	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
13	1	Office - Custodian	Recessed	E	4'T8	4	3	32	Sw	16	365	5	404	2,359	C	Recessed	4'T8	E	OS	4	3	32	12	365	5	404	1770	0	590	590
14	1	Classroom (D103)	Wall Mounted	E	4'T8	2	6	32	Sw	8	190	5	394	599	N/A	Recessed	4'T8	E	Sw	2	6	32	8	190	5	394	599	0	0	0
15	1	Classroom (D103)	Wall Mounted	E	4'T8	2	20	32	Sw	8	190	5	1,290	1,961	N/A	Recessed	4'T8	E	Sw	2	20	32	8	190	5	1290	1961	0	0	0
16	1	Classroom (D103)	Parabolic Ceiling Suspended	E	4'T8	3	30	32	Sw	8	190	5	2,895	4,400	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	30	32	8	190	5	2895	4400	0	0	0
17	1	Classroom (D103)	Exit Sign	S	LED	1	1	5	N	8	365	1	6	16	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	8	365	1	6	16	0	0	0
18	1	Storage Room (D103)	Recessed	E	4'T8	2	3	32	Sw	2	190	5	202	77	N/A	Recessed	4'T8	E	Sw	2	3	32	2	190	5	202	77	0	0	0
19	1	lassroom - Applied Tech Departme	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
20	1	Classroom (D102)	Wall Mounted	E	4'T8	1	12	32	Sw	8	190	5	389	591	N/A	Recessed	4'T8	E	Sw	1	12	32	8	190	5	389	591	0	0	0
21	1	Classroom (D102)	Wall Mounted	E	4'T8	1	20	32	Sw	9	190	5	645	1,103	N/A	Recessed	4'T8	E	Sw	1	20	32	9	190	5	645	1103	0	0	0
22	1	Classroom (D102)	Parabolic Ceiling Suspended	E	4'T8	3	27	32	Sw	8	190	5	2,607	3,963	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	27	32	8	190	5	2607	3963	0	0	0
23	1	Classroom (D102)	Exit Sign	S	LED	1	1	5	N	8	365	1	6	16	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	8	365	1	6	16	0	0	0
24	1	Storage Room (D102)	Recessed	E	4'T8	1	2	32	Sw	2	190	5	69	26	N/A	Recessed	4'T8	E	Sw	1	2	32	2	190	5	69	26	0	0	0
25	1	Meeting Room - Faculty Lounge	Parabolic Ceiling Suspended	E	4'T8	5	30	32	Sw	9	190	5	4,825	8,251	C	Parabolic Ceiling Suspendec	4'T8	E	OS	5	30	32	7	190	5	4825	6188	0	2063	2063
26	1	Meeting Room - Faculty Lounge	Parabolic Ceiling Suspended	E	4'T8	2	21	32	Sw	9	190	5	1,354	2,315	C	Parabolic Ceiling Suspendec	4'T8	E	OS	2	21	32	7	190	5	1354	1737	0	579	579
27	1	Meeting Room - Faculty Lounge	Parabolic Ceiling Suspended	E	4'T8	5	30	32	Sw	9	190	5	4,825	8,251	C	Parabolic Ceiling Suspendec	4'T8	E	OS	5	30	32	7	190	5	4825	6188	0	2063	2063
28	1	Meeting Room - Faculty Lounge	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
29	1	Office - Faculty Lounge	Recessed	E	4'T8	4	4	32	Sw	9	190	5	532	910	C	Recessed	4'T8	E	OS	4	4	32	7	190	5	532	682	0	227	227
30	1	Office - Faculty Lounge	Exit Sign	S	LED	1	1	5	Sw	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	Sw	1	1	5	24	365	1	6	48	0	0	0
31	1	Copy Room - Faculty Lounge	Recessed	E	4'T8	8	3	32	Sw	9	190	5	808	1,382	C	Recessed	4'T8	E	OS	8	3	32	7	190	5	808	1036	0	345	345
32	1	Office	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
33	1	Bathroom Men	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
34	1	Bathroom Women	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
35	1	Kitchen Closet	Recessed	E	4'T8	1	2	32	Sw	4	190	5	69	52	N/A	Recessed	4'T8	E	Sw	1	2	32	4	190	5	69	52	0	0	0
36	1	Locker Room Women	Recessed	E	4'T8	2	2	32	Sw	9	190	5	138	210	N/A	Recessed	4'T8	E	Sw	2	2	32	9	190	5	138	210	0	0	0
37	1	Bathroom Women	Recessed	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
38	1	Kitchen	Recessed	E	4'T8	5	4	32	Sw	9	190	5	665	1,137	N/A	Recessed	4'T8	E	Sw	5	4	32	9	190	5	665	1137	0	0	0
39	1	Kitchen	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
40	1	Refuse room	Recessed	E	4'T8	3	2	32	Sw	24	365	5	207	1,813	C	Recessed	4'T8	E	OS	3	2	32	18	365	5	207	1360	0	453	453
41	1	Kitchen - Storage Room	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
42	1	Kitchen - Storage Room	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
43	1	Walk-in Refrigerator #1	Ceiling Mounted	S	Inc	2	1	60	Sw	4	190	0	120	91	CFL	Ceiling Mounted	CFL	S	Sw	2	1	20	4	190	0	40	30	61	0	61
44	1	Walk-in Refrigerator #2	Ceiling Mounted	S	Inc	2	1	60	Sw	4	190	0	120	91	CFL	Ceiling Mounted	CFL	S	Sw	2	1	20	4	190	0	40	30	61	0	61
45	1	Kitchen	Recessed	E	4'T8	8	4	32	Sw	9	190	5	1,197	2,047	N/A	Recessed	4'T8	E	Sw	8	4	32	9	190	5	1197	2047	0	0	0
46	1	Kitchen - Equipment Hood	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
47	1	Kitchen	Recessed	E	4'T8	15	4	32	Sw	9	190	5	1,995	3,411	N/A	Recessed	4'T8	E	Sw	15	4	32	9	190	5	1995	3411	0	0	0
48	1	Kitchen	Recessed	E	4'T8	1	4	32	Sw	9	190	5	133	227	N/A	Recessed	4'T8	E	Sw	1	4	32	9	190	5	133	227	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)
49	1	Kitchen	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
50	1	Kitchen	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
51	1	Kitchen - Equipment Hood	Recessed	S	Inc	2	1	60	Sw	9	190	0	120	205	CFL	Recessed	CFL	S	Sw	2	1	20	9	190	0	40	68	137	0	137
52	1	Kitchen - Office	Recessed	E	4'T8	3	4	32	Sw	9	190	5	399	682	N/A	Recessed	4'T8	E	Sw	3	4	32	9	190	5	399	682	0	0	0
53	1	Classroom (D101)	Wall Mounted	E	4'T8	2	24	32	Sw	9	190	5	1,546	2,350	N/A	Recessed	4'T8	E	Sw	2	24	32	9	190	5	1546	2350	0	0	0
54	1	Classroom (D101)	Wall Mounted	E	4'T8	2	6	32	Sw	9	190	5	394	599	N/A	Recessed	4'T8	E	Sw	2	6	32	9	190	5	394	599	0	0	0
55	1	Classroom (D101)	Parabolic Ceiling Suspended	E	4'T8	2	24	32	Sw	9	190	5	1,546	2,350	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	24	32	9	190	5	1546	2350	0	0	0
56	1	Classroom (D101)	Parabolic Ceiling Suspended	E	4'T8	1	18	32	Sw	9	190	5	581	883	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	18	32	9	190	5	581	883	0	0	0
57	1	Classroom (D101)	Exit Sign	S	LED	1	1	5	N	9	365	1	6	16	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	9	365	1	6	16	0	0	0
58	1	Storage Room (D101)	Recessed	E	4'T8	2	4	32	Sw	2	190	5	266	101	N/A	Recessed	4'T8	E	Sw	2	4	32	2	190	5	266	101	0	0	0
59	1	Life Science Department (D101)	Recessed	E	4'T8	2	4	32	Sw	9	190	5	266	404	N/A	Recessed	4'T8	E	Sw	2	4	32	9	190	5	266	404	0	0	0
60	1	Classroom (D100)	Parabolic Ceiling Suspended	E	4'T8	2	18	32	Sw	9	190	5	1,162	1,766	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	18	32	9	190	5	1162	1766	0	0	0
61	1	Classroom (D100)	Wall Mounted	E	4'T8	2	18	32	Sw	9	190	5	1,162	1,766	N/A	Recessed	4'T8	E	Sw	2	18	32	9	190	5	1162	1766	0	0	0
62	1	Classroom (D100)	Wall Mounted	E	4'T8	2	14	32	Sw	9	190	5	906	1,377	N/A	Recessed	4'T8	E	Sw	2	14	32	9	190	5	906	1377	0	0	0
63	1	Classroom (D100)	Wall Mounted	E	4'T8	1	20	32	Sw	9	190	5	645	980	N/A	Recessed	4'T8	E	Sw	1	20	32	9	190	5	645	980	0	0	0
64	1	Classroom (D100)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
65	1	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	9	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	9	190	5	404	614	0	0	0
66	1	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	9	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	9	190	5	404	614	0	0	0
67	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
68	1	Hallway	Recessed	E	4'T8	8	3	32	Sw	16	365	5	808	4,719	N/A	Recessed	4'T8	E	Sw	8	3	32	16	365	5	808	4719	0	0	0
69	1	Vestibule - Exit 12	Recessed	E	4'T8	1	3	32	Sw	24	365	5	101	885	N/A	Recessed	4'T8	E	Sw	1	3	32	24	365	5	101	885	0	0	0
70	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
71	1	Cafeteria	Parabolic Ceiling Suspended	E	4'T8	7	15	32	Sw	12	190	5	3,395	7,741	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	15	32	12	190	5	3395	7741	0	0	0
72	1	Cafeteria	Wall Mounted	E	4'T8	8	20	32	Sw	12	190	5	5,160	11,765	N/A	Recessed	4'T8	E	Sw	8	20	32	12	190	5	5160	11765	0	0	0
73	1	Cafeteria	Exit Sign	S	LED	5	1	5	N	24	365	1	28	241	N/A	Equipment / Fume Hood	LED	S	N	5	1	5	24	365	1	28	241	0	0	0
74	1	Cafeteria	Wall Mounted	E	4'T8	2	12	32	Sw	12	190	5	778	1,774	N/A	Recessed	4'T8	E	Sw	2	12	32	12	190	5	778	1774	0	0	0
75	1	Cafeteria	Wall Mounted	E	4'T8	2	8	32	Sw	12	190	5	522	1,190	N/A	Recessed	4'T8	E	Sw	2	8	32	12	190	5	522	1190	0	0	0
76	1	Cafeteria	Wall Mounted	E	4'T8	2	12	32	Sw	12	190	5	778	1,774	N/A	Recessed	4'T8	E	Sw	2	12	32	12	190	5	778	1774	0	0	0
77	1	Cafeteria	Recessed	S	4'T8	21	4	32	Sw	12	190	5	2,793	6,369	N/A	Recessed	4'T8	S	Sw	21	4	32	12	190	5	2793	6369	0	0	0
78	1	Cafeteria	Parabolic Ceiling Suspended	E	4'T8	7	18	32	Sw	12	190	5	4,067	9,273	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	18	32	12	190	5	4067	9273	0	0	0
79	1	Hallway	Recessed	E	4'T8	11	4	32	Sw	16	365	5	1,463	8,544	N/A	Recessed	4'T8	E	Sw	11	4	32	16	365	5	1463	8544	0	0	0
80	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
81	1	Fitness Center	Recessed Parabolic	E	4'T8	24	4	32	Sw	8	190	5	3,192	4,852	C	Recessed Parabolic	4'T8	E	OS	24	4	32	6	190	5	3192	3639	0	1213	1213
82	1	Fitness Center	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
83	1	Fitness Center - Storage	Recessed	E	4'T8	1	2	32	Sw	2	190	5	69	26	N/A	Recessed	4'T8	E	Sw	1	2	32	2	190	5	69	26	0	0	0
84	1	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
85	1	Hallway	Recessed	E	4'T8	11	3	32	Sw	16	365	5	1,111	6,489	N/A	Recessed	4'T8	E	Sw	11	3	32	16	365	5	1111	6489	0	0	0
86	1	Office - Women Phys. Ed.	Recessed	E	4'T8	4	4	32	Sw	8	190	5	532	809	C	Recessed	4'T8	E	OS	4	4	32	6	190	5	532	606	0	202	202
87	1	Bathroom Women	Recessed	E	4'T8	2	2	32	Sw	8	261	5	138	288	N/A	Recessed	4'T8	E	Sw	2	2	32	8	261	5	138	288	0	0	0
88	1	Showers Women	Recessed	S	Inc	1	1	60	N	8	365	0	60	175	CFL	Recessed	CFL	S	N	1	1	20	8	365	0	20	58	117	0	117
89	1	Storage Room	Recessed	E	4'T8	1	2	32	Sw	2	365	5	69	50	N/A	Recessed	4'T8	E	Sw	1	2	32	2	365	5	69	50	0	0	0
90	1	Locker Room Women	Parabolic Ceiling Suspended	E	4'T8	16	2	32	Sw	8	190	5	1,104	1,678	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	16	2	32	8	190	5	1104	1678	0	0	0
91	1	Locker Room Women	Recessed	E	4'T8	3	3	32	Sw	8	190	5	303	461	N/A	Recessed	4'T8	E	Sw	3	3	32	8	190	5	303	461	0	0	0
92	1	Locker Room Women - Bathroom	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
93	1	Locker Room Women - Showers	Recessed	E	4'T8	3	2	32	Sw	8	190	5	207	315	N/A	Recessed	4'T8	E	Sw	3	2	32	8	190	5	207	315	0	0	0
94	1	Locker Room Women - Showers	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
95	1	Locker Room Women - Vestibule	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
96	1	Office - Mens Phys. Ed.	Recessed	E	4'T8	4	4	32	Sw	8	190	5	532	809	C	Recessed	4'T8	E	OS	4	4	32	6	190	5	532	606	0	202	202

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)
97	1	Bathroom Men	Recessed	E	4'T8	2	2	32	Sw	8	365	5	138	403	N/A	Recessed	4'T8	E	Sw	2	2	32	8	365	5	138	403	0	0	0
98	1	Showers Men	Recessed	S	Inc	1	1	60	N	8	190	0	60	91	CFL	Recessed	CFL	S	N	1	1	20	8	190	0	20	30	61	0	61
99	1	Storage Room	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
100	1	Locker Room Men	Parabolic Ceiling Suspended	E	4'T8	16	2	32	Sw	8	190	5	1,104	1,678	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	16	2	32	8	190	5	1104	1678	0	0	0
101	1	Locker Room Men	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
102	1	Locker Room Men - Bathroom	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	307	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	307	0	0	0
103	1	Locker Room Men - Showers	Recessed	E	4'T8	3	2	32	Sw	8	190	5	207	315	N/A	Recessed	4'T8	E	Sw	3	2	32	8	190	5	207	315	0	0	0
104	1	Locker Room Men - Showers	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
105	1	Locker Room Men - Vestibule	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
106	1	Hallway	Recessed	E	4'T8	4	3	32	Sw	16	365	5	404	2,359	N/A	Recessed	4'T8	E	Sw	4	3	32	16	365	5	404	2359	0	0	0
107	1	Office	Recessed	E	4'T8	3	4	32	Sw	9	190	5	399	682	N/A	Recessed	4'T8	E	Sw	3	4	32	9	190	5	399	682	0	0	0
108	1	Bathroom	Recessed	E	4'T8	1	4	32	Sw	8	190	5	133	202	N/A	Recessed	4'T8	E	Sw	1	4	32	8	190	5	133	202	0	0	0
109	1	ROTC	Parabolic Ceiling Suspended	E	4'T8	10	2	32	Sw	8	190	5	690	1,049	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	10	2	32	8	190	5	690	1049	0	0	0
110	1	Gymnasium	High Bay	S	PSMH	16	2	400	N	12	190	80	14,080	32,102	N/A	High Bay	PSMH	S	N	16	2	400	12	190	80	14080	32102	0	0	0
111	1	Gymnasium	Exit Sign	S	LED	7	1	5	N	24	365	1	39	337	N/A	Equipment / Fume Hood	LED	S	N	7	1	5	24	365	1	39	337	0	0	0
112	1	Gymnasium	High Bay	S	PSMH	21	2	250	N	12	190	50	11,550	26,334	N/A	High Bay	PSMH	S	N	21	2	250	12	190	50	11550	26334	0	0	0
113	1	Classroom (B100B)	Parabolic Ceiling Suspended	E	4'T8	2	21	32	Sw	8	190	5	1,354	2,058	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	21	32	8	190	5	1354	2058	0	0	0
114	1	Classroom (B100A)	Parabolic Ceiling Suspended	E	4'T8	2	21	32	Sw	8	190	5	1,354	2,058	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	21	32	8	190	5	1354	2058	0	0	0
115	1	Hallway	Recessed	E	4'T8	2	3	32	Sw	16	365	5	202	1,180	N/A	Recessed	4'T8	E	Sw	2	3	32	16	365	5	202	1180	0	0	0
116	1	Classroom (B100)	Parabolic Ceiling Suspended	E	4'T8	2	10	32	Sw	8	190	5	650	988	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	10	32	8	190	5	650	988	0	0	0
117	1	Classroom (B100)	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
118	1	Classroom (B100)	Recessed	E	8 U-Shap	2	2	32	Sw	8	190	5	138	210	N/A	Recessed	4'T8 U-Shaped	E	Sw	2	2	32	8	190	5	138	210	0	0	0
119	1	Bathroom Men (B100)	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
120	1	Bathroom Women (B100)	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
121	1	Storage Room (B100)	Recessed	E	4'T8	1	3	32	Sw	2	190	5	101	38	N/A	Recessed	4'T8	E	Sw	1	3	32	2	190	5	101	38	0	0	0
122	1	Lobby	Recessed	E	4'T8	4	4	32	Sw	16	365	5	532	3,107	N/A	Recessed	4'T8	E	Sw	4	4	32	16	365	5	532	3107	0	0	0
123	1	Lobby	Wall Mounted	E	4'T8	2	20	32	Sw	16	365	5	1,290	7,534	N/A	Recessed	4'T8	E	Sw	2	20	32	16	365	5	1290	7534	0	0	0
124	1	Lobby	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
125	1	Vestibule	Recessed	E	4'T8	2	4	32	Sw	8	365	5	266	777	N/A	Recessed	4'T8	E	Sw	2	4	32	8	365	5	266	777	0	0	0
126	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	365	5	1,010	5,888	N/A	Recessed	4'T8	E	Sw	10	3	32	16	365	5	1010	5898	0	0	0
127	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
128	1	Bathroom Men	Recessed	E	4'T8	5	3	32	Sw	8	190	5	505	768	C	Recessed	4'T8	E	OS	5	3	32	8	190	5	505	576	0	192	192
129	1	Bathroom Women	Recessed	E	4'T8	5	3	32	Sw	8	190	5	505	768	C	Recessed	4'T8	E	OS	5	3	32	8	190	5	505	576	0	192	192
130	1	Locker Room Women	Recessed	E	4'T8	2	4	32	Sw	12	190	5	266	606	N/A	Recessed	4'T8	E	Sw	2	4	32	12	190	5	266	606	0	0	0
131	1	Locker Room Women - Bathroom	Recessed	E	4'T8	3	3	32	Sw	4	190	5	303	230	N/A	Recessed	4'T8	E	Sw	3	3	32	4	190	5	303	230	0	0	0
132	1	Locker Room Women - Showers	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
133	1	Locker Room Women	Parabolic Ceiling Suspended	E	4'T8	16	2	32	Sw	12	190	5	1,104	2,517	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	16	2	32	12	190	5	1104	2517	0	0	0
134	1	Locker Room Women	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
135	1	Locker Room Men	Recessed	E	4'T8	2	4	32	Sw	12	190	5	266	606	N/A	Recessed	4'T8	E	Sw	2	4	32	12	190	5	266	606	0	0	0
136	1	Locker Room Men - Bathroom	Recessed	E	4'T8	3	3	32	Sw	4	190	5	303	230	N/A	Recessed	4'T8	E	Sw	3	3	32	4	190	5	303	230	0	0	0
137	1	Locker Room Men - Showers	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
138	1	Locker Room Men	Parabolic Ceiling Suspended	E	4'T8	16	2	32	Sw	12	190	5	1,104	2,517	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	16	2	32	12	190	5	1104	2517	0	0	0
139	1	Locker Room Men	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
140	1	Office	Recessed	E	4'T8	2	4	32	Sw	8	190	5	266	404	N/A	Recessed	4'T8	E	Sw	2	4	32	8	190	5	266	404	0	0	0
141	1	Office	Recessed	E	8 U-Shap	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	8	190	5	69	105	0	0	0
142	1	Bathroom Women	Recessed	E	4'T8	2	3	32	Sw	8	190	5	202	291	N/A	Recessed	4'T8	E	Sw	2	3	32	8	190	5	202	291	0	0	0
143	1	Bathroom Women	Recessed	S	Inc	1	1	60	Sw	8	180	0	60	86	CFL	Recessed	CFL	S	N	1	1	20	8	180	0	20	29	58	0	58
144	1	Trainer Room	Recessed	E	4'T8	9	3	32	Sw	8	190	5	909	1,382	C	Recessed	4'T8	E	N	9	3	32	8	190	5	909	1382	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)
145	1	Bathroom	Recessed	E	4'T8	1	3	32	Sw	8	180	5	101	145	C	Recessed	4'T8	E	N	1	3	32	8	180	5	101	145	0	0	0
146	1	Storage Room	Recessed	E	4'T8	1	3	32	Sw	2	261	5	101	53	C	Recessed	4'T8	E	N	1	3	32	2	261	5	101	53	0	0	0
147	1	Gymnasium	Recessed	E	4'T8	3	3	32	Sw	12	190	5	303	691	C	Recessed	4'T8	E	N	3	3	32	12	190	5	303	691	0	0	0
148	1	Gymnasium	Parabolic Ceiling Suspended	E	4'T8	6	2	32	Sw	12	190	5	414	944	C	Parabolic Ceiling Suspended	4'T8	E	N	6	2	32	12	190	5	414	944	0	0	0
149	1	Gymnasium	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
150	1	Hallway	Recessed	E	4'T8	4	3	32	Sw	16	365	5	404	2,359	N/A	Recessed	4'T8	E	Sw	4	3	32	16	365	5	404	2359	0	0	0
151	1	Storage Room	Recessed	E	4'T8	1	3	32	Sw	2	365	5	101	74	N/A	Recessed	4'T8	E	Sw	1	3	32	2	365	5	101	74	0	0	0
152	1	Hallway	Recessed	S	LED	3	1	5	N	16	365	1	17	96	N/A	Recessed	LED	S	N	3	1	5	16	365	1	17	96	0	0	0
153	1	Hallway	Recessed	E	4'T8	9	3	32	Sw	16	365	5	909	5,309	N/A	Recessed	4'T8	E	Sw	9	3	32	16	365	5	909	5309	0	0	0
154	1	Vestibule - Exit 5	Recessed	E	4'T8	1	3	32	Sw	8	365	5	101	295	N/A	Recessed	4'T8	E	Sw	1	3	32	8	365	5	101	295	0	0	0
155	1	Classroom (C100)	Parabolic Ceiling Suspended	E	4'T8	2	16	32	Sw	8	190	5	1,034	1,572	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	16	32	8	190	5	1034	1572	0	0	0
156	1	Classroom (C100)	Parabolic Ceiling Suspended	E	4'T8	1	14	32	Sw	8	190	5	453	689	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	14	32	8	190	5	453	689	0	0	0
157	1	Classroom (C101)	Parabolic Ceiling Suspended	E	4'T8	2	16	32	Sw	8	190	5	1,034	1,572	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	16	32	8	190	5	1034	1572	0	0	0
158	1	Classroom (C102)	Parabolic Ceiling Suspended	E	4'T8	2	16	32	Sw	8	190	5	1,034	1,572	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	16	32	8	190	5	1034	1572	0	0	0
159	1	Classroom (C101)	Parabolic Ceiling Suspended	E	4'T8	1	14	32	Sw	8	190	5	453	689	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	14	32	8	190	5	453	689	0	0	0
160	1	Classroom (C102)	Parabolic Ceiling Suspended	E	4'T8	1	14	32	Sw	8	190	5	453	689	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	14	32	8	190	5	453	689	0	0	0
161	1	Vestibule	Recessed	E	4'T8	1	3	32	Sw	24	365	5	101	885	N/A	Recessed	4'T8	E	Sw	1	3	32	24	365	5	101	885	0	0	0
162	1	Hallway	Recessed	E	4'T8	7	3	32	Sw	16	365	5	707	4,129	N/A	Recessed	4'T8	E	Sw	7	3	32	16	365	5	707	4129	0	0	0
163	1	Gymnasium	Exit Sign	S	LED	4	1	5	N	24	365	1	22	193	N/A	Equipment / Fume Hood	LED	S	N	4	1	5	24	365	1	22	193	0	0	0
164	1	Gymnasium	High Bay	S	PSMH	30	2	350	Sw	12	190	70	23,100	52,668	N/A	High Bay	PSMH	S	Sw	30	2	350	12	190	70	23100	52668	0	0	0
165	1	Storage Room	Parabolic Ceiling Suspended	E	4'T8	9	2	32	Sw	2	190	5	621	236	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	9	2	32	2	190	5	621	236	0	0	0
166	1	Storage Room	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
167	1	Storage Room	Recessed	E	4'T8	5	2	32	N	2	190	5	345	131	N/A	Recessed	4'T8	E	N	5	2	32	2	190	5	345	131	0	0	0
168	1	Storage Room	Recessed	E	4'T8	1	2	32	Sw	2	190	5	69	26	N/A	Recessed	4'T8	E	Sw	1	2	32	2	190	5	69	26	0	0	0
169	1	Hallway	Recessed	E	4'T8	8	3	32	Sw	16	365	5	809	4,719	N/A	Recessed	4'T8	E	Sw	8	3	32	16	365	5	809	4719	0	0	0
170	1	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	4	261	5	404	422	N/A	Recessed	4'T8	E	Sw	4	3	32	4	261	5	404	422	0	0	0
171	1	Hallway	Exit Sign	S	LED	2	1	5	N	16	365	1	11	64	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	16	365	1	11	64	0	0	0
172	1	Janitor's Closet	Recessed	E	T8 U-Shap	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
173	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
174	1	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
175	1	Vestibule - Exit 9	Recessed	E	4'T8	2	4	32	Sw	24	365	5	266	2,330	N/A	Recessed	4'T8	E	Sw	2	4	32	24	365	5	266	2330	0	0	0
176	1	Staircase	Recessed	E	4'T8	4	3	32	Sw	16	365	5	404	2,359	T8-BL	Recessed	4'T8	E	BL	4	3	32	0	365	5	404	1378	0	981	981
177	1	Staircase	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
178	1	Server Room	Recessed	E	T8 U-Shap	1	2	32	Sw	8	261	5	69	144	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	8	261	5	69	144	0	0	0
179	Str	Storage Room	Parabolic Ceiling Suspended	E	4'T8	1	2	32	Sw	2	261	5	69	36	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	2	32	2	261	5	69	36	0	0	0
180	Str	Nurse's Station	Recessed	E	4'T8	2	4	32	Sw	9	190	5	266	455	N/A	Recessed	4'T8	E	Sw	2	4	32	9	190	5	266	455	0	0	0
181	Str	Nurse's Station	Recessed	E	4'T8	6	4	32	Sw	9	190	5	798	1,365	C	Recessed	4'T8	E	OS	6	4	32	7	190	5	798	1023	0	341	341
182	Str	Nurse's Station Storage	Recessed	E	4'T8	2	4	32	Sw	2	190	5	266	101	N/A	Recessed	4'T8	E	Sw	2	4	32	2	190	5	266	101	0	0	0
183	Str	Nurse's Station Office	Wall Mounted	E	4'T8	2	4	32	Sw	9	190	5	266	455	N/A	Recessed	4'T8	E	Sw	2	4	32	9	190	5	266	455	0	0	0
184	1	Hallway	Recessed	E	T8 U-Shap	7	2	32	Sw	16	365	5	483	2,821	N/A	Recessed	4'T8 U-Shaped	E	Sw	7	2	32	16	365	5	483	2821	0	0	0
185	1	Hallway	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
186	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
187	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
188	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
189	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
190	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
191	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
192	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	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)
193	1	Bathroom Men	Recessed	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
194	1	Bathroom Women	Recessed	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
195	1	Office	Recessed	E	4'T8	1	6	32	Sw	9	190	5	197	337	N/A	Recessed	4'T8	E	Sw	1	6	32	9	190	5	197	337	0	0	0
196	1	Hallway	Recessed	E	T8 U-Shap	5	2	32	Sw	16	365	5	345	2,015	N/A	Recessed	4'T8 U-Shaped	E	Sw	5	2	32	16	365	5	345	2015	0	0	0
197	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
198	1	Bathroom Men	Recessed	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
199	1	Bathroom Women	Recessed	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
200	1	Meeting Room	Wall Mounted	E	4'T8	10	2	32	Sw	8	190	5	690	1,049	C	Recessed	4'T8	E	OS	10	2	32	6	190	5	690	787	0	262	262
201	1	Office	Recessed Parabolic	E	4'T8	3	3	32	Sw	9	190	5	303	518	N/A	Recessed Parabolic	4'T8	E	Sw	3	3	32	9	190	5	303	518	0	0	0
202	1	Hallway	Recessed	E	T8 U-Shap	2	2	32	Sw	16	365	5	138	806	N/A	Recessed	4'T8 U-Shaped	E	Sw	2	2	32	16	365	5	138	806	0	0	0
203	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
204	1	Storage Room	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
205	1	Main Office	Recessed	E	4'T8	1	3	32	Sw	9	261	5	101	237	N/A	Recessed	4'T8	E	Sw	1	3	32	9	261	5	101	237	0	0	0
206	1	Main Office	Parabolic Ceiling Suspended	E	4'T8	1	10	32	Sw	9	261	5	325	783	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	10	32	9	261	5	325	763	0	0	0
207	1	Main Office	Parabolic Ceiling Suspended	E	4'T8	3	4	32	Sw	9	261	5	399	937	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	4	32	9	261	5	399	937	0	0	0
208	1	Office	Recessed	E	4'T8	3	4	32	Sw	9	261	5	399	937	N/A	Recessed	4'T8	E	Sw	3	4	32	9	261	5	399	937	0	0	0
209	1	Office	Recessed	E	4'T8	4	4	32	Sw	9	261	5	532	1,250	C	Recessed	4'T8	E	OS	4	4	32	7	261	5	532	937	0	312	312
210	1	Career room	Wall Mounted	E	4'T8	1	8	32	Sw	8	190	5	261	397	N/A	Recessed	4'T8	E	Sw	1	8	32	8	190	5	261	397	0	0	0
211	1	Career room	Parabolic Ceiling Suspended	E	4'T8	3	4	32	Sw	8	190	5	399	606	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	4	32	8	190	5	399	606	0	0	0
212	1	Corridor	Recessed	E	T8 U-Shap	4	2	32	Sw	16	365	5	276	1,612	C	Recessed	4'T8 U-Shaped	E	OS	4	2	32	12	365	5	276	1209	0	403	403
213	1	Corridor	Exit Sign	S	LED	3	1	5	N	24	365	1	17	145	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	365	1	17	145	0	0	0
214	1	Office	Wall Mounted	E	4'T8	3	6	32	Sw	9	261	5	591	1,388	N/A	Recessed	4'T8	E	Sw	3	6	32	9	261	5	591	1388	0	0	0
215	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
216	1	Office	Parabolic Ceiling Suspended	E	4'T8	2	4	32	Sw	9	261	5	266	625	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	4	32	9	261	5	266	625	0	0	0
217	1	Office	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	9	261	5	133	312	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	9	261	5	133	312	0	0	0
218	1	Attendance Office	Parabolic Ceiling Suspended	E	4'T8	2	4	32	Sw	9	261	5	266	625	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	4	32	9	261	5	266	625	0	0	0
219	1	Attendance Office	Wall Mounted	E	4'T8	2	6	32	Sw	9	261	5	394	926	N/A	Recessed	4'T8	E	Sw	2	6	32	9	261	5	394	926	0	0	0
220	1	Main Office	Wall Mounted	E	4'T8	4	4	32	Sw	9	261	5	532	1,250	C	Recessed	4'T8	E	OS	4	4	32	7	261	5	532	937	0	312	312
221	1	Main Office	High Bay	E	HPS	2	1	150	N	9	261	30	360	846	N/A	High Bay	HPS	E	N	2	1	150	9	261	30	360	846	0	0	0
222	1	Main Office	Wall Mounted	E	4'T8	1	18	32	Sw	9	261	5	517	1,214	N/A	Recessed	4'T8	E	Sw	1	18	32	9	261	5	517	1214	0	0	0
223	1	Hallway	Recessed	E	4'T8	11	3	32	Sw	16	365	5	1,111	6,488	N/A	Recessed	4'T8	E	Sw	11	3	32	16	365	5	1111	6488	0	0	0
224	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
225	2	Mechanical Room	Parabolic Ceiling Suspended	E	4'T8	4	2	32	Sw	2	261	5	276	144	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	2	32	2	261	5	276	144	0	0	0
226	2	Mechanical Room	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
227	2	Mechanical Room	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
228	2	Mechanical Room	Parabolic Ceiling Suspended	E	4'T8	4	2	32	Sw	2	261	5	276	144	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	2	32	2	261	5	276	144	0	0	0
229	2	Storage Room	Parabolic Ceiling Suspended	E	4'T8	10	2	32	Sw	2	261	5	690	360	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	10	2	32	2	261	5	690	360	0	0	0
230	2	Storage Room	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
231	1	Vestibule	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
232	1	Vestibule	Recessed	E	4'T8	1	4	32	Sw	24	365	5	133	1,165	N/A	Recessed	4'T8	E	Sw	1	4	32	24	365	5	133	1165	0	0	0
233	1	Lobby	Wall Mounted	E	4'T8	1	12	32	Sw	16	365	5	389	2,272	N/A	Recessed	4'T8	E	Sw	1	12	32	16	365	5	389	2272	0	0	0
234	1	Lobby	Wall Mounted	E	4'T8	2	18	32	Sw	8	365	5	1,162	3,393	N/A	Recessed	4'T8	E	Sw	2	18	32	8	365	5	1162	3393	0	0	0
235	1	Lobby	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
236	1	Vestibule	Recessed	E	4'T8	2	4	32	Sw	8	365	5	266	777	N/A	Recessed	4'T8	E	Sw	2	4	32	8	365	5	266	777	0	0	0
237	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	7	8	32	Sw	8	190	5	2,051	3,118	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	8	32	8	190	5	2051	3118	0	0	0
238	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
239	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	15	32	Sw	8	190	5	485	737	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	15	32	8	190	5	485	737	0	0	0
240	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	6	32	8	190	5	197	299	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)
241	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	6	32	8	190	5	197	299	0	0	0
242	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	9	32	Sw	8	190	5	293	445	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	9	32	8	190	5	293	445	0	0	0
243	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	15	32	Sw	8	190	5	485	737	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	15	32	8	190	5	485	737	0	0	0
244	1	Media Center	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
245	1	Office	Recessed	E	4'T8	10	3	32	OS	9	261	5	1,010	2,372	N/A	Recessed	4'T8	E	OS	10	3	32	9	261	5	1010	2372	0	0	0
246	1	Storage Room	Recessed	E	4'T8	3	2	32	Sw	2	261	5	207	108	N/A	Recessed	4'T8	E	Sw	3	2	32	2	261	5	207	108	0	0	0
247	1	Storage Room	Recessed	E	4'T8	6	3	32	Sw	2	261	5	606	316	N/A	Recessed	4'T8	E	Sw	6	3	32	2	261	5	606	316	0	0	0
248	1	Storage Room	Wall Mounted	E	4'T8	1	18	32	Sw	2	261	5	581	303	N/A	Recessed	4'T8	E	Sw	1	18	32	2	261	5	581	303	0	0	0
249	1	Library	Wall Mounted	E	4'T8	3	72	32	Sw	8	190	5	6,927	10,529	N/A	Recessed	4'T8	E	Sw	3	72	32	8	190	5	6927	10529	0	0	0
250	1	Library	Wall Mounted	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Recessed	4'T8	E	Sw	1	6	32	8	190	5	197	299	0	0	0
251	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
252	1	Library	Parabolic Ceiling Suspended	E	4'T8	7	6	32	Sw	8	190	5	1,379	2,096	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	6	32	8	190	5	1379	2096	0	0	0
253	1	Library	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
254	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
255	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
256	1	Hallway	Recessed	E	4'T8	9	3	32	Sw	16	365	5	909	5,309	N/A	Recessed	4'T8	E	Sw	9	3	32	16	365	5	909	5309	0	0	0
257	1	Office (A100)	Parabolic Ceiling Suspended	E	4'T8	5	3	32	Sw	9	261	5	505	1,186	C	Parabolic Ceiling Suspended	4'T8	E	OS	5	3	32	7	261	5	505	890	0	297	297
258	1	Electrical Room	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
259	1	Server Room Unoccupied	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
260	1	Storage Room	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
261	1	Classroom (A100A)	Parabolic Ceiling Suspended	E	4'T8	3	8	32	Sw	8	190	5	783	1,190	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	8	32	8	190	5	783	1190	0	0	0
262	1	Classroom (A100B)	Parabolic Ceiling Suspended	E	4'T8	3	8	32	Sw	8	190	5	783	1,190	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	8	32	8	190	5	783	1190	0	0	0
263	1	Hallway	Recessed	E	4'T8	6	3	32	Sw	16	365	5	606	3,539	N/A	Recessed	4'T8	E	Sw	6	3	32	16	365	5	606	3539	0	0	0
264	1	Classroom (A102A)	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
265	1	Classroom (A102B)	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
266	1	Storage Room	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
267	1	Classroom	Recessed Parabolic	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Recessed Parabolic	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
268	1	Hallway	Recessed	E	4'T8	12	3	32	Sw	16	261	5	1,212	5,061	N/A	Recessed	4'T8	E	Sw	12	3	32	16	261	5	1212	5061	0	0	0
269	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
270	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	261	5	1,010	4,218	N/A	Recessed	4'T8	E	Sw	10	3	32	16	261	5	1010	4218	0	0	0
271	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
272	1	Hallway	Wall Mounted	E	4'T8	6	10	32	Sw	16	261	5	1,950	8,143	N/A	Recessed	4'T8	E	Sw	6	10	32	16	261	5	1950	8143	0	0	0
273	1	Hallway	Wall Mounted	E	4'T8	6	6	32	Sw	16	261	5	1,182	4,936	N/A	Recessed	4'T8	E	Sw	6	6	32	16	261	5	1182	4936	0	0	0
274	1	Student Store	Recessed	E	4'T8	8	4	32	Sw	8	190	5	1,064	1,617	C	Recessed	4'T8	E	OS	8	4	32	6	190	5	1064	1213	0	404	404
275	1	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
276	1	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
277	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
278	1	Hallway	Recessed	M	4'T8	11	3	32	Sw	16	261	5	1,111	4,640	N/A	Recessed	4'T8	M	Sw	11	3	32	16	261	5	1111	4640	0	0	0
279	1	Storage Room	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
280	1	Electrical Room	Recessed	E	4'T8	2	2	32	Sw	2	190	5	138	52	N/A	Recessed	4'T8	E	Sw	2	2	32	2	190	5	138	52	0	0	0
281	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
282	1	Vestibule	Recessed	E	4'T8	1	3	32	Sw	24	365	5	101	885	N/A	Recessed	4'T8	E	Sw	1	3	32	24	365	5	101	885	0	0	0
283	1	Hallway	Wall Mounted	E	4'T8	6	20	32	Sw	16	365	5	3,870	22,601	N/A	Recessed	4'T8	E	Sw	6	20	32	16	365	5	3870	22601	0	0	0
284	1	Hallway	Wall Mounted	E	4'T8	6	8	32	Sw	16	365	5	1,566	9,145	N/A	Recessed	4'T8	E	Sw	6	8	32	16	365	5	1566	9145	0	0	0
285	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	365	5	1,010	5,898	N/A	Recessed	4'T8	E	Sw	10	3	32	16	365	5	1010	5898	0	0	0
286	1	Hallway	Exit Sign	S	LED	4	1	5	N	24	365	1	22	193	N/A	Equipment / Fume Hood	LED	S	N	4	1	5	24	365	1	22	193	0	0	0
239	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	15	32	Sw	8	190	5	485	737	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	15	32	8	190	5	485	737	0	0	0
240	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	6	32	8	190	5	197	299	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)
241	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	6	32	8	190	5	197	299	0	0	0
242	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	9	32	Sw	8	190	5	293	445	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	9	32	8	190	5	293	445	0	0	0
243	1	Media Center	Parabolic Ceiling Suspended	E	4'T8	1	15	32	Sw	8	190	5	485	737	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	15	32	8	190	5	485	737	0	0	0
244	1	Media Center	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
245	1	Office	Recessed	E	4'T8	10	3	32	OS	9	261	5	1,010	2,372	N/A	Recessed	4'T8	E	OS	10	3	32	9	261	5	1010	2372	0	0	0
246	1	Storage Room	Recessed	E	4'T8	3	2	32	Sw	2	261	5	207	108	N/A	Recessed	4'T8	E	Sw	3	2	32	2	261	5	207	108	0	0	0
247	1	Storage Room	Recessed	E	4'T8	6	3	32	Sw	2	261	5	606	316	N/A	Recessed	4'T8	E	Sw	6	3	32	2	261	5	606	316	0	0	0
248	1	Storage Room	Wall Mounted	E	4'T8	1	18	32	Sw	2	261	5	581	303	N/A	Recessed	4'T8	E	Sw	1	18	32	2	261	5	581	303	0	0	0
249	1	Library	Wall Mounted	E	4'T8	3	72	32	Sw	8	190	5	6,927	10,529	N/A	Recessed	4'T8	E	Sw	3	72	32	8	190	5	6927	10529	0	0	0
250	1	Library	Wall Mounted	E	4'T8	1	6	32	Sw	8	190	5	197	299	N/A	Recessed	4'T8	E	Sw	1	6	32	8	190	5	197	299	0	0	0
251	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
252	1	Library	Parabolic Ceiling Suspended	E	4'T8	7	6	32	Sw	8	190	5	1,379	2,096	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	6	32	8	190	5	1379	2096	0	0	0
253	1	Library	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
254	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
255	1	Library	Recessed Parabolic	E	4'T8	9	2	32	Sw	8	190	5	621	944	N/A	Recessed Parabolic	4'T8	E	Sw	9	2	32	8	190	5	621	944	0	0	0
256	1	Hallway	Recessed	E	4'T8	9	3	32	Sw	16	365	5	909	5,309	N/A	Recessed	4'T8	E	Sw	9	3	32	16	365	5	909	5309	0	0	0
257	1	Office (A100)	Parabolic Ceiling Suspended	E	4'T8	5	3	32	Sw	9	261	5	505	1,186	C	Parabolic Ceiling Suspended	4'T8	E	OS	5	3	32	7	261	5	505	890	0	297	297
258	1	Electrical Room	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
259	1	Server Room Unoccupied	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
260	1	Storage Room	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
261	1	Classroom (A100A)	Parabolic Ceiling Suspended	E	4'T8	3	8	32	Sw	8	190	5	783	1,190	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	8	32	8	190	5	783	1190	0	0	0
262	1	Classroom (A100B)	Parabolic Ceiling Suspended	E	4'T8	3	8	32	Sw	8	190	5	783	1,190	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	8	32	8	190	5	783	1190	0	0	0
263	1	Hallway	Recessed	E	4'T8	6	3	32	Sw	16	365	5	606	3,539	N/A	Recessed	4'T8	E	Sw	6	3	32	16	365	5	606	3539	0	0	0
264	1	Classroom (A102A)	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
265	1	Classroom (A102B)	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
266	1	Storage Room	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
267	1	Classroom	Recessed Parabolic	E	4'T8	2	8	32	Sw	8	190	5	522	793	N/A	Recessed Parabolic	4'T8	E	Sw	2	8	32	8	190	5	522	793	0	0	0
268	1	Hallway	Recessed	E	4'T8	12	3	32	Sw	16	261	5	1,212	5,061	N/A	Recessed	4'T8	E	Sw	12	3	32	16	261	5	1212	5061	0	0	0
269	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
270	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	261	5	1,010	4,218	N/A	Recessed	4'T8	E	Sw	10	3	32	16	261	5	1010	4218	0	0	0
271	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
272	1	Hallway	Wall Mounted	E	4'T8	8	10	32	Sw	16	261	5	1,950	8,143	N/A	Recessed	4'T8	E	Sw	8	10	32	16	261	5	1950	8143	0	0	0
273	1	Hallway	Wall Mounted	E	4'T8	6	6	32	Sw	16	261	5	1,182	4,936	N/A	Recessed	4'T8	E	Sw	6	6	32	16	261	5	1182	4936	0	0	0
274	1	Student Store	Recessed	E	4'T8	8	4	32	Sw	8	190	5	1,064	1,617	C	Recessed	4'T8	E	OS	8	4	32	6	190	5	1064	1213	0	404	404
275	1	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
276	1	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
277	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
278	1	Hallway	Recessed	M	4'T8	11	3	32	Sw	16	261	5	1,111	4,640	N/A	Recessed	4'T8	M	Sw	11	3	32	16	261	5	1111	4640	0	0	0
279	1	Storage Room	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
280	1	Electrical Room	Recessed	E	4'T8	2	2	32	Sw	2	190	5	138	52	N/A	Recessed	4'T8	E	Sw	2	2	32	2	190	5	138	52	0	0	0
281	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
282	1	Vestibule	Recessed	E	4'T8	1	3	32	Sw	24	365	5	101	885	N/A	Recessed	4'T8	E	Sw	1	3	32	24	365	5	101	885	0	0	0
283	1	Hallway	Wall Mounted	E	4'T8	6	20	32	Sw	16	365	5	3,870	22,601	N/A	Recessed	4'T8	E	Sw	6	20	32	16	365	5	3870	22601	0	0	0
284	1	Hallway	Wall Mounted	E	4'T8	6	8	32	Sw	16	365	5	1,566	9,145	N/A	Recessed	4'T8	E	Sw	6	8	32	16	365	5	1566	9145	0	0	0
285	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	365	5	1,010	5,898	N/A	Recessed	4'T8	E	Sw	10	3	32	16	365	5	1010	5898	0	0	0
286	1	Hallway	Exit Sign	S	LED	4	1	5	N	24	365	1	22	193	N/A	Equipment / Fume Hood	LED	S	N	4	1	5	24	365	1	22	193	0	0	0
287	1	Auditorium	Exit Sign	S	LED	8	1	5	N	24	365	1	44	385	N/A	Equipment / Fume Hood	LED	S	N	8	1	5	24	365	1	44	385	0	0	0
288	1	Auditorium	Recessed	S	CFL	14	1	23	Sw	4	190	0	322	245	N/A	Recessed	CFL	S	Sw	14	1	23	4	190	0	322	245	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)
287	1	Auditorium	Exit Sign	S	LED	8	1	5	N	24	365	1	44	385	N/A	Equipment / Fume Hood	LED	S	N	8	1	5	24	365	1	44	385	0	0	0
288	1	Auditorium	Recessed	S	CFL	14	1	23	Sw	4	190	0	322	245	N/A	Recessed	CFL	S	Sw	14	1	23	4	190	0	322	245	0	0	0
289	1	Bathroom	Wall Mounted	E	4'T8	6	2	32	Sw	4	190	5	414	315	N/A	Recessed	4'T8	E	Sw	6	2	32	4	190	5	414	315	0	0	0
290	1	Bathroom	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
291	1	Auditorium	Recessed	S	CFL	35	1	23	Sw	4	190	0	805	612	N/A	Recessed	CFL	S	Sw	35	1	23	4	190	0	805	612	0	0	0
292	1	Above Stage Area	Parabolic Ceiling Suspended	S	4'T8	4	3	32	Sw	4	190	5	404	307	N/A	Parabolic Ceiling Suspendec	4'T8	S	Sw	4	3	32	4	190	5	404	307	0	0	0
293	1	Above Stage Area	Parabolic Ceiling Suspended	E	4'T8	12	2	32	Sw	4	190	5	829	629	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	12	2	32	4	190	5	829	629	0	0	0
294	1	Staircase	Wall Mounted	S	CFL	4	1	23	N	16	365	0	92	537	N/A	Wall Mounted	CFL	S	N	4	1	23	16	365	0	92	537	0	0	0
295	1	Control Room	Recessed	E	4'T8	3	3	32	Sw	4	190	5	303	230	N/A	Recessed	4'T8	E	Sw	3	3	32	4	190	5	303	230	0	0	0
296	1	Hallway	Recessed	M	4'T8	9	3	32	Sw	16	365	5	909	5,309	N/A	Recessed	4'T8	M	Sw	9	3	32	16	365	5	909	5309	0	0	0
297	1	Vestibule - Exit 27	Recessed	M	4'T8	2	3	32	Sw	24	365	5	202	1,770	N/A	Recessed	4'T8	M	Sw	2	3	32	24	365	5	202	1770	0	0	0
298	1	Classroom (E100)	Recessed	S	CFL	4	2	13	Sw	8	190	0	104	158	N/A	Recessed	CFL	S	Sw	4	2	13	8	190	0	104	158	0	0	0
299	1	Classroom (E100)	Parabolic Ceiling Suspended	E	4'T8	3	14	32	Sw	8	190	5	1,359	2,066	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	14	32	8	190	5	1359	2066	0	0	0
300	1	Classroom (E100)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
301	1	Classroom (E100)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
302	1	Storage Room (E100)	Recessed	E	4'T8	6	3	32	Sw	2	261	5	606	316	N/A	Recessed	4'T8	E	Sw	6	3	32	2	261	5	606	316	0	0	0
303	1	Classroom (E101)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
304	1	Kiln Room (E101)	Recessed	E	4'T8	4	3	32	Sw	2	190	5	404	154	N/A	Recessed	4'T8	E	Sw	4	3	32	2	190	5	404	154	0	0	0
305	1	Classroom (E102)	Parabolic Ceiling Suspended	E	4'T8	3	14	32	Sw	8	190	5	1,359	2,066	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	14	32	8	190	5	1359	2066	0	0	0
306	1	Classroom (E102)	Parabolic Ceiling Suspended	E	4'T8	3	12	32	Sw	8	190	5	1,167	1,774	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	12	32	8	190	5	1167	1774	0	0	0
307	1	Classroom (E102)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
308	1	Computer Lab (E102)	Recessed	E	4'T8	2	4	32	Sw	8	190	5	266	404	N/A	Recessed	4'T8	E	Sw	2	4	32	8	190	5	266	404	0	0	0
309	1	Classroom (E103)	Parabolic Ceiling Suspended	E	4'T8	3	22	32	Sw	8	190	5	2,127	3,233	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	3	22	32	8	190	5	2127	3233	0	0	0
310	1	Classroom (E103)	Recessed	E	4'T8	5	4	32	Sw	8	190	5	665	1,011	N/A	Recessed	4'T8	E	Sw	5	4	32	8	190	5	665	1011	0	0	0
311	1	Classroom (E103)	Exit Sign	S	LED	1	1	5	N	24	190	1	6	25	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	190	1	6	25	0	0	0
312	1	Storage Room (E103)	Recessed	E	4'T8	3	2	32	Sw	2	190	5	207	79	N/A	Recessed	4'T8	E	Sw	3	2	32	2	190	5	207	79	0	0	0
313	1	Storage Room (E103)	Recessed	E	4'T8	3	2	32	Sw	2	190	5	207	79	N/A	Recessed	4'T8	E	Sw	3	2	32	2	190	5	207	79	0	0	0
314	1	Utility Room (E103)	Recessed	E	4'T8	1	4	32	Sw	2	190	5	133	51	N/A	Recessed	4'T8	E	Sw	1	4	32	2	190	5	133	51	0	0	0
315	1	Office (E103)	Recessed	S	4'T8	4	4	32	Sw	9	261	5	532	1,250	C	Recessed	4'T8	S	OS	4	4	32	7	261	5	532	937	0	312	312
316	1	Music Studio (E103)	Ceiling Mounted	E	4'T8	3	2	32	Sw	9	190	5	207	354	N/A	Ceiling Mounted	4'T8	E	Sw	3	2	32	9	190	5	207	354	0	0	0
317	1	Music Studio (E103)	Ceiling Mounted	E	4'T8	2	2	32	Sw	9	190	5	138	236	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	9	190	5	138	236	0	0	0
318	1	Vestibule	Recessed	E	4'T8	1	4	32	Sw	6	365	5	133	388	N/A	Recessed	4'T8	E	Sw	1	4	32	6	365	5	133	388	0	0	0
319	1	Hallway	Recessed	E	4'T8	10	3	32	Sw	16	365	5	1,010	5,898	N/A	Recessed	4'T8	E	Sw	10	3	32	16	365	5	1010	5898	0	0	0
320	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
321	1	Meeting Room	Recessed	E	4'T8	4	4	32	Sw	8	190	5	532	809	N/A	Recessed	4'T8	E	Sw	4	4	32	8	190	5	532	809	0	0	0
322	1	Office	Recessed	E	4'T8	4	4	32	Sw	9	261	5	532	1,250	C	Recessed	4'T8	E	OS	4	4	32	7	261	5	532	937	0	312	312
323	1	Server Room Occupied	Recessed	E	4'T8	2	4	32	Sw	2	261	5	266	139	N/A	Recessed	4'T8	E	Sw	2	4	32	2	261	5	266	139	0	0	0
324	1	Storage Room	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
325	1	Hallway	Recessed	E	4'T8	6	3	32	Sw	16	365	5	606	3,539	N/A	Recessed	4'T8	E	Sw	6	3	32	16	365	5	606	3539	0	0	0
326	1	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
327	1	Classroom (A104)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
328	1	Storage Room (A104)	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
329	1	Storage Room	Recessed	E	4'T8	3	2	32	Sw	2	261	5	207	109	N/A	Recessed	4'T8	E	Sw	3	2	32	2	261	5	207	109	0	0	0
330	1	Classroom (A105)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
331	1	Classroom (A106)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
332	1	Storage Room (A106)	Recessed	E	4'T8 U-Shaped	1	2	32	N	2	261	5	69	36	N/A	Recessed	4'T8 U-Shaped	E	N	1	2	32	2	261	5	69	36	0	0	0
333	1	Computer Lab (A107)	Parabolic Ceiling Suspended	E	4'T8	4	4	32	Sw	8	190	5	532	809	N/A	Parabolic Ceiling Suspendec	4'T8	E	Sw	4	4	32	8	190	5	532	809	0	0	0
334	1	Hallway	Recessed	E	4'T8	2	3	32	Sw	16	365	5	202	1,180	N/A	Recessed	4'T8	E	Sw	2	3	32	16	365	5	202	1180	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)
335	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
336	1	Vestibule - Exit 28	Recessed	E	4'T8	4	3	32	Sw	24	365	5	404	3,539	N/A	Recessed	4'T8	E	Sw	4	3	32	24	365	5	404	3539	0	0	0
337	1	Vestibule - Exit 28	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
338	1	Hallway	Recessed	E	4'T8	8	3	32	Sw	16	365	5	808	4,719	N/A	Recessed	4'T8	E	Sw	8	3	32	16	365	5	808	4719	0	0	0
339	1	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
340	Str	Staircase	Recessed	E	4'T8	5	3	32	Sw	16	365	5	505	2,949	T8-BL	Recessed	4'T8	E	BL	5	3	32	0	365	5	505	1723	0	1226	1226
341	Str	Staircase	Exit Sign	S	LED	1	1	5	N	16	365	1	6	32	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	16	365	1	6	32	0	0	0
342	2	Hallway	Recessed	E	4'T8	3	2	32	Sw	16	365	5	207	1,209	N/A	Recessed	4'T8	E	Sw	3	2	32	16	365	5	207	1209	0	0	0
343	2	Storage Room	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
344	2	Lobby	Exit Sign	S	LED	2	1	5	N	16	365	1	11	64	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	16	365	1	11	64	0	0	0
345	2	Office (A200)	Recessed	E	4'T8	1	2	32	Sw	8	180	5	69	99	N/A	Recessed	4'T8	E	Sw	1	2	32	8	180	5	69	99	0	0	0
346	2	Office (A200)	Recessed	E	4'T8	6	4	32	Sw	8	180	5	798	1,149	N/A	Recessed	4'T8	E	Sw	6	4	32	8	180	5	798	1149	0	0	0
347	2	Hallway	Recessed	E	4'T8	7	3	32	Sw	16	365	5	707	4,129	N/A	Recessed	4'T8	E	Sw	7	3	32	16	365	5	707	4129	0	0	0
348	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
349	2	Storage Room	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
350	2	Science Room / Laboratory (A228)	Parabolic Ceiling Suspended	E	4'T8	7	8	32	Sw	8	190	5	1,827	2,777	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	8	32	8	190	5	1827	2777	0	0	0
351	2	Classroom (A228)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
352	2	Classroom (A227)	Parabolic Ceiling Suspended	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
353	Str	Staircase	Recessed	E	4'T8	5	3	32	Sw	16	365	5	505	2,949	T8-BL	Recessed	4'T8	E	BL	5	3	32	0	365	5	505	1723	0	1226	1226
354	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
355	2	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
356	2	Electrical Room	Recessed	E	4'T8	5	2	32	Dw	2	261	5	345	180	N/A	Recessed	4'T8	E	Sw	5	2	32	2	261	5	345	180	0	0	0
357	2	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	N/A	Recessed	4'T8	E	Sw	4	3	32	8	190	5	404	614	0	0	0
358	2	Bathroom Women	Recessed	E	4'T8 U-Shaped	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	8	190	5	69	105	0	0	0
359	2	Janitor's Closet	Recessed	E	4'T8	3	2	32	Sw	2	261	5	207	108	N/A	Recessed	4'T8	E	Sw	3	2	32	2	261	5	207	108	0	0	0
360	2	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	4	190	5	404	307	N/A	Recessed	4'T8	E	Sw	4	3	32	4	190	5	404	307	0	0	0
361	2	Bathroom Men	Recessed	E	4'T8 U-Shaped	1	2	32	Sw	8	190	5	69	105	N/A	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	8	190	5	69	105	0	0	0
362	2	Hallway	Recessed	E	4'T8	12	3	32	Sw	16	365	5	1,212	7,078	N/A	Recessed	4'T8	E	Sw	12	3	32	16	365	5	1212	7078	0	0	0
363	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
364	2	Classroom (A226)	Recessed	S	CFL	2	2	13	Sw	8	190	0	52	79	N/A	Recessed	CFL	S	Sw	2	2	13	8	190	0	52	79	0	0	0
365	2	Classroom (A226)	Parabolic Ceiling Suspended	E	4'T8	3	16	32	Sw	8	190	5	1,551	2,358	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	3	16	32	8	190	5	1551	2358	0	0	0
366	2	Classroom (A225)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
367	2	Classroom (A225)	Parabolic Ceiling Suspended	E	4'T8	4	16	32	Sw	8	190	5	2,068	3,143	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	16	32	8	190	5	2068	3143	0	0	0
368	2	Classroom (A224)	Parabolic Ceiling Suspended	E	4'T8	4	16	32	Sw	8	190	5	2,068	3,143	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	16	32	8	190	5	2068	3143	0	0	0
369	2	Classroom (A224)	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
370	2	Hallway	Recessed	E	4'T8	1	3	32	Sw	16	365	5	101	590	N/A	Recessed	4'T8	E	Sw	1	3	32	16	365	5	101	590	0	0	0
371	2	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
372	Str	Staircase	Recessed	E	4'T8	4	3	32	Sw	16	365	5	404	2,359	T8-BL	Recessed	4'T8	E	BL	4	3	32	0	365	5	404	1378	0	981	981
373	Str	Staircase	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
374	3	Science Room / Laboratory (A223)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
375	3	Classroom (A222)	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
376	2	Hallway	Recessed	E	4'T8	8	3	32	Sw	8	190	5	808	1,229	N/A	Recessed	4'T8	E	Sw	8	3	32	8	190	5	808	1229	0	0	0
377	3	Classroom (A220)	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
378	2	Science Room / Laboratory	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
379	2	Science Room / Laboratory	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	8	190	5	133	202	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	8	190	5	133	202	0	0	0
380	2	Science Room / Laboratory	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
381	2	Hallway	Recessed	E	4'T8	5	3	32	Sw	16	365	5	505	2,949	N/A	Recessed	4'T8	E	Sw	5	3	32	16	365	5	505	2948	0	0	0
382	2	Science Room / Laboratory (A221)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
383	2	Science Room / Laboratory (A219)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
384	2	Science Room / Laboratory (A219)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
385	2	Science Room / Laboratory (A221)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
386	2	Classroom (A218)	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
387	2	Classroom (A216)	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Dw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
388	2	Science Room / Laboratory	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	788	1,198	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	788	1198	0	0	0
389	2	Science Room / Laboratory	Parabolic Ceiling Suspended	E	4'T8	1	4	32	Sw	8	190	5	133	202	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	4	32	8	190	5	133	202	0	0	0
390	2	Science Room / Laboratory	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	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)
391	2	Classroom (A217)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
392	2	Classroom (A217)	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
393	2	Meeting Room	Recessed	E	4'T8	4	3	32	Sw	8	261	5	404	844	N/A	Recessed	4'T8	E	Sw	4	3	32	8	261	5	404	844	0	0	0
394	2	Electrical Room	Recessed	E	4'T8 U-Shaped	1	2	32	N	2	261	5	69	36	N/A	Recessed	4'T8 U-Shaped	E	N	1	2	32	2	261	5	69	36	0	0	0
395	2	Office	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
396	2	Classroom (A213)	Recessed	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
397	2	Classroom (A215)	Recessed	M	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	M	Sw	4	10	32	8	190	5	1300	1976	0	0	0
398	2	Hallway	Recessed	M	4'T8	7	3	32	Sw	16	365	5	707	4,129	N/A	Recessed	4'T8	M	Sw	7	3	32	16	365	5	707	4129	0	0	0
399	2	Hallway	Exit Sign	S	LED	3	1	5	N	24	365	1	17	146	N/A	Equipment / Fume Hood	LED	S	N	3	1	5	24	365	1	17	146	0	0	0
400	Str	Staircase	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Equipment / Fume Hood	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
401	Str	Staircase	Recessed	E	4'T8	5	3	32	Sw	16	365	5	505	2,949	T8-BL	Recessed	4'T8	E	BL	5	3	32	0	365	5	505	1725	0	1226	1226
402	2	Classroom (A214)	Recessed	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
403	2	Science Room / Laboratory (A212)	Parabolic Ceiling Suspended	E	4'T8	5	12	32	Sw	8	190	5	1,945	2,956	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	5	12	32	8	190	5	1945	2956	0	0	0
404	2	Prep Room (A212)	Parabolic Ceiling Suspended	E	4'T8	4	4	32	Sw	8	190	5	532	809	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	4	32	8	190	5	532	809	0	0	0
405	2	Science Room / Laboratory (A211)	Parabolic Ceiling Suspended	E	4'T8	5	12	32	Sw	8	190	5	1,945	2,956	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	5	12	32	8	190	5	1945	2956	0	0	0
406	2	Hallway	Recessed	E	4'T8	6	3	32	Sw	16	365	5	606	3,539	N/A	Recessed	4'T8	E	Sw	6	3	32	16	365	5	606	3539	0	0	0
407	2	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
408	Str	Staircase	Recessed	E	4'T8	4	3	32	N	16	365	5	404	2,359	T8-BL	Recessed	4'T8	E	BL	4	3	32	0	365	5	404	1378	0	981	981
409	Str	Classroom (A210)	Recessed	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
410	Str	Computer Lab (A209)	Recessed	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
411	Str	Classroom (A208)	Recessed	E	4'T8	4	10	32	Sw	8	190	5	1,300	1,976	N/A	Recessed	4'T8	E	Sw	4	10	32	8	190	5	1300	1976	0	0	0
412	2	Storage Room	Recessed	M	4'T8	2	2	32	Sw	2	261	5	138	72	N/A	Recessed	4'T8	M	Sw	2	2	32	2	261	5	138	72	0	0	0
413	2	Office	Recessed	M	4'T8	5	3	32	Sw	9	261	5	505	1,186	C	Recessed	4'T8	M	OS	5	3	32	7	261	5	505	860	0	297	297
414	2	Hallway	Recessed	M	4'T8	7	3	32	Sw	16	365	5	707	4,129	N/A	Recessed	4'T8	M	Sw	7	3	32	16	365	5	707	4129	0	0	0
415	2	Computer Lab (A207)	Parabolic Ceiling Suspended	E	4'T8	12	4	32	Sw	8	190	5	1,596	2,426	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	12	4	32	8	190	5	1596	2426	0	0	0
416	2	Business Prep Classroom	Parabolic Ceiling Suspended	E	4'T8	2	8	32	Sw	4	190	5	394	299	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	8	32	4	190	5	394	299	0	0	0
417	2	Classroom (A205)	Parabolic Ceiling Suspended	E	4'T8	4	12	32	Sw	8	190	5	1,556	2,365	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	12	32	8	190	5	1556	2365	0	0	0
418	2	Janitor's Closet	Parabolic Ceiling Suspended	E	4'T8	2	3	32	Sw	2	261	5	202	106	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	2	3	32	2	261	5	202	106	0	0	0
419	2	Bathroom Men	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	C	Recessed	4'T8	E	OS	4	3	32	6	190	5	404	461	0	154	154
420	2	Bathroom Women	Recessed	E	4'T8	4	3	32	Sw	8	190	5	404	614	C	Recessed	4'T8	E	OS	4	3	32	6	190	5	404	461	0	154	154
421	2	Classroom (A206)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
422	2	Science Room / Laboratory (A203)	Parabolic Ceiling Suspended	E	4'T8	5	12	32	Sw	8	190	5	1,945	2,956	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	5	12	32	8	190	5	1945	2956	0	0	0
423	2	Prep Room	Parabolic Ceiling Suspended	E	4'T8	8	4	32	Sw	8	190	5	1,064	1,617	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	8	4	32	8	190	5	1064	1617	0	0	0
424	2	Prep Room	Parabolic Ceiling Suspended	E	4'T8	8	4	32	Sw	8	190	5	1,064	1,617	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	8	4	32	8	190	5	1064	1617	0	0	0
425	2	Storage Room	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
426	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
427	2	Hallway	Recessed	E	4'T8	16	3	32	Sw	16	365	5	1,616	8,437	N/A	Recessed	4'T8	E	Sw	16	3	32	16	365	5	1616	9437	0	0	0
428	2	Hallway	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Equipment / Fume Hood	LED	S	N	2	1	5	24	365	1	11	96	0	0	0
429	2	Prep Room	Parabolic Ceiling Suspended	E	4'T8	2	8	32	N	8	190	5	394	599	N/A	Parabolic Ceiling Suspended	4'T8	E	N	2	8	32	8	190	5	394	599	0	0	0
430	2	Prep Room	Parabolic Ceiling Suspended	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
431	2	Science Room / Laboratory (A204)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
432	2	Science Room / Laboratory (A201)	Parabolic Ceiling Suspended	M	4'T8	5	12	32	Sw	8	190	5	1,945	2,956	N/A	Parabolic Ceiling Suspended	4'T8	M	Sw	5	12	32	8	190	5	1945	2956	0	0	0
433	2	Storage Room	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
434	2	Science Room / Laboratory (A202)	Parabolic Ceiling Suspended	E	4'T8	7	10	32	Sw	8	190	5	2,275	3,458	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	7	10	32	8	190	5	2275	3458	0	0	0
435	2	Prep Room (A202)	Parabolic Ceiling Suspended	E	4'T8	4	6	32	Sw	8	190	5	780	1,186	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	4	6	32	8	190	5	780	1186	0	0	0
436	2	Prep Room (A202)	Parabolic Ceiling Suspended	E	4'T8	1	2	32	Sw	8	190	5	69	105	N/A	Parabolic Ceiling Suspended	4'T8	E	Sw	1	2	32	8	190	5	69	105	0	0	0
437	2	Meeting Room	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
438	2	Office	Recessed	E	4'T8	2	4	32	Sw	9	261	5	266	625	N/A	Recessed	4'T8	E	Sw	2	4	32	9	261	5	266	626	0	0	0
439	2	Faculty lounge	Recessed	E	4'T8	6	4	32	Sw	9	190	5	799	1,365	C	Recessed	4'T8	E	OS	6	4	32	7	190	5	799	1023	0	341	341
440	2	Faculty lounge	Recessed	E	4'T8 U-Shaped	2	2	32	Sw	8	190	5	139	236	N/A	Recessed	4'T8 U-Shaped	E	Sw	2	2	32	9	190	5	138	236	0	0	0
441	2	Bathroom Women	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
442	2	Bathroom Men	Recessed	E	4'T8	1	3	32	Sw	8	190	5	101	154	N/A	Recessed	4'T8	E	Sw	1	3	32	8	190	5	101	154	0	0	0
443	Ext	Exterior	Pole Mounted	E	HPS	20	1	100	T	12	365	20	2,400	10,512	N/A	Pole Mounted	HPS	E	T	20	1	100	12	365	20	2400	10512	0	0	0
444	Ext	Parking	Pole Mounted	E	HPS	40	1	400	T	12	365	80	19,200	84,096	N/A	Pole Mounted	HPS	E	T	40	1	400	12	365	80	19200	84096	0	0	0
445	Ext	Parking	Pole Mounted	E	HPS	20	2	400	T	12	365	80	17,600	77,088	N/A	Pole Mounted	HPs	E	T	20	2	400	12	365	80	17600	77088	0	0	0
446	Ext	Exterior	Recessed	E	4'T8	18	2	32	PC	12	365	5	1,342	5,440	N/A	Recessed	4'T8	E	PC	18	2	32	12	365	5	1242	5440	0	0	0
447	Ext	Exterior Stairs	Recessed	E	MH	14	1	100	T	12	365	28	1,792	7,849	N/A	Recessed	MH	E	T	14	1	100	12	365	28	1792	7849	0	0	0
448	Ext	Exterior	Flood	E	MH	1	1	100	T	12	365	28	128	561	N/A	Flood	MH	E	T	1	1	100	12	365	28	128	561	0	0	0
449	Ext	Exterior	Ceiling Mounted	E	4'T8	5	1	32	PC	12	365	5	185	810	N/A	Ceiling Mounted	4'T8	E	PC	5	1	32	12	365	5	185	810	0	0	0
450	Ext	Exterior	Wallpack	E	HPS	18	1	100	T	12	365	20	2,160	9,461	N/A	Wallpack	HPS	E	T	18	1	100	12	365	20	2160	9461	0	0	0
451	Ext	Exterior	Wallpack	E	HPS	1	1	100	T	12	365	20	120	526	N/A	Wallpack	HPS	E	T	1	1	100	12	365	20	120	526	0	0	0
452	Ext	Exterior	Wallpack	E	CFL	1	1	32	T	12	365	0	32	140	N/A	Wallpack	CFL	E	T	1	1	32	12	365	0	32	140	0	0	0
453	Ext	Exterior	Pole Mounted	E	HPS	2	1	100	Sw	4	40	20	240	38	N/A	Pole Mounted	HPS	E	Sw	2	1	100	4	40	20	240	38	0	0	0
454	Ext	Exterior	Recessed	E	4'T8	4	3	32	T	12	365	5	404	1,770	N/A	Recessed	4'T8	E	T	4	3	32	12	365	5	404	1770	0	0	0
Totals:						1,010	2,192	14,854				2,343	344,415	895,369						1,010	2,192	14,574			2,343	343,815	875,383	904	19,083	19,987

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

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	220,000		
Average Power Cost ($/kWh)	0.1540		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	198,290	198,290	**0**
Exterior Power (watts)	45,503	45,503	**0**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	697,079	677,092	**19,987**
Lighting Power (watts)	298,912	298,312	**600**
Lighting Power Density (watts/SF)	1.36	1.36	**0.00**
Estimated Cost of Fixture Replacement ($)	753		
Estimated Cost of Controls Improvements ($)	9,915		
Total Consumption Cost Savings ($)	**3,360**		

Legend							
Fixture Type		Lamp Type			Control Type	Ballast Type	Retrofit Category
Ceiling Suspended	Recessed	CFL	3T12	8T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3T12 U-Shaped	8T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3T5	8T8	Contact (CI)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3T5 U-Shaped	8T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1T12	4T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1T12 U-Shaped	4T5 U-Shaped	FI	Dimmer (DI)		C (Controls Only)
Chandelier		1T5	6T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1T5 U-Shaped	6T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1T8	6T5	Infrared	None (N)		
Landscape		1T8 U-Shaped	6T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2T12 U-Shaped	6T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2T5	6T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2T5 U-Shaped	8T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2T8 U-Shaped	8T12 U-Shaped				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS
http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.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
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.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
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com

Third Party Electric Suppliers for JCPL Service Territory	Telephone & Web Site
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 NJNG Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	(877) 750-7046 www.metromediaenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
NJ Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NewJerseyGasElectric.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

Third Party Gas Suppliers for NJNG Service Territory	Telephone & Web Site
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

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

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

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

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

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

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

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

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

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

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

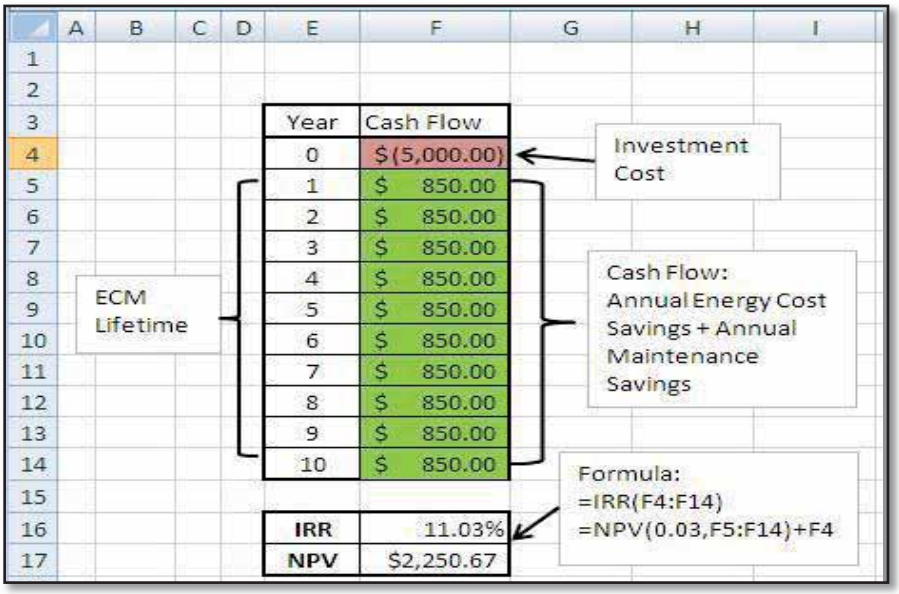
Calculation References

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

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

Excel NPV and IRR Calculation

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



Solar PV ECM Calculation

There are several components to the calculation:

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

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

ECM and Equipment Lifetimes

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

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

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

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

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

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

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Freehold Regional HS District - Colts Neck High School

Building ID: 2303478
For 12-month Period Ending: February 28, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 20, 2010

Facility
Freehold Regional HS District - Colts Neck High School
59 Five Points Road
Colts Neck, NJ 07722

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1995
Gross Floor Area (ft²): 220,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	12,406,393
Natural Gas (kBtu)[4]	14,380,102
Total Energy (kBtu)	26,786,495

Energy Intensity[5]	
Site (kBtu/ft²/yr)	122
Source (kBtu/ft²/yr)	257

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	2,654

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	63
National Average Source EUI	133
% Difference from National Average Source EUI	93%
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.

Certifying Professional
N/A

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

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

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: VendingMiser™ and SnackMiser™ Energy Savings

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)	.154
Facility Occupied Hours per Week	40
Number of Cold Drink Vending Machines	2
Number of Non-refrigerated Snack Machines	2
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	$269.07	$98.23	$170.84	63%

SNACK MACHINES	Current	Projected	Total Savings	% Savings
kWh	699	166	532	76%
Cost of Operation	$107.63	$25.63	$82	76%

Location's Total Annual Savings

	Current	Projected	Total Savings	% Savings
kWh	2446	804	1642	67%
Cost of Operation	$376.70	$123.86	$252.84	67%

Total Project Cost	Break Even (Months)
$596	28.29

Estimated Five Year Savings on ALL Machines = $1,264.20

APPENDIX H: ENERGY CONSERVATION MEASURES

0-5 Year Payback

ECM #	ECM description	Est. intstalled cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime 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
1	**Install Fifteen (15) New CFL Fixtures**	135	0	135	904	0.2	0	0.0	265	405	5	2,023	0.3	1398	280	299	1,707	1,619
2	**Install Variable Frequency Drives on Motors of Heating Hot Water Circulators**	20,000	0	20,000	64,000	13.3	0	1.0	0	9,856	15	147,840	2.0	639	43	49	97,660	87,680
3	**Retrofit Two (2) Refrigerated Vending Machines with VendingMiser™ Devices**	398	0	398	1,109	0.2	0	0.1	0	171	5	854	2.3	115	23	43	2,511	1,986
4	**Retrofit Two (2) Existing Vending Machines with SnackMiser™ Devices**	198	0	198	532	0.1	0	0.1	0	82	5	410	2.4	107	21	41	766	953
5	**Install Variable Frequency Drives on Motors of Heating Hot Water Circulators**	13,500	0	13,500	32,200	6.7	0	0.5	0	4,959	15	74,382	2.7	451	30	36	45,698	44,114

	ECM #	ECM description	Est. intstalled cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime 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
	6	**Install thirty (30) New Occupancy Sensors**	6,600	600	6,000	12,460	2.6	0	0.2	0	1,919	15	28,783	3.1	380	25	31	16,579	22,310
	7	**Install (27) New Bi-level T8 Fluorescent Fixtures in Stairwells**	4,590	675	3,915	6,623	1.4	0	0.1	0	1,020	15	15,298	3.8	291	19	25	8,086	11,858
	8	**Install Variable Frequency Drives on Motors of Chilled Water Circulators**	20,000	4,800	15,200	24,100	5.0	0	0.4	0	3,711	15	55,671	4.1	266	18	23	29,106	33,017
5-10 Year Payback	9	**Install Premium Efficiency Motors on (2) Heating Hot Water Circulators**	5,082	324	4,758	5,632	1.2	0	0.1	0	867	20	17,347	5.5	265	13	18	8,146	7,716
	10	**Install Variable Frequency Drives on Motors of Chilled Water Circulators**	16,000	3,000	13,000	15,100	3.1	0	0.2	0	2,325	15	34,881	5.6	168	11	16	14,760	20,687
	12	**Replace Seven (7) Compact Refrigerators with 2.7 Cu. Ft. ENERGY STAR® Models**	693	0	693	560	0.1	0	0.1	0	86	15	1,294	8.0	87	6	9	322	1,003

	ECM #	ECM description	Est. intstalled cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime 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
	14	**Replace Two (2) Washing Machines with ENERGY STAR® Units**	1,600	0	1,600	1,000	0.2	0	0.1	17	171	15	2,565	9.4	60	4	7	412	1,791
	15	**Replace Seventeen (17) Large Refrigerators with ENERGY STAR® Units**	7,650	0	7,650	5,100	1.1	0	0.1	0	785	15	11,781	9.7	54	4	6	1,592	9,132
	16	**Install Premium Efficiency Motors on Walk-In Box Evaporator Fans**	3,500	0	3,500	2,283	0.5	0	0.0	0	352	20	7,032	10.0	101	5	8	1,731	3,128
Renewable Measures	11	**Install 49.68 kW PV Rooftop System with Incentives**	355,350	22,500	332,850	58,007	47	0	0.9	0	43,733	25	223,327	7.6	123.9	5.0	10.6	238,143	79,470
	13	**Install 190.90 kW PV Rooftop System without Incentives**	1,050,525	0	1,050,525	169,888	140	0	2.6	0	127,563	25	654,069	8.2	107.0	4.3	9.4	615,557	232,747

APPENDIX I: METHOD OF ANALYSIS

Assumptions and tools

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

Disclaimer

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

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