EAST BRUNSWICK BOARD OF EDUCATION

HAMMARSKJOLD MIDDLE SCHOOL

200 Rues Lane, East Brunswick, NJ 08816

LOCAL GOVERNMENT ENERGY AUDIT PROGRAM
FOR
NEW JERSEY
BOARD OF PUBLIC UTILITIES

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CHA PROJECT NO. 31007

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REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±20%, and are based on data obtained from the owner, data obtained during site observations, professional experience, historical data, and standard engineering practice. Cost data does not include soft costs such as engineering fees, legal fees, project management fees, financing, etc.

A thorough walkthrough of the building was performed, which included gathering nameplate information and operating parameters for all accessible equipment and lighting systems. Unless otherwise stated, model, efficiency, and capacity information included in this report were collected directly from equipment nameplates and /or from documentation provided by the owner during the site visit. Typical operation and scheduling information was obtained from interviewing staff and spot measurements taken in the field.

List of Common Energy Audit Abbreviations

- A/C – Air Conditioning
- AHS – Air Handling Unit
- BMS – Building Management System
- Btu – British thermal unit
- CDW – Condenser Water
- CFM – Cubic feet per minute
- CHW – Chilled Water
- DCV – Demand Control Ventilation
- DDC – Direct Digital Control
- DHW – Domestic Hot Water
- DX – Direct Expansion
- EER – Energy Efficiency Ratio
- EF – Exhaust Fan
- EUI – Energy Use Intensity
- Gal – Gallon
- GPD – Gallons per day
- GPF – Gallons Per Flush
- GPH – Gallons per hour
- GPM – Gallons per minute
- GPS – Gallons per second
- HHW – Heating Hot Water
- HID – High Intensity Discharge
- HP – Horsepower
- HRU – Heat Recovery Unit
- HVAC – Heating, Ventilation, Air Conditioning
- HX – Heat Exchanger
- kbtu/mbtu – One thousand (1,000) Btu
- kW – Kilowatt (1,000 watts)
- kWh – Kilowatt-hours
- LED – Light Emitting Diode
- mbh – Thousand Btu per hour
- mmbtu – One million (1,000,000) Btu
- OCC – Occupancy Sensor
- PSI – Pounds per square inch
- RTU – Rooftop Unit
- SBC – System Benefits Charge
- SF – Square foot
- UH – Unit Heater
- V – Volts
- VAV – Variable Air Volume
- VSD – Variable Speed Drive
- W – Watt

1.0 EXECUTIVE SUMMARY

This report summarizes the energy audit performed by CHA for the East Brunswick Board Of Education in connection with the New Jersey Board of Public Utilities (NJBPU) Local Government Energy Audit (LGEA) Program. The purpose of this report is to identify energy savings opportunities associated with major energy consumers and inefficient practices. Low-cost and no-cost are also identified during the study. This report details the results of the energy audit conducted for the building listed below:

Building Name	Address	Square Feet	Construction Date
Hammarskjold Middle School	200 Rues Lane East Brunswick NJ 08816	271,520	2008

The potential total annual energy and cost savings for the recommended energy conservation measures (ECM) identified in the survey are shown below:

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings ($)	Payback (years)
Hammarskjold Middle School	491,762	6,547	90,674	11.7

Each individual measure's annual savings are dependent on that measure alone, there are no interactive effects calculated. Incentives shown (if any) are based only on the SmartStart Incentive Program. Other NJBPU or local utility incentives may also be available/ applicable and are discussed in Section 6.0.

Each measure recommended by CHA typically has a stand-alone simple payback period of 15 years or less. However, if the owner choses to pursue an Energy Savings Improvement Plan (ESIP), high payback measures could be bundled with lower payback measures which ultimately can result in a payback which is favorable for an ESIP project to proceed. Occasionally, we will recommend an ECM that has a longer payback period, based on the need to replace that piece(s) of equipment due to its age, such as a boiler for example.

The following table provides a detailed summary of each ECM for the building surveyed, including costs, savings, SmartStart incentives and payback.

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
ECM-1	Replace RTUs	194,800	16,971	11.5	6,194	11.1	Y
ECM-2	Install Kitchen Hood Controls	39,504	2,952	13.4	1,000	13.0	Y
ECM-3	Convert Booster Heater to Gas	20,800	3,064	6.8	1,785	6.2	Y
ECM-4	Retro-Commission Controls	101,641	12,947	7.9	0	7.9	Y
ECM-5	Walk-In Freezer/Cooler Controls	22,275	1,490	14.9	0	14.9	Y
ECM-L1	Lighting Replacement w/ Controls	734,670	53,249	13.8	45,920	12.9	Y
	Total**	**1,113,690**	**90,674**	**12.3**	**54,899**	**11.7**	
	Total(Recommended)	**1,113,690**	**90,674**	**12.3**	**54,899**	**11.7**	

* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

By implementing the recommended ECMs, the building could result in a total of 242 metric tons of greenhouse gas (GHG) reduction.

CHA has evaluated the potential energy production for the installation of solar photovoltaic panels on the roofs of Hammarskjold. The summary of results are as follows:

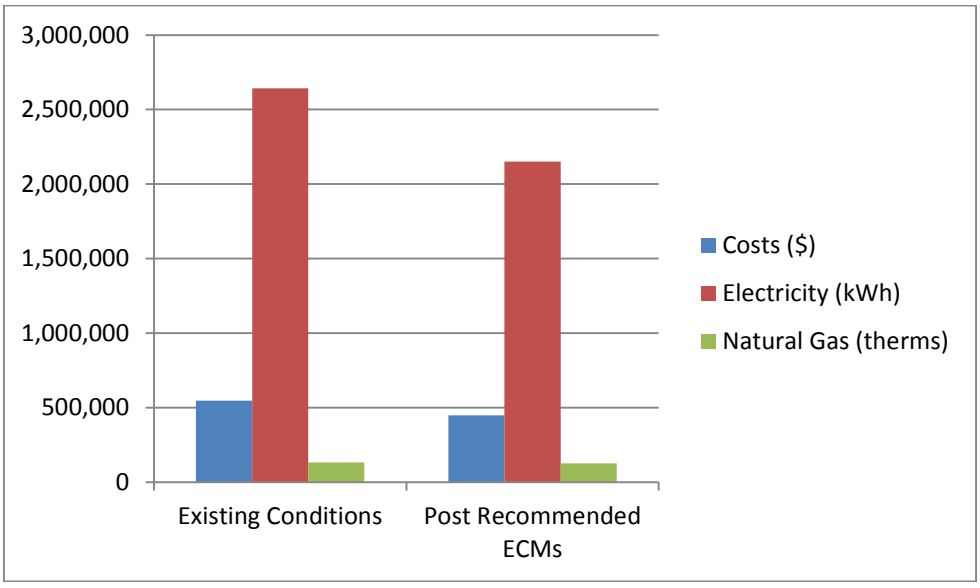
Photovoltaic (PV) Rooftop Power Generation – 510 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
2,040,000	510.0	618,103	0	100,751	154,526	20.2	8.0	FS

See alternative energy measure *Solar PV Electricity Generation* in Section 7.0 for detailed information on potential photovoltaic savings

If East Brunswick Board Of Education implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	546,069	455,396	17%
Electricity (kWh)	2,642,402	2,150,640	19%
Natural Gas (therms)	132,263	125,716	5%
Site EUI (kbtu/SF/Yr)	81.9	73.3	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

The following is a summary of building information related to HVAC, plumbing, building envelope, lighting, kitchen equipment and domestic hot water systems as observed during CHAs site visit. See Appendix B for detailed information on mechanical equipment, including capacities, model numbers and age. See appendix D for representative photos of some of the existing conditions observed while onsite.

Building Name: Hammarskjold Middle School
Address: 200 Rues Lane, East Brunswick NJ 08816
Gross Floor Area: 271,520 square feet
Number of Floors: There is a single story section that is linked together with a two story building. The one story building is primarily administrative with spaces to house the electrical and mechanical equipment. The two-story section houses classrooms.
Year Built: The main school was built in 2008 and is modern.

General

Description of Spaces: Besides classrooms and office spaces, this school has gyms, cafeteria, media center, music room, kitchen, mechanical rooms, an auditorium and storage spaces.
Description of Occupancy: There are about 1,300 students enrolled with about 100 staff personnel.
Building Usage: The school operates Monday through Friday from 7:00 AM to 6:00 PM due to after school program and with janitors occupying the facility until 11:00 PM.
Construction Materials: The outside walls are constructed of 8" CMU, 3" insulation and concrete. No ECM associated with wall upgrades was evaluated.

Roof: The roof is flat, insulated and in good condition. No ECM associated with roof replacement was evaluated.
Windows: The windows are double pane in metal frames. No ECM pertaining to window replacements has been evaluated.
Exterior Doors: All exterior doors of the facility are steel doors and are in good condition. No ECM associated with replacing the doors have been evaluated.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Heating to most areas comes from six (6) Aerco Benchmark 2.0 gas fired boilers producing heating hot water and delivering it to unit ventilators located throughout the building. There are (2) 50 HP heating hot water pumps operating in lead lag fashion and utilizing VFDs

Cooling: The entire building is cooled utilizing DX cooling via rooftop packaged units working with VAV boxes and reheat coils. Several spaces are cooled with split systems. There are 36 RTUs roof top units serving this building. An ECM has been evaluated for RTUs.

Ventilation: The fresh air for ventilation is provided through roof top equipment. As ventilation rates are assumed to be minimum, there are no ECMs associated with the ventilation system.

Exhaust: This building has many fractional HP exhaust fans serving restrooms, science rooms, kitchen and general exhaust located on the roof. No ECM related to Exhaust Fans was evaluated.

Controls Systems

HVAC controls consist of full EMS Johnson controls that are preprogrammed with operating and setback schedules. During the site visit it was observed that both heating and cooling systems were running at the same time. An ECM has been evaluated related to recommissioning the controls system.

Domestic Hot Water Systems

Domestic Hot Water is produced by three (3) AO Smith gas fired water heaters with capacities of (2) 100 gallon and (1) 80 gallons installed in 2007.

Kitchen Equipment

This is a full operation kitchen. There is a dish washer, multiple gas cooking stoves, two (2) large exhaust hoods, a walk-cooler, a walk-in freezer, six (6) warming cabinets, six (6) double door fridges and two (2) single door fridges . ECMs related to placing controls on the exhaust hoods and walk-ins have been evaluated.

Plug Load

The facility has computers, copiers, printers, and kitchen appliances that contribute to the plug load in the building. We have evaluated that the plug loads have minimal impact compared to other electric consuming devices therefore no ECMs associated with plug loads have been evaluated.

Plumbing Systems

There are numerous restrooms in the building. Plumbing fixtures are low flow types and many with metering controls. No ECM associated with plumbing fixtures were evaluated.

Lighting Systems

Indoor lighting predominantly consists of standard T-8s, T-5HOs and some spot CFLs. Lighting is operated on occupancy sensors in most classrooms and offices. Outdoor lighting consists of several wall mounted CFLs. There are also pole mounted HIDs lamps controlled by sensors. An ECM related to lighting and its controls has been evaluated.

3.0 UTILITIES

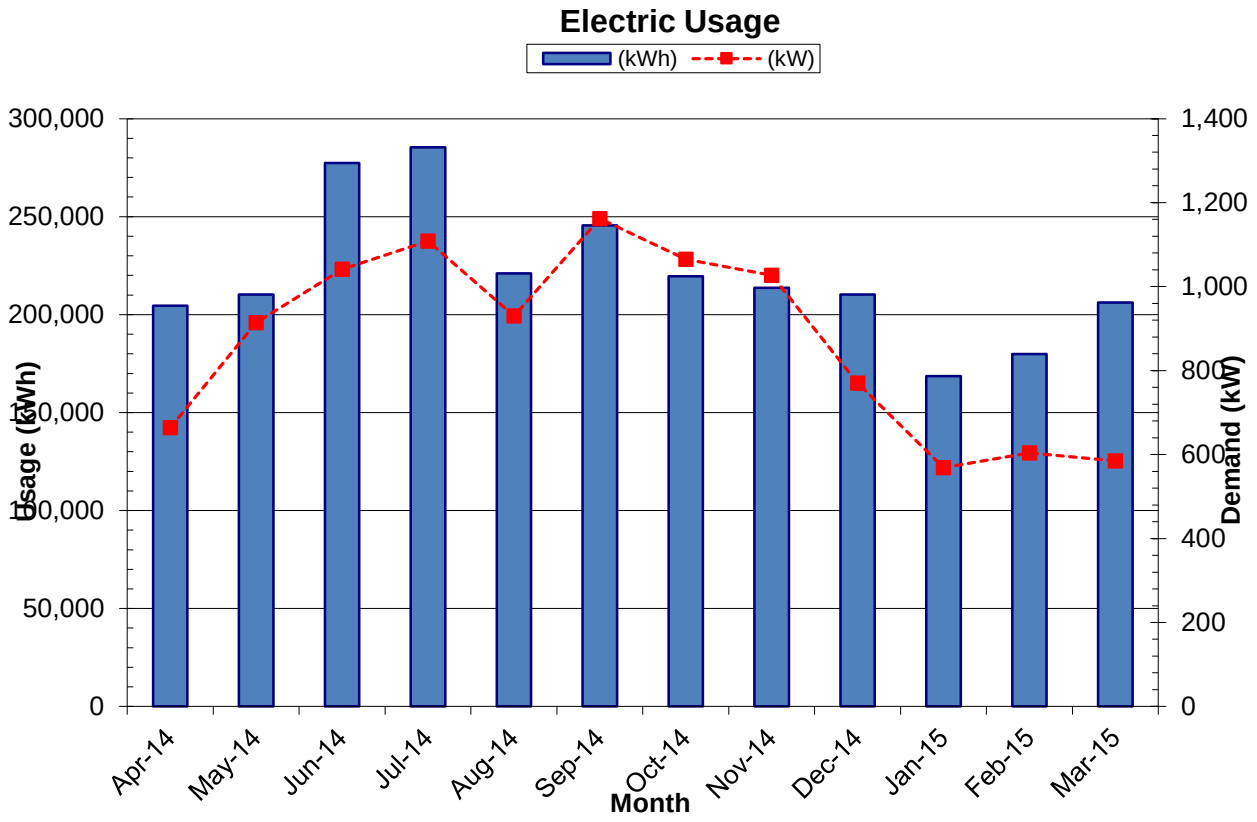
Natural gas, electricity and water are separately metered into this building. Utilities used by the building are delivered and supplied by the following utility companies:

	Electric	Natural Gas	Water
Deliverer	PSE&G	PSE&G	Township of East Brunswick
Supplier	PSE&G	PSE&G	N/A

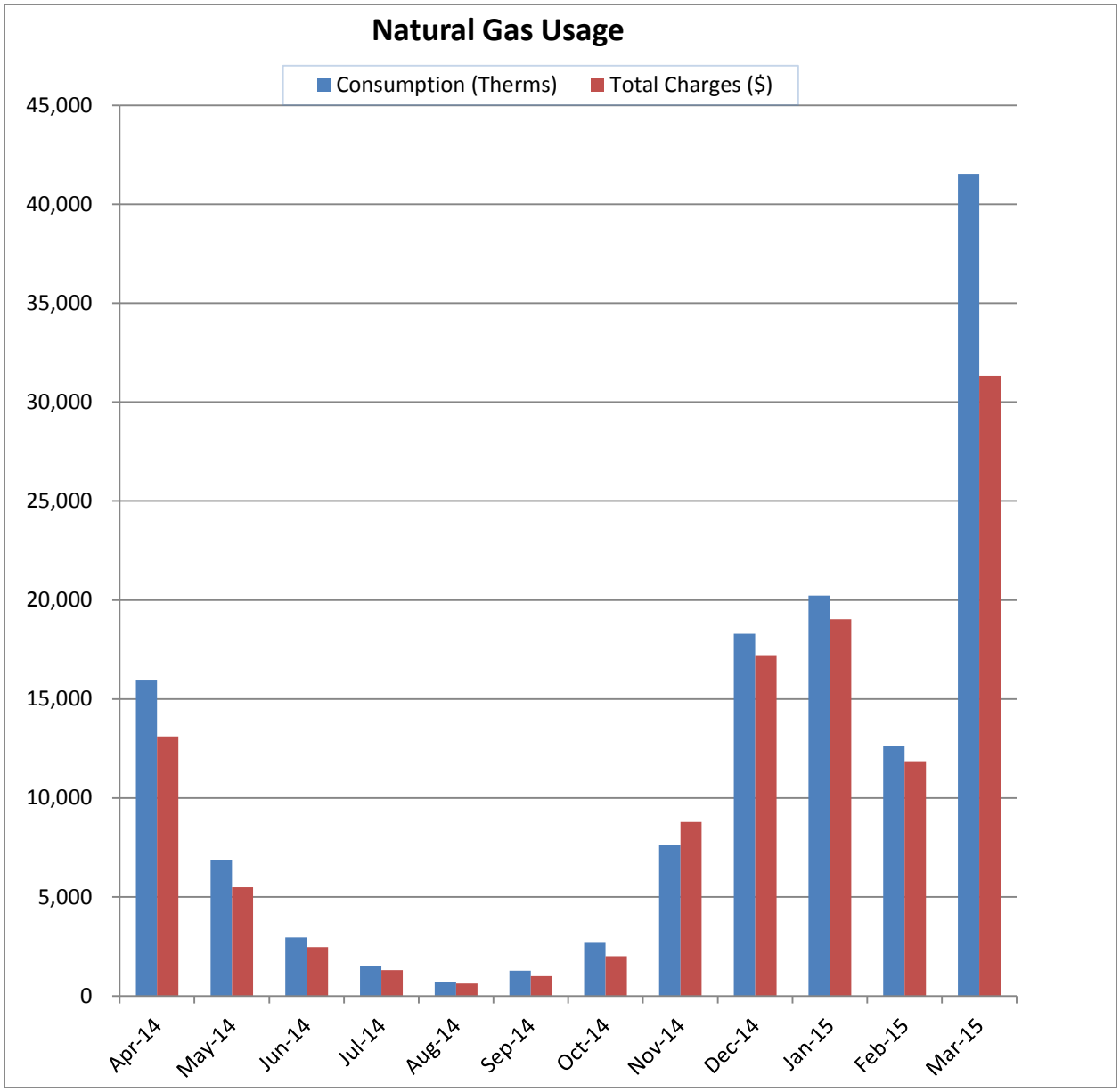
For the 12-month period ending in March 2015, the utilities usages and costs for the building were as follows:

Electric		
Annual Usage	2,642,420	kWh/yr
Annual Cost	431,809	$
Blended Rate	0.163	$/kWh
Consumption Rate	0.136	$/kWh
Demand Rate	7.03	$/kW
Peak Demand	1,162	kW
Min. Demand	569.1	kW
Avg. Demand	870.2	kW
Natural Gas		
Annual Usage	132,263	Therms/yr
Annual Cost	114,261	$
Total Rate	0.864	$/therm

Blended Rate: Average rate charged determined by the annual cost / annual usage
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)



The electric usage is consistent throughout the year and varies with the usage of the building. It can be seen that in the summer months the electricity peaks due to cooling load of the buildings many roof top units.



The natural gas usage in this building is for heating and DHW production, and therefore the usage in summer months is relatively small compared with heating months. The gas usage during the heating season is correlated to winter weather conditions.

It was observed form the gas utility bills supplied to CHA that there were imbalance charges which were effecting the data to have higher cost and uses appearing as peaks in utility usage. After research it was found that the reasons for this imbalance comes from the daily contracted quantities (DCQ). Below is a description of the DCQ and an explanation of how it causes imbalances.

***Daily Contracted Quantities (DCQ's)**

Residential, Commercial and Industrial customers will have DCQ's (Daily Contracted Quantities) posted to the account, one for each month of the year. These DCQ's are based upon the customer's weather-normalized historical usage, prorated from their meter reading periods to calendar months and then divided by the number of days in the calendar month. These 12 monthly DCQ's are what Public Service would expect the customer to consume, under normal weather conditions and if the customer utilized his gas equipment in the same manner as was utilized historically. However, weather is rarely normal, so we expect that there will be a difference between actual usage and the DCQ's. This imbalance is used to adjust the DCQ delivery in the second succeeding month. For example, an imbalance from the billing period in February will adjust April's calendar month delivery; March's imbalance will adjust May's delivery. The DCQ's will be updated each year on the anniversary date in which they were originally posted, to correctly reflect any changes in a customer usage pattern or change in equipment.

TPS's must deliver the Aggregate Daily Contract Quantity for its customers as set forth in PSE&G's Gas Tariff -Third Party Supplier Requirements.
*Information taken from PSE&G Third Party Supplier Gas Choice Operating Manual

See Appendix A for utility analysis.

Under New Jersey's energy deregulation law, the supply portion of the electric (or natural gas) bill is separated from the delivery portion. The supply portion is open to competition, and customers can shop around for the best price for their energy suppliers. The electric and natural gas distribution utilities will still deliver the gas/ electric supplies through their wires and pipes – and respond to emergencies, should they arise – regardless of where those supplies are purchased. Purchasing the energy supplies from a company other than your electric or gas utility is purely an economic decision; it has no impact on the reliability or safety of the service.

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	School Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.163	$0.13	Y
Natural Gas	$/Therm	$0.864	$0.96	N

* Per U.S. Energy Information Administration (2013 data – Electricity and Natural Gas, 2012 data – Fuel Oil)

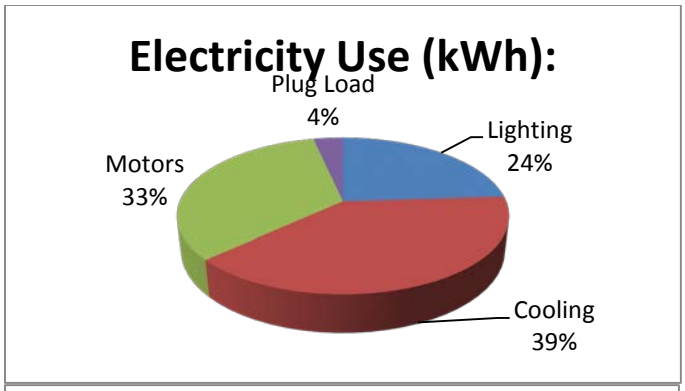
Additional information on selecting a third party energy supplier is available here:

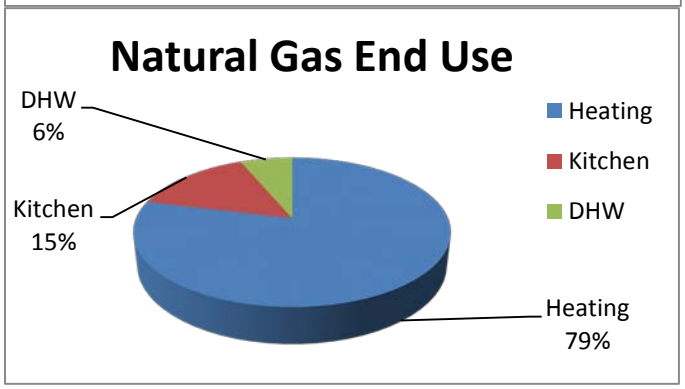
http://www.state.nj.us/bpu/commercial/shopping.html.

See Appendix A for a list of third-party energy suppliers licensed by the Board of Public Utilities to sell within the building's service area.

The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

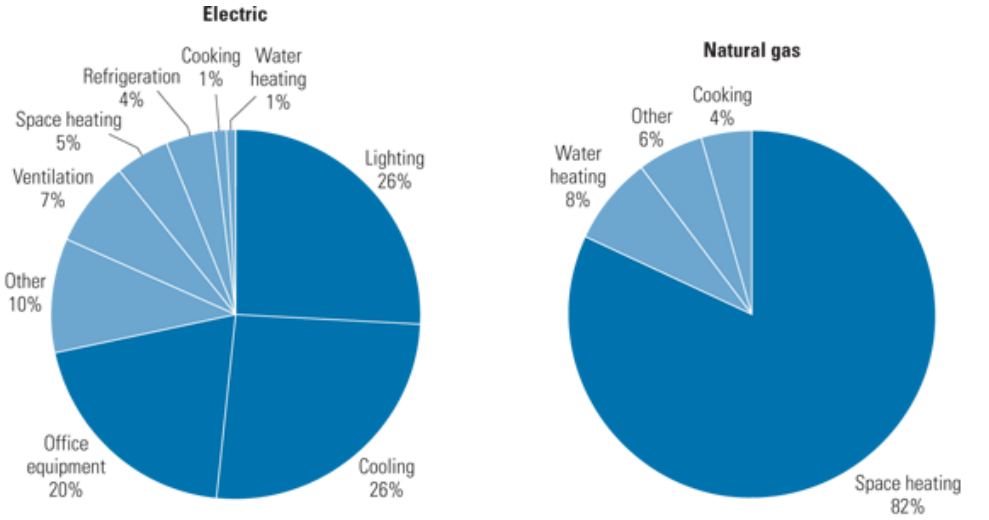
Site End-Use Utility Profile





Most of the electricity consumed by educational facilities is used to for lighting, cooling, and plug loads such as computers and copiers; most of the natural gas is used for space heating. Each school's energy profile is different, and the following charts represent typical utility profiles for K-12 schools per U.S. Department of Energy.

Typical End-Use Utility Profile for Educational Facilities



Courtesy: E SOURCE; from Commercial Building Energy Consumption Survey, 1999 data

4.0 BENCHMARKING

The EPA Portfolio Manager benchmarking tool provides a site and source Energy Use Intensity (EUI), as well as an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100, with 100 being the most efficient. In order for a building to receive and Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase. However, the EPA does not have score for all types of buildings. The buildings that do not have energy rating now are compared with national median EUI.

The site EUI is the amount of heat and electricity consumed by a building as reflected in utility bills. Site energy may be delivered to a facility in the form of primary energy, which is raw fuel burned to create heat or electricity, such as natural gas or oil; or as secondary energy, which is the product created from a raw fuel such as electricity or district steam. To provide an equitable comparison for different buildings with varying proportions of primary and secondary energy consumption, Portfolio Manager uses the convention of source EUIs. The source energy also accounts for losses incurred in production, storage, transmission, and delivery of energy to the site, which provide an equivalent measure for various types of buildings with differing energy sources. The results of the benchmarking are contained in the table below. Copies of the benchmarking report are available in Appendix F.

Site EUI kBtu/ft^2/yr	Source EUI (kBtu/ft^2/yr)	Energy Star Rating (1-100)
81.9	155.4	31

The school has a below average Energy Star Rating Score (50 being the median score), and as such by implementing the measures discussed in this report, it is expected that the EUI can be further reduced and the Energy Star Rating further increased.

EPA Portfolio Manager can be accessed with the following:

Web URL: https://portfoliomanager.energystar.gov/pm/login.html

[redacted]

[redacted]

5.0 ENERGY CONSERVATION MEASURES

The following types of energy savings opportunities are identified in this section of the report:

- Energy conservation measures (ECMs) are energy savings recommendations that typically require a financial investment. For these areas of opportunity, CHA prepared detailed calculations, as summarized in this section and in Appendix C. In general, additional savings may exist from reductions in maintenance activities associated with new equipment or better controls; however for conservatism, maintenance savings are not accounted for in this report; instead the only savings which are reported are those derived directly from reductions in energy which can be tracked by the utility bills.

- Operational and Maintenance measures (O&M) consist of low- or no-cost operational opportunities, which if implemented would have positive impacts on overall building operation, comfort levels, and/or energy usage. There are no estimated savings, costs or paybacks associated with the O&M measures included as part of this study.

Energy savings were quantified in the form of:

- electrical usage (kWh=Kilowatt-hour),
- electrical demand (kW=kilowatts),
- natural gas (therms=100,000 Btu),
- propane gas (gallons=91,650 Btu),
- fuel oil (gallons =138,700 Btu), and
- water (kgal=1,000 gallons).

These recommendations are influenced by the time period that it takes for a proposed project to "break even" referred to as "Simple Payback". Simple payback is calculated by dividing the estimated cost of implementing the ECM by the energy cost savings (in dollars) of that ECM.

Another financial indicator of the performance of a particular ECM is the Return on Investment or ROI, which represents the benefit (annual savings over the life of a project) of an investment divided by the cost of the investment. The result is expressed as a percentage or ratio.

Two other financial analyses included in this report are Internal Rate of Return (IRR) and Net Present Value (NPV). Internal Rate of Return is the discount rate at which the present value of a project costs equals the present value of the project savings. Net Present Value is the difference between present value of an investment's future net cash flows and the initial investment. If the NPV equals "0", the project would equate to investing the same amount of dollars at the desired rate. NPV is sometimes referred to as Net Present Worth. These values are provided in the Summary Tab in Appendix C.

5.1 ECM-1 Replace RTUs with High Efficiency RTUs

The school has 14 rooftop units that are either at the end of their useful life or past their useful life. This ECM evaluates the energy savings associated with replacing older less efficient rooftop units with modern high efficiency rooftop units of the same capacities. Calculations show savings in electric power consumption only as it is assumed that the gas furnaces will have the same efficiencies.

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

ECM-1 Replace RTUs with High Efficiency RTUs

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
194,800	26.1	108,576	-	16,971	0.5	6,194	11.5	11.1

* Incentive shown, if available, is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.2 ECM-2 Install Kitchen Hood Controls

Installing a Melink hood control system was evaluated. Upon activation of the Melink system, the hood lights will turn on and the fans reach a preset minimum speed of 10 and 50 percent. When cooking appliances are turned on, the fan speed will increase based on temperature sensed in the exhaust duct. During actual cooking, an optical sensor will sense particulates entering the hood and the speed will increase to 100 percent until smoke and heat are removed.

Energy saving is calculated from reduction of exhaust fan speed and the amount of heated air supplied by the kitchen's make-up air unit (MUA).

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

ECM-2 Install Kitchen Hood Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
39,504	-	5,484	2,382	2,952	(0.3)	1,000	13.4	13.0

This measure is recommended.

5.3 ECM-3 Replace Electric Dishwasher with Gas

The school's kitchen uses an electric dishwasher. The building typically uses this equipment for about 800 hours per year. Natural gas is available in the kitchen and could be used instead of electricity. Implementation would require a new DHW gas fired heater and venting. Monetary cost savings would be achieved through the lower cost of natural gas versus the higher cost of electricity.

The calculation uses estimated electrical consumption and cost for the unit as the baseline, which was converted to natural gas for the proposed case. The difference between the two values is the energy savings.

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

ECM-3 Replace Electric Dishwasher with Gas

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
20,800	7.4	24,619	(1,050)	3,064	0.8	1,785	6.8	6.2

This measure is recommended.

5.4 ECM-4 Retro-Commission Existing DDC Controls

The building is equipped with a full EMS Johnson controls system. As observed during the site visit, however, the integration and functionality of the system with respect to building systems could be improved.

Commissioning is the process of verifying that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. Retro-commissioning is the same systematic process applied to existing buildings.

Both controls and components of the heating and cooling systems present saving opportunities during the retro-commissioning process. The DDC system and controls within a building play a crucial role in providing a comfortable building environment. Over time, temperature sensors or thermostats may drift out of synch. Poorly calibrated sensors can increase heating and cooling loads and lead to occupant discomfort. The following procedure is recommended:

- Calibrate the indoor and outdoor building sensors. Calibration of room thermostats, duct thermostats, humidistats, and pressure and temperature sensors should be in accordance with the original design specifications. Calibrating these controls may require specialized skills or equipment and may require outside expertise.
- Inspect damper and valve controls to verify proper functioning. Dampers should also be examined for proper opening and closing. Stiff dampers can cause

improper modulation of the amount of outside air being used in the supply airstream. In some cases, dampers may be wired in a single position or disconnected, violating minimum outside air requirements.

- Review building operating schedules. HVAC controls must be adjusted to heat and cool the building properly during occupied hours. Occupancy schedules can change frequently over the life of a building, and control schedules should be adjusted accordingly. When the building is unoccupied, the temperature should be set back to save heating or cooling energy; however, minimal heating and cooling may be required when the building is unoccupied. In cold climates, for example, heating may be needed to keep water pipes from freezing.

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

ECM-4 Retro- commission existing DDC Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
101,641	-	51,789	5,215	12,947	0.9	-	7.9	7.9

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.5 ECM-5 Install Walk-in Cooler / Freezer Controls

Presently there is one (1) walk-in cooler and one (1) walk-in freezer in this building.

Installing a walk-in cooler/ freezer control system was assessed. The system will monitor both dry and wet bulb temperature within the walk-in unit and allow evaporators and compressors to modulate up and down based on enthalpy set points rather than by dry bulb temperature alone. Savings is a result of reduced run time of evaporator fans, compressors and door heaters.

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

ECM-5 Install Walk-in Cooler / Freezer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
22,275	0	9,142	-	1,490	(0.3)	-	14.9	14.9

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.6 ECM-L1 Lighting Replacements with Controls

This measure is recommending replace/upgrade the current lighting fixtures to more efficient ones and installing occupancy sensors on the new lights. Interactive effects of the higher efficiency lights and occupancy sensors lead the energy and cost savings for this measure to not be cumulative or equivalent to the sum of replacing the lighting fixtures alone and installing occupancy sensors without the lighting upgrade. The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-L1 Lighting Replacements with Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
734,670	160.2	291,153	-	53,249	(0.2)	45,920	13.8	12.9

This measure is recommended.

5.7 Additional O&M Opportunities

This list of operations and maintenance (O&M) - type measures represent low-cost or no-cost opportunities, which if implemented will have a positive impact on the overall building operations, comfort and/or energy consumption. The recommended O&M measures for this building are as follows:

- Replace filters in air handling equipment regularly
- Check exhaust fans for backdraft dampers and install dampers if they are not present

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

The following sections give detailed information on available incentive programs including New Jersey Smart Start, Direct Install, New Jersey Pay for Performance (P4P) and Energy Savings Improvement Plan (ESIP). If the School District wishes to and is eligible to participate in the Energy Savings Improvement Plan (ESIP) program and/or the Pay for Performance Incentive Program (P4P), it cannot participate in either the Smart Start or Direct Install Programs. More details can be found at the NJ Clean Energy Program website
(http://www.njcleanenergy.com/commercial-industrial/home/home).

6.1.1 New Jersey Smart Start Program

For this energy audit, The New Jersey Smart Start Incentives are used in the energy savings calculations, where applicable. This program is intended for medium and large energy users and provides incentives for:

- Electric Chillers
- Gas Chillers
- Gas Heating
- Unitary HVAC
- Ground Source Heat Pumps
- Variable frequency Drives/ motors
- Refrigeration
- Prescriptive and performance lighting and lighting controls

The equipment is procured using a typical bid- build method, installed and paid for and then the incentives are reimbursed to the owner.

6.1.2 Direct Install Program

The Direct Install Program applies to smaller facilities that have a peak electrical demand of 200 kW or less in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric utility companies.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 70% of the costs for lighting, HVAC, motors, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can reduce the implementation cost of energy conservation projects.

The Direct Install program has specific HVAC equipment and lighting requirements and is generally applicable only to smaller package HVAC units, small boilers and lighting retrofits.

The program pays a maximum amount of $75,000 per building, and up to $250,000 per customer per year. Installations must be completed by an approved Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this energy audit. The incentive is reimbursed to the Owner upon successful replacement and payment of the equipment.

The building does not qualify for this program since the peak electric demand during the 12 month evaluated period was more than 200 KW.

6.1.3 New Jersey Pay For Performance Program (P4P)

This building may be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed to offset the cost of energy conservation projects for facilities that pay the Societal Benefits Charge (SBC) and whose demand (kW) in any of the preceding 12 months exceeds 100 kW. This demand minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations and *is not applicable to public schools*. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). Additionally, the overall return on investment (ROI) must exceed 10%. If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The ERP must include a detailed energy audit of the desired ECMs, energy savings calculations (using building modeling software) and inputting of all utility bills into the EPA Portfolio Manager website.

- Incentive Amount: $0.10/SF
- Minimum incentive: $5,000
- Maximum Incentive: $50,000 or 50% of Facility annual energy cost

The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above. The ERP must be completed by a Certified Energy Manager (CEM) and submitted along with the project application.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy savings as determined in Incentive #1 (Minimum 15% savings must be achieved), and is paid upon successful installation of recommended measures.

<u>Electric</u>

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved.

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved.

Incentive cap: 25% of total project cost

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool.

Electric

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved.

Gas

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved.

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

For the purpose of demonstrating the eligibility of the ECM's to meet the minimum savings requirement of 15% annual savings and 10% ROI for the Pay for Performance Program, all ECM's identified in this report have been included in the incentive calculations. The results for the building are shown in Appendix C.

6.1.4 Energy Savings Improvement Plan

The Energy Savings Improvement Program (ESIP) allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the ESIP provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

ESIP allows local units to use "energy savings obligations" (ESO) to pay for the capital costs of energy improvements to their facilities. ESIP loans have a maximum loan term of 15 year. ESOs are not considered "new general obligation debt" of a local unit and do not count against debt limits or require voter approval. They may be issued as refunding bonds or leases. Savings generated from the installation of energy conservation measures pay

the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach. The “Local Finance Notice” outlines how local governments can develop and implement an ESIP for their facilities. The ESIP can be prepared internally if the entity has qualified staff. If not, the ESIP must be implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs. Refer to Appendix D for more information on this program.

6.1.5 Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) is part of New Jersey's efforts to reach its Energy Master Plan goals of striving to use 30 percent of electricity from renewable sources by 2020.

Incentives for sustainable bio-power projects and for energy storage projects are currently under development, with competitive solicitations for each of those technologies expected to begin in the first quarter of 2014. The wind program is currently on hold.

New solar projects are no longer eligible for REIP incentives, but can register for Solar Renewable Energy Certificates (SRECs) through the SREC Registration Program (SRP).

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 Photovoltaic Rooftop Solar Power Generation

The building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The amount of available area determines how large of a solar array can be installed on any given space. The table below summarizes the approximate area available and the associated solar array size that can be installed.

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
120,524	510

The PVWATTS solar power generation model was utilized to calculate PV power generation; this model is provided in Appendix E.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of $250/SREC for 2016 and this number was utilized in the cash flow for this report.

The system costs for PV installations were derived from recent solar contractor budgetary pricing in the state of New Jersey and include the total cost of the system installation (PV panels, inverters, wiring, ballast, controls). The cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a typical system. There are other considerations that have not been included in this pricing, such as the condition of the roof and need for structural reinforcement. Photovoltaic systems can be ground mounted if the roof is not suitable, however, this installation requires a substantial amount of open property (not wooded) and underground wiring, which adds more cost. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will most likely need to be replaced during the useful life of the PV system.

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

Photovoltaic (PV) Rooftop Power Generation

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
2,040,000	510.0	618,103	-	100,751	154,526	20.2	8.0	FS

Note: CHA typically recommends a more detailed evaluation be conducted for the installation of PV Solar arrays when the screening evaluation shows a payback of less than 20 years. Therefore, this ECM is recommended for further study. Before implementation is pursued, the school should consult with a certified solar PV contractor.

7.1.2 Solar Thermal Hot Water Generation

Active solar thermal systems use solar collectors to gather the sun's energy to heat a fluid. An absorber in the collector (usually black colored piping) converts the sun's energy into heat. The heat is transferred to circulating water, antifreeze, or air for immediate use or is storage for later utilization. Applications for active solar thermal energy include supplementing domestic hot water, heating swimming pools, space heating or preheating air in residential and commercial buildings.

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

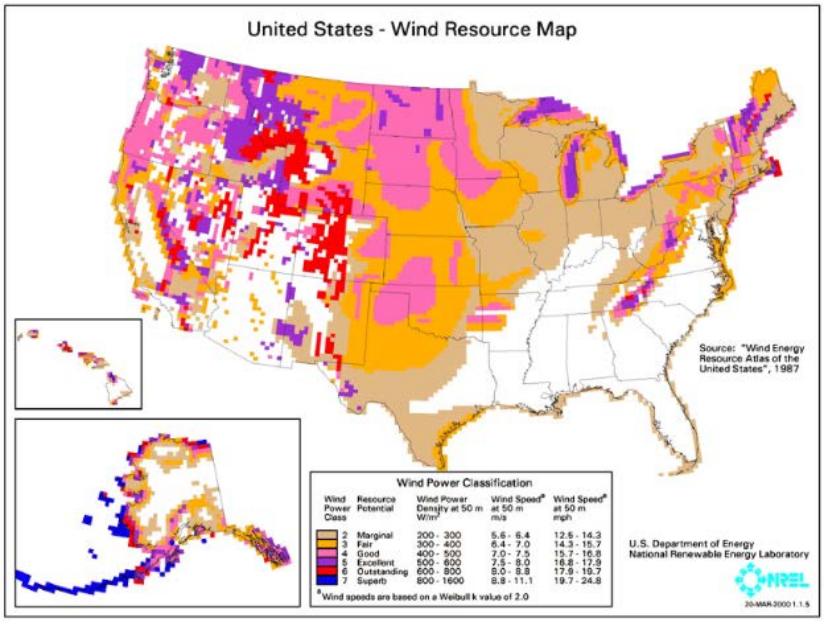
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). The most practical system would transfer the heat from the panels to thermal storage tanks and then use the pre-heated water for domestic hot water production. DHW is presently produced by natural gas fired water heaters and, therefore, this measure would offer natural gas utility savings. Unfortunately, the amount of domestic hot water that is currently used by this school is very small. Installing a solar domestic hot water system is not recommended due to the limited amount of domestic hot water presently consumed by the school.

This measure is not recommended due to the relatively low domestic hot water usage.

7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are

mounted onto a tower. Newer wind turbines also use advanced technology to generate electricity at a variety of frequencies depending on the wind speed, convert it to DC and then back to AC before sending it to the grid. Wind turbines range from 50 – 750 kW for utility scale turbines down to below 50 kW for residential use. On a scale of 1 (the lowest) to 7 (the highest), Class 3 and above (wind speeds of 13 mph or greater) are generally considered "good wind resource" according to the Wind Energy Development Programmatic EIS Information Center hosted by the Bureau of Land Management. According to the map below, published by NREL, Newark, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



This measure is not recommended due to the location of the school.

7.3 Combined Heat and Power Plant

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

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter; however thermal usage during the summer months does not exist. Thermal energy produced by the CHP plant in

the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. CHP is not recommended due to the building's limited summer thermal demand.

This measure is not recommended due to the absence of year-round thermal loads which are needed for efficiency CHP operation. However, a mini-size CHP could be an option for the school to consider. The sizing and energy savings of the mini-size CHP require further study.

7.4 Demand Response Curtailment

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

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From April 2014 through March 2015 the following table summarizes the electricity load profile for the building.

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
1,162.0	569.1	870.2	N	Y

*the demand is estimated from one month bill

This measure is not recommended due to the lack of enough onsite generation.

8.0 CONCLUSIONS & RECOMMENDATIONS

The following section summarizes the LGEA energy audit conducted by CHA for Hammarskjold Middle School.

The following projects should be considered for implementation:

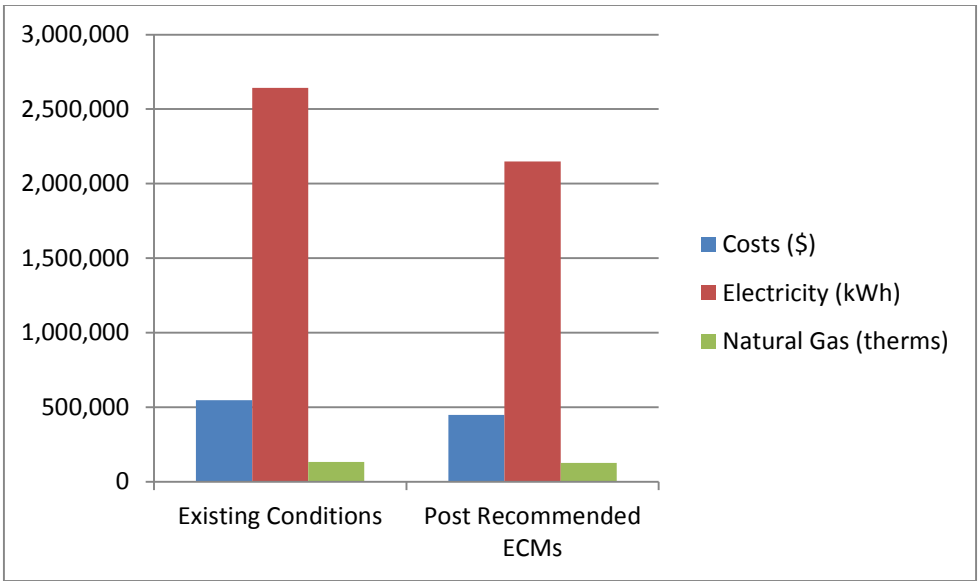
- Replace RTUs with high efficiency RTUs
- Install kitchen hood controls
- Convert booster heater to gas
- Retro-Commission existing DDC
- Install walk-in controls
- Lighting replacements/upgrades w/ controls

The potential annual energy and cost savings for the recommended ECMs are shown in the following table.

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings ($)	Payback (years)
491,762	6,547	90,674	11.7

If the school implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	546,069	455,396	17%
Electricity (kWh)	2,642,402	2,150,640	19%
Natural Gas (therms)	132,263	125,716	5%
Site EUI (kbtu/SF/Yr)	81.9	73.3	



Next Steps: This energy audit has identified several areas of potential energy savings. East Brunswick Board Of Education can use this information to pursue incentives offered by the NJBPU's NJ Clean Energy Program. A close-out meeting will be scheduled with school staff members to review the ECMs and possible incentive options.

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

Local Government Energy Audit
East Brunswick Board of Education
Hammarskjold Middle School

Utility Bills: Account Numbers

Account Number	Building	Type
4200571005	Hammarskjold Middle School	Electric
6576072309	Hammarskjold Middle School	Gas

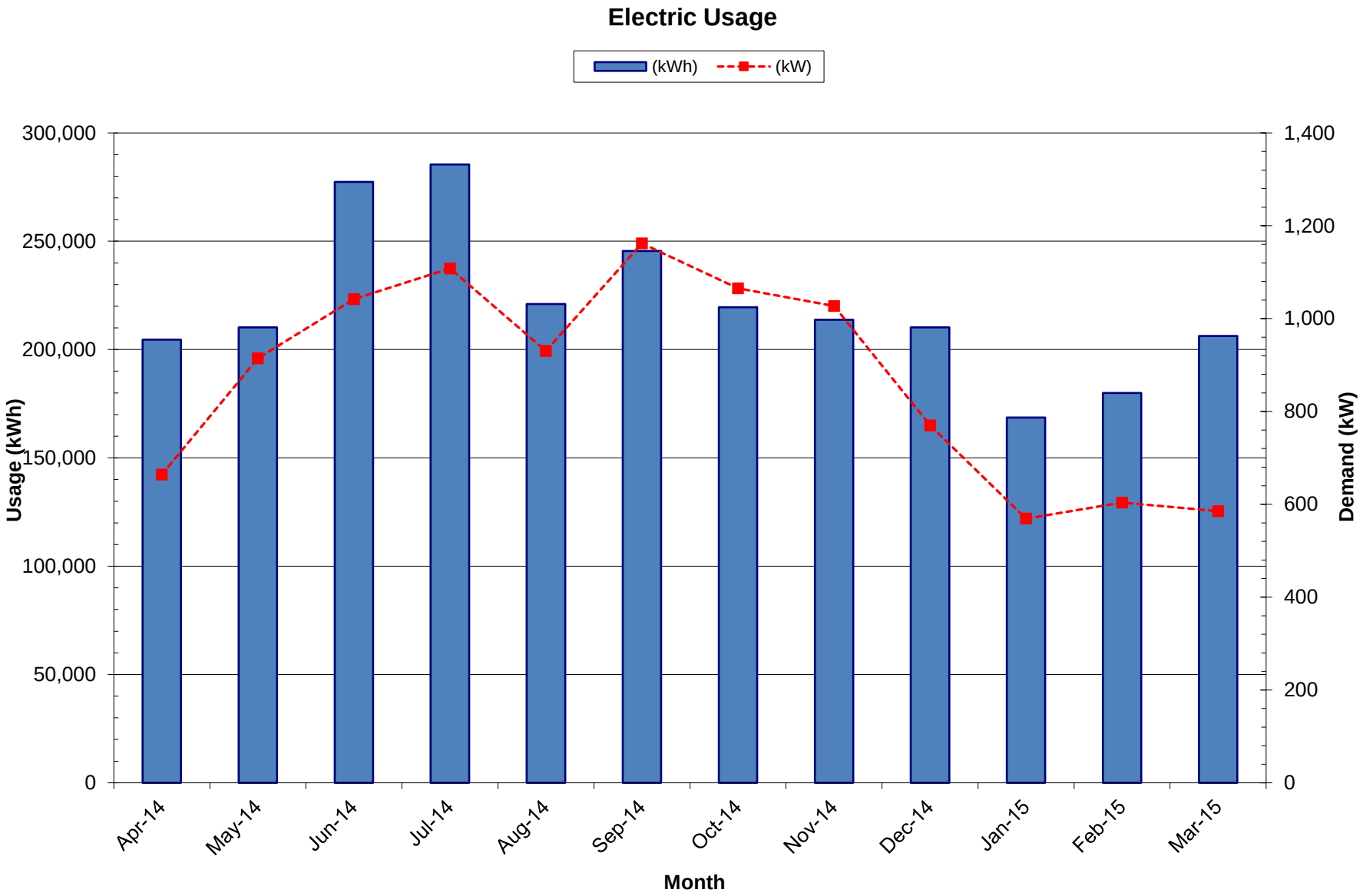
Local Government Energy Audit
East Brunswick Board of Education
Hammarskjold Middle School

Electric Service

For Service at: Hammarskjold Middle School
Account No.: 4200571005 **Delivery: PSE&G**
Meter No.: 778014396/9214521 **Supply: PSE&G**

						Provider Charges			Unit Costs				
	Consumption		Demand		Delivery	Supplier	Total	Demand	Consumption	Delivery	Supplier	Blended Rate
Month	(kWh)	($)	(kW)	($)	($)	($)	($)	($/kW)	($/kWh)	($/kWh)	($/kWh)	($/kWh)
April-14	204,529	32,813.06	664.1	2,353.84	8,656.40	26,510.50	35,166.90	3.544	0.160	0.042	0.130	0.172
May-14	210,297	28,492.20	914.5	3,241.35	9,711.08	22,022.47	31,733.55	3.544	0.135	0.046	0.105	0.151
June-14	277,392	33,556.12	1,041.8	12,448.09	20,668.06	25,336.15	46,004.21	11.949	0.121	0.075	0.091	0.166
July-14	285,440	34,604.91	1,108.4	13,296.96	21,472.14	26,429.73	47,901.87	11.997	0.121	0.075	0.093	0.168
August-14	220,962	25,953.32	930.2	11,313.46	17,726.01	19,540.77	37,266.78	12.162	0.117	0.080	0.088	0.169
September-14	245,489	29,873.88	1,162.0	14,132.72	21,215.76	22,790.84	44,006.60	12.162	0.122	0.086	0.093	0.179
October-14	219,590	25,196.85	1,065.4	3,834.80	10,177.81	18,853.84	29,031.65	3.599	0.115	0.046	0.086	0.132
November-14	213,752	26,814.97	1,027.3	3,697.66	9,819.91	20,692.72	30,512.63	3.599	0.125	0.046	0.097	0.143
December-14	210,192	27,202.77	770.2	2,772.26	8,798.75	21,176.28	29,975.03	3.599	0.129	0.042	0.101	0.143
January-15	168,585	24,834.77	569.1	2,048.42	6,959.73	19,923.46	26,883.19	3.599	0.147	0.041	0.118	0.159
February-15	179,936	27,074.91	603.9	2,173.68	7,397.40	21,851.19	29,248.59	3.599	0.150	0.041	0.121	0.163
March-15	206,238	41,970.74	585.1	2,107.09	8,040.00	36,037.83	44,077.83	3.601	0.204	0.039	0.175	0.214
Total (All)	**2,642,402**	**$358,388.50**	**1,162.0**	**73,420.33**	**$150,643.05**	**$281,165.78**	**$431,808.83**	**$7.031**	**$0.136**	**$0.057**	**$0.106**	**$0.163**
Total (last 12-months)	**2,642,402**	**$358,388.50**	**1,162.0**	**73,420**	**$150,643.05**	**$281,165.78**	**$431,808.83**	**$7.031**	**$0.136**	**$0.057**	**$0.106**	**$0.163**
Notes	1A	1B	2A	2B	3	4	5	6	7	8	9	9

1A.) Number of kWh of electric energy used per month
1B.) Consumption charges ($)
2A.) Number of kW of power measured
2B.) Demand charges ($)
3.) Electric charges from Delivery provider
4.) Electric charges from Supply provider - note, includes 8.875% tax
5.) Total charges (Delivery + Supplier)
6.) Demand charges ($) / Demand (kW)
7.) Consumption charges ($) / Consumption (kWh)
8.) Delivery Charges ($) / Consumption (kWh) — 35% of blended rate (fixed portion of the bill that can't be negotiated)
9.) Supplier Charges ($) / Consumption (kWh) — 65% of blended rate (portion of the bill that can be negotiated)
10.) Total Charges ($) / Consumption (kWh)

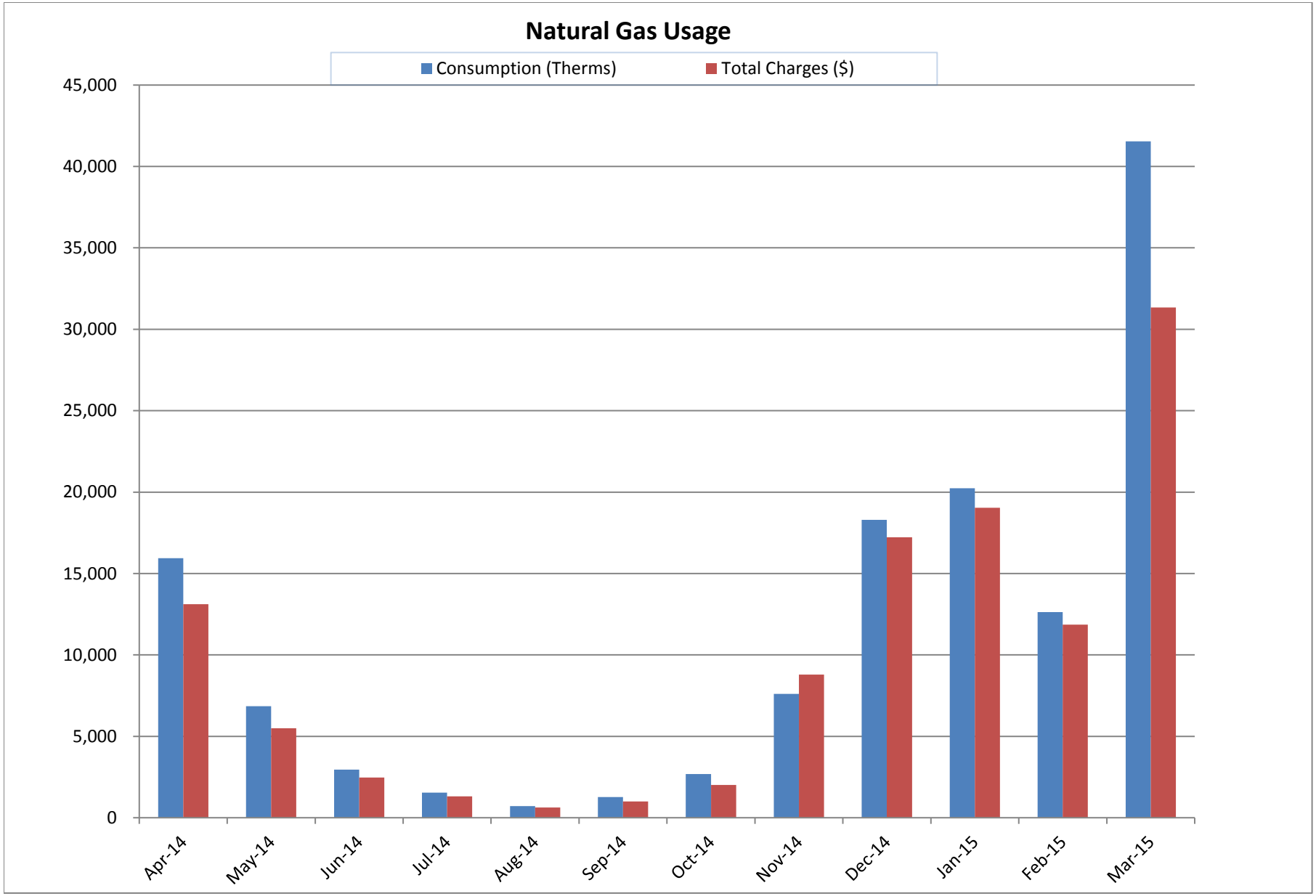

Electric Usage
(kWh)
(kW)
300,000
250,000
200,000
150,000
100,000
50,000
0
1,400
1,200
1,000
800
600
400
200
0
Usage (kWh)
Demand (kW)
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Month

Local Government Energy Audit
East Brunswick Board of Education
Hammarskjold Middle School

Natural Gas Service

For Service at: **Hammarskjold Middle School**
Account No.: **6576072309**
Meter No: **3166062**
Delivery: **PSE&G**
Supply: **PSE&G**

Month	Consumption (Therms)	Supply Charge ($)	Delivery Charge ($)	Total Charges ($)	Supply Rate ($/Therm)	Delivery Rate ($/Therm)	Total Rate ($/Therm)
April-14	15,935.0	11,503.33	1,606.25	13,109.58	0.722	0.101	0.823
May-14	6,846.1	4,724.85	766.76	5,491.61	0.690	0.112	0.802
June-14	2,954.0	2,068.14	400.48	2,468.62	0.700	0.136	0.836
July-14	1,541.2	1,047.67	261.63	1,309.30	0.680	0.170	0.850
August-14	709.1	458.45	174.66	633.11	0.647	0.246	0.893
September-14	1,271.1	768.22	228.56	996.78	0.604	0.180	0.784
October-14	2,685.4	1,656.06	355.17	2,011.23	0.617	0.132	0.749
November-14	7,613.5	4,701.63	4,090.76	8,792.39	0.618	0.537	1.155
December-14	18,298.1	11,534.81	5,683.63	17,218.44	0.630	0.311	0.941
January-15	20,232.1	13,053.92	5,980.85	19,034.77	0.645	0.296	0.941
February-15	12,632.9	7,023.15	4,838.67	11,861.82	0.556	0.383	0.939
March-15	41,544.4	21,710.57	9,622.38	31,332.95	0.523	0.232	0.754
Total (All)	**132,262.8**	**$80,250.80**	**$34,009.80**	**$114,260.60**	**0.607**	**0.257**	**0.864**
Total (last 12-months)	**132,262.8**	**$80,250.80**	**$34,009.80**	**$114,260.60**	**0.607**	**0.257**	**0.864**
		70.2%	29.8%	100.0%			


Natural Gas Usage
Consumption (Therms)
Total Charges ($)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15

PSE&G ELECTRIC SERVICE TERRITORY
Last Updated: 10/24/12

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

Supplier	Telephone & Web Site	*Customer Class
AEP Energy, Inc. 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	**C/I** **ACTIVE**
Alpha Gas and Electric, LLC 641 5th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	**R/C** **ACTIVE**
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877)-30-AMBIT (877) 302-6248 www.ambitenergy.com	**R/C** **ACTIVE**
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	**C** **ACTIVE**
Amerigreen Energy, Inc. 1463 Lamberton Road Trenton, NJ 08611	888-423-8357 www.amerigreen.com	**R/C** **ACTIVE**
AP Gas & Electric, LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apge.com	**R/C/I** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergyllc.com	**R/C/I** **ACTIVE**
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(888) 978-9974 www.group.barclays.com	**C** **ACTIVE**
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	**C/I** **ACTIVE**
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**R/C/I** **ACTIVE**

Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	888-565-4490 www.4choiceenergy.com	**R/C** **ACTIVE**
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(888) CLR-VIEW (800) 746-4702 www.clearviewenergy.com	**R/C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674 www.commerceenergy.com	**R** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(866) 237-7693 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	**C** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 348-4193 www.directenergy.com	**R** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**
Dominion Retail, Inc. **d/b/a Dominion Energy Solutions** 395 Route #70 West Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.dom.com/products	**R/C** **ACTIVE**

DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	**R/C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	**C/I** **ACTIVE**
Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**

Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	**R/C** **ACTIVE**
HOP Energy, LLC d/b/a Metro Energy, HOP Fleet Fueling, HOP Energy Fleet Fueling 1011 Hudson Avenue Ridgefield, NJ 07657	(877) 390-7155 www.hopenergy.com	**R/C/I** **ACTIVE**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 3711 Market Street, 10th Fl. Philadelphia, PA 19104	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com	**C/I** **ACTIVE**
Keil & Sons, Inc. **d/b/a Systrum Energy** 1 Bergen Blvd. Fairview, NJ 07022	(877) 797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**

Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	**R/C/I** **ACTIVE**
MXenergy Electric Inc. 900 Lake Street Ramsey, NJ 07446	(800) 785-4374 www.mxenergy.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. 532 Freeman St. Orange, NJ 07050	(973) 678-1800 x. 251 www.supremeenergyinc.com	**R/C** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	**R/C** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**

PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Public Power & Utility of New Jersey, LLC 39 Old Ridgebury Rd. Suite 14 Danbury, CT 06810	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**
Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com/pjm	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	**C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, N.J. 08007	(800) 695-0666 www.sjnaturalgas.com	**R/C** **ACTIVE**
Spark Energy, L.P. 2105 CityWest Blvd., Ste 100 Houston, Texas 77042	(800) 441-7514 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**
Stream Energy 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 39-8150 www.streamenergy.net	**R** **ACTIVE**

UGI Energy Services, Inc. d/b/a GASMARK 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 50 East Palisades Avenue Englewood, NJ 07631	(800) 388-3862 www.lowcostpower.com	**R/C/I** **ACTIVE**
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
Xoom Energy New Jersey, LLC 744 Broad Street Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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PSE&G GAS SERVICE TERRITORY
Last Updated: 12/11/14

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

Supplier	Telephone & Web Site	*Customer Class
Ambit Northeast, LLC d/b/a Ambit Energy 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284 www.ambitenergy.com	**R/C** **ACTIVE**
Amerigreen Energy, Inc. **333 Sylvan Avenue Suite 206** **Englewood Cliffs, NJ 07632**	(888)559-4567 www.amerigreen.com	**R/C/I** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	888-850-1872 www.AstralEnergyLLC.com	**R/C/I** **ACTIVE**
BBPC, LLC Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	888-651-4121 www.greateasternenergy.com	**C** **ACTIVE**
Choice Energy, LLC **4257 US Highway 9, Suite 6C** **Freehold, NJ 07728**	(888) 565-4490 www.4choiceenergy.com	**R/C/I**
Clearview Electric Inc. **d/b/a Clearview Gas** 1744 Lexington Ave. Pennsauken, NJ 08110	800-746-4720 www.clearviewenergy.com	**R/C** **ACTIVE**
Colonial Energy, Inc. 83 Harding Road Wyckoff, NJ 07481	845-429-3229 www.colonialgroupinc.com	**C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07746	888 817-8572 www.commerceenergy.com	**R** **ACTIVE**
Compass Energy Services, Inc. 33 Wood Avenue South, 610 Iselin, NJ 08830	866-867-8328 www.compassenergy.net	**C/I** **ACTIVE**

Compass Energy Gas Services, LLC 33 Wood Avenue South Suite 610 Iselin, NJ 08830	866-867-8328 www.compassenergy.net	**C/I** **ACTIVE**
ConocoPhillips Company 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Consolidated Edison Energy, Inc. **d/b/a Con Edison Solutions** 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-686-1383 x2130 www.conedenergy.com	
Consolidated Edison Solutions, Inc. Cherry Tree Corporate Center 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
Constellation NewEnergy-Gas Division, LLC 116 Village Boulevard, Suite 200 Princeton, NJ 08540	800-785-4373 www.constellation.com	**C/I** **ACTIVE**
Constellation Energy Gas Choice, Inc. 116 Village Blvd., Suite 200 Princeton, NJ 08540	800-785-4373 www.constellation.com	**R/C/I** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	888-925-9115 http://www.business.directenergy.com/	**R** **ACTIVE**
Direct Energy Business Marketing, LLC (fka Hess Energy Marketing) One Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergy.com	**R** **ACTIVE**

Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC) One Hess Plaza Woodbridge, NJ 07095	(888) 464-4377 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Gateway Energy Services Corp. 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 348-4193 www.gesc.com	**R/C** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	888-452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing, LLC 129 Wentz Avenue Springfield, NJ 07081	800-542-0778 www.globalp.com	**C/I** **ACTIVE**
Great Eastern Energy 116 Village Blvd., Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.com	**C/I** **ACTIVE**
Greenlight Energy 330 Hudson Street, Suite 4 Hoboken, NJ 07030	718-204-7467 www.greenlightenergy.us	**C** **ACTIVE**
Harborside Energy LLC 101 Hudson Street, Suite 2100 Jersey City, NJ 07302	877-940-3835 www.harborsideenergynj.com	**R/C** **ACTIVE**
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	888 264-4908 www.hikoenergy.com	**R/C/I** **ACTIVE**
Hudson Energy Services, LLC 7 Cedar Street Ramsey, NJ 07446	877- Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	877-887-6866 www.idtenergy.com	**R/C** **ACTIVE**

Infinite Energy dba Intelligent Energy 1200 Route 22 East Suite 2000 Bridgewater, NJ 08807-2943	(800) 927-9794 www.InfiniteEnergy.com	**R/C/I** **ACTIVE**
Integrys Energy Services-Natural Gas, LLC 101 Eisenhower Parkway Suite 300 Roseland, NJ 07068	(800) 536-0151 www.integrysenergy.com	**C/I** **ACTIVE**
Jsynergy LLC 445 Cental Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020 www.Jsnergyllc.com	**R/C/I** **ACTIVE**
Major Energy Services, LLC 1001 East Lawn Drive Teaneck NJ 07666	888-625-6760 www.majorenergy.com	**R/C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	888-779-7255 www.mecny.com	**R/C/I** **ACTIVE**
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	1-877-750-7046 www.metromediaenergy.com	**C/I** **ACTIVE**
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	888-53-Metro www.metroenergy.com	**R/C** **ACTIVE**
MPower Energy NJ LLC One University Plaza, Suite 507 Hackensack, NJ 07601	877-286-7693 www.mpowerenergy.com	**R/C/I** **ACTIVE**
NATGASCO (Supreme Energy, Inc.) 532 Freeman Street Orange, NJ 07050	800-840-4427 www.supremeenergyinc.com	**R/C/I** **ACTIVE**
New Energy Services LLC 101 Neptune Avenue Deal, New Jersey 07723	800-660-3643 www.newenergyservicesllc.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 10 North Park Place Suite 420 Morristown, NJ 07960	866-568-0290 www.njgande.com	**R/C** **ACTIVE**

Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
North American Power & Gas, LLC d/b/a North American Power 197 Route 18 South Ste. 300 New Brunswick, NJ 08816	888- 313-8086 www.napower.com	**R/C/I** **ACTIVE**
North Eastern States, Inc. d/b/a Entrust Energy 90 Washington Valley Road Bedminster, NJ 07921	(888) 535-6340 www.entrustenergy.com	**R/C/I** **ACTIVE**
Oasis Power, LLC d/b/a Oasis Energy 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046 www.oasisenergy.com	**R/C** **ACTIVE**
Palmco Energy NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	855-32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
PPL EnergyPlus, LLC Shrewsbury Executive Offices 788 Shrewsbury Avenue Suite 2200 Tinton Falls, NJ 07724	(732) 741-0505 www.pplenergyplus.com	**C/I** **ACTIVE**
PPL EnergyPlus Retail, LLC Shrewsbury Executive Offices 788 Shrewsbury Avenue, Suite 220 Tinton Falls, NJ 07724	(732) 741-0505 – 2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Public Power & Utility of New Jersey, LLC One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**

Residents Energy, LLC 550 Broad Street Newark, NJ 07102	(888) 828-7374 www.residentsenergy.com	**R/C**
Respond Power LLC 1001 East Lawn Drive Teaneck, NJ 07666	(877) 973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
Save on Energy, LLC 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877) 658-3183 www.saveonenergy.com	**R/C** **ACTIVE**
SFE Energy One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 www.sfeenergy.com	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666 www.sjnaturalgas.com	**C** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	800-266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**
SouthStar Energy d/b/a New Jersey Energy 1085 Morris Avenue, Suite 155 Union, NJ 07083	(866) 477-8823 www.newjerseyenergy.com	**R/C** **ACTIVE**
Spark Energy Gas, LP/ Spark Energy 2105 City West Blvd. Suite 100 Houston, TX 77042	(713)600-2600 www.sparkenergy.com	**R/C/I** **ACTIVE**
Sperian Energy Corp. Bridgewater Center 1200 Route 22 East Bridgewater, NJ 08807	888-682-8082 www.sperianenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	855-466-2842 www.spragueenergy.com	**C/I** **ACTIVE**
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-640-6457 www.stuyfuel.com	**C** **ACTIVE**

Stream Energy New Jersey, LLC 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 www.streamenergy.net	**R/C** **ACTIVE**
Summit Energy Services, Inc. 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT www.summitenergy.com	**C/I** **ACTIVE**
Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786 www.systrumenergy.com	**R/C/I** **ACTIVE**
Tiger Natural Gas, Inc. dba Tiger, Inc. 234 20th Avenue Brick, NJ 008724	888-875-6122 www.tigernaturalgas.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. dba UGI Energy Link 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-427-8545 www.ugienergylink.com	**C/I** **ACTIVE**
UGI Energy Services, Inc. d/b/a GASMARK 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995 www.ugienergylink.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 2001 Route 46 Waterview Plaza, Suite 301 Parsippany, NJ 07054	800-388-3862 www.lowcostpower.com	**R/C** **ACTIVE**
Viridian Energy PA LLC 2001 Route 46, Waterview Plaza Suite 230 Parsippany, NJ 07054	866-663-2508 www.viridian.com	**R/C** **ACTIVE**
Vista Energy Marketing, L.P. 197 State Route 18 South, Suite 3000 South Wing East Brunswick, NJ 08816	888-508-4782 www.vistaenergymarketing.com	**R/C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**

Woodruff Energy US LLC 73 Water Street, P.O. Box 777 Bridgeton, NJ 08302	856-455-1111 800-557-1121 www.woodruffenergy.com	**C/I** **ACTIVE**
XOOM Energy New Jersey, LLC 744 Broad Street. 16th Floor Newark, NJ 07102	888-997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	855-732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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APPENDIX B

Equipment Inventory

East Brunswick Board of Education
CHA Project# 31007
Estimated
Hammarskjold Middle School

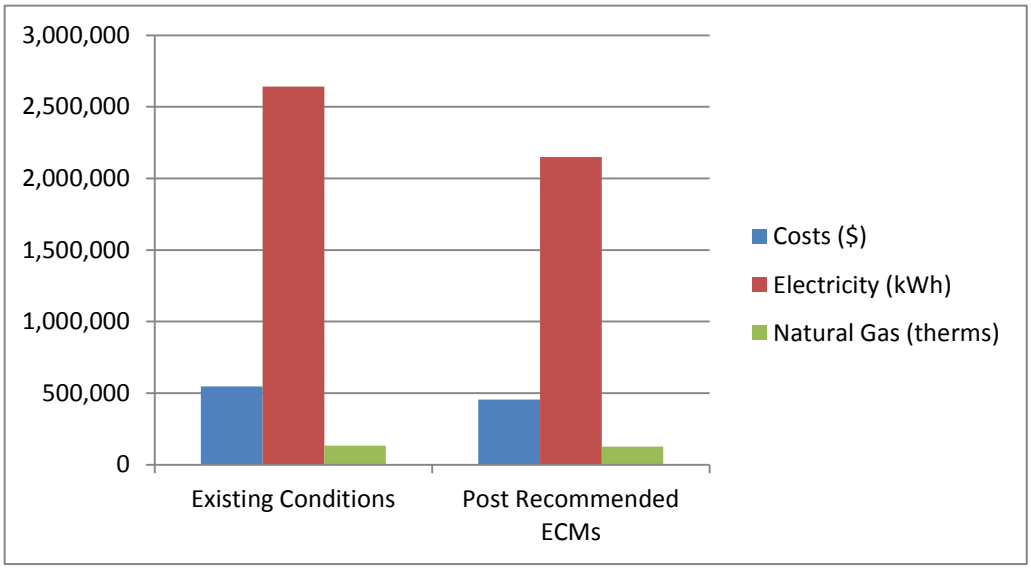
Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size	Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
Roof Top Unit	4	McQuay	RPS090C	Various	Cooling/Electric	90T	10.6 EER	Roof	1st and 2nd floor classrooms	2006	5	
Roof Top Unit	4	Aaon	RM025-3-0-BB02-EJN	Various	Cooling/Electric	25T	11 EER	Roof	Various	2006	5	
Roof Top Unit	2	Aaon	RM020-3-0-BB02-EJN	Various	Cooling/Electric	20T	11 EER	Roof	Theater Arts	2006	5	
Roof Top Unit	1	Aaon	RM013-3-0-BB02-EJL	200705AMWK02258	Cooling/Electric	13T	11 EER	Roof	Faculty Dining	2007	6	
Roof Top Unit	2	Aaon	RM026-3-0-BB02-EJK	Various	Cooling/Electric	26T	11 EER	Roof	Offices	2006	5	
Roof Top Unit	1	Aaon	RM015-3-0-BB02-EJL	200705AMWL02259	Cooling/Electric	15T	11 EER	Roof	Kitchen	2006	5	
Roof Top Unit	1	Aaon	RM065-3-0-BB02-EJN	200705AMWM02266	Cooling/Electric	15T	11 EER	Roof	1st floor and basement	2007	6	
Roof Top Unit	1	Aaon	RM030-3-0-BB02-EJN	200705AMWT02266	Cooling/Electric	15T	11 EER	Roof	PE Support Area	2006	5	
Roof Top Unit	1	McQuay	RPS040CLW	FB0U07040121902	Cooling/Electric	40T	10.6 EER	Roof	Auditorium	2006	5	
Roof Top Unit	2	McQuay	RPS045CSW	Various	Cooling/Electric	45T	10.6 EER	Roof	Aux Gym/Gym	2006	5	
Roof Top Unit	1	McQuay	RPS080CSW	FB0U07040121802	Cooling/Electric	80T	10.6 EER	Roof	Cafeteria	2006	5	
Roof Top Unit	1	McQuay	RPS030CLW	FB0U07040096300	Cooling/Electric	30T	10.6 EER	Roof	Music Suite	2006	5	
MAU	1	DesChamp	PV-W8-MWB	N/A	Cooling/Electric	N/A	N/A	Roof	Kitchen	2006	5	
Roof Top Unit	7	Lennox	GCS24-813-130-2G	Various	Cooling/Heating	6T	9.5 EER	Roof	Various	1997	-4	
Roof Top Unit	1	Lennox	GCS24-653-130-1G	5697M03046	Cooling/Heating	4T	9.5 EER	Roof	Various	1997	-4	
Roof Top Unit	6	Lennox	GCS20-048-120-1G	Various	Cooling/Heating	5T	9.5 EER	Roof	Various	1997	-4	
Boiler	6	Aerco	Benchmark 2.0	Various	Heating/Natural Gas	1860MBH	96%	Boiler Room	Various	2006	20	
HHW Pumps	2	Baldor	EMT2543T	Various	Electric	50 HP	95%	Boiler Room	Boiler	2006	N/A	
DHW Heater	3	A.O Smith	Various	Various	Natural Gas	Various	96%	Various	Restrooms	2007	6	

APPENDIX C

ECM Calculations

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	546,069	455,396	17%
Electricity (kWh)	2,642,402	2,150,640	19%
Natural Gas (therms)	132,263	125,716	5%
Site EUI (kbtu/SF/Yr)	81.9	73.3	



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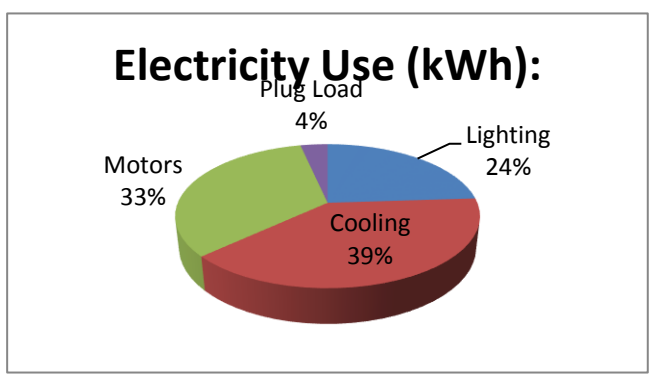
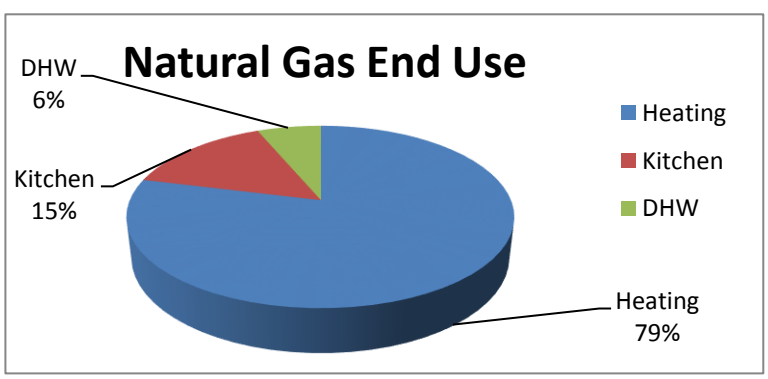
Utility End Use Analysis			
Electricity Use (kWh):		**Notes/Comments:**	
2,642,402	Total	Based on utility analysis	
633,621	Lighting	From Lighting Calculations	24%
1,035,771	Cooling	From Utilities	39%
882,088	Motors	From Calc	33%
90,922	Plug Load	Estimated	3%
			100%
Natural Gas Use (Therms):		**Notes/Comments:**	
132,263	Total	Based on utility analysis	
104,304	Heating	Utilities	79%
19,558	Kitchen	Utilities	15%
8,400	DHW	Utilities	6%
			100%





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Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
$ 0.163	$/kWh blended		0.000420205	271,520	Electric	Natural Gas	Fuel Oil
$ 0.136	$/kWh supply	2,642,402	0.000420205		$ 431,809	$ 114,261	
$ 7.03	$/kW	1,162.0	0				
$ 0.86	$/Therm	132,263	0.00533471				
	$/kgals		0				
	$/Gal						

Hammarskjold Middle School

Recommend?		Item	Savings						Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR
Y or N			kW	kWh	therms	No. 2 Oil gal	Water kgal	$								kW	kWh	therms	kgal/yr	$			
Y	ECM-1	Replace RTUs in Old School Wing	26.1	108,576	0	0	0	16,971	$ 194,800	11.5	15	45.6	$ 6,194	N	11.1	392.0	1,628,640	0	0	########	0.5	$13,992	4.0%
Y	ECM-2	Install Kitchen Hood Controls	0.0	5,484	2,382	0	0	2,952	$ 39,504	13.4	10.0	15.0	$ 1,000	N	13.0	0.0	54,838	23,820	0	$ 29,519	(0.3)	($13,323)	-4.6%
Y	ECM-3	Convert Booster Heater to gas	7.4	24,619	(1,050)	0	0	3,064	$ 20,800	6.8	10.0	4.7	$ 1,785	N	6.2	73.9	246,190	(10,500)	0	$ 37,288	0.8	$7,123	9.8%
Y	ECM-4	Retro Commission Controls	0.0	51,789	5,215	0	0	12,947	$ 101,641	7.9	15.0	49.6	$ -	N	7.9	0.0	776,828	78,228	0	########	0.9	$52,925	9.5%
Y	ECM-5	Walk in Feezer/Cooler Controls	0.0	9,142	0	0	0	1,490	$ 22,275	14.9	10.0	3.8	$ -	N	14.9	0.0	91,420	0	0	$ 14,901	(0.3)	($9,564)	-6.7%
Y	ECM-L1	Lighting Replacement With Controls	160.2	292,153	0	0	0	53,249	$ 734,670	13.8	10.0	122.8	$ 45,920	N	12.9	1,602.0	2,921,530	0	0	########	(0.2)	($234,524)	-4.4%
		Total	**193.7**	**491,762**	**6,547**	**0**	**0**	**$ 90,674**	**$ 1,113,690**	**12.3**	**11.7**	**242**	**$ 54,899**		**11.7**	**2,068**	**5,719,445**	**91,549**	**-**	########	**0.1**	**($219,820)**	**-1.0%**
		Recommended Measures (highlighted green	**193.7**	**491,762**	**6,547**	**0**	**0**	**$ 90,674**	**$ 1,113,690**	**12.3**	**11.7**	**242**	**$ 54,899**	**0**	**11.7**	**2,068**	**5,719,445**	**91,549**	**-**	########	**0.1**	**($219,820)**	**-1.0%**
		% of Existing	**17%**	**18.61%**	**4.95%**	**#DIV/0!**	**#DIV/0!**																

		City:	Newark, NJ				
		Occupied Hours/Week	70	70	70	70	50
			Building	Auditorium	Gymnasium	Library	Classrooms
	Enthalpy		Operating	Occupied	Occupied	Occupied	Occupied
Temp	h (Btu/lb)	Bin Hours	Hours	Hours	Hours	Hours	Hours
102.5							
97.5	35.4	6	3	3	3	3	2
92.5	37.4	31	13	13	13	13	9
87.5	35.0	131	55	55	55	55	39
82.5	33.0	500	208	208	208	208	149
77.5	31.5	620	258	258	258	258	185
72.5	29.9	664	277	277	277	277	198
67.5	27.2	854	356	356	356	356	254
62.5	24.0	927	386	386	386	386	276
57.5	20.3	600	250	250	250	250	179
52.5	18.2	730	304	304	304	304	217
47.5	16.0	491	205	205	205	205	146
42.5	14.5	656	273	273	273	273	195
37.5	12.5	1,023	426	426	426	426	304
32.5	10.5	734	306	306	306	306	218
27.5	8.7	334	139	139	139	139	99
22.5	7.0	252	105	105	105	105	75
17.5	5.4	125	52	52	52	52	37
12.5	3.7	47	20	20	20	20	14
7.5	2.1	34	14	14	14	14	10
2.5	1.3	1	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

Heating System Efficiency	92%
Cooling Eff (kW/ton)	1.26

Heating		
Hours	4,427	Hrs
Weighted Avg	40	F
Avg	28	F

Cooling		
Hours	4,333	Hrs
Weighted Avg	68	F
Avg	78	F

East Brunswick BOE
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Hammarskjold Middle School

ECM-1: Replace Unitary HVAC Equipment With More Efficient Unitary Equipment

Description: This ECM evaluates the energy savings associated with replacing older less efficient heating and cooling equipment with modern high efficiency unitary equipment havings the same capacity

Equipment Tag	Equipment Description	General Type	Cooling Capacity (Btu/h)	Heating Capacity (Btu/h)	QTY
6-Ton	RTU	HVAC	72,000	104,000	7
5-Ton	RTU	HVAC	60,000	104,000	6
4-Ton	RTU	HVAC	48,000	96,000	1
SUM	RTU	HVAC	912,000	1,448,000	14

Item	Value	Units	Formula/Comments	
Demand Rate	$ 7.03	/ kW		
Electricity Rate	$ 0.14	/kWh		
FORMULA CONSTANTS				
Coincidence Factor	0.67		NJ Protocols	
Conversion	3.412	btu/kW		
COOLING - HVAC				
Cooling Capacity	912,000	btu/hr		btuh
Baseline EER	9.5		See Table Below	EERb
Proposed EER	16.0		Equipment	EERq
Equivalent Full Load Hours	1,131	hrs	NJ Protocols	
Demand Savings	26.13	kW		
Energy Savings	108,576	kWh		
HEATING - Heat Pump				
Heating Capacity		btu/h		
Baseline Heating EER	9.5		See Table Below	
Proposed Heating EER	16.0		Equipment	
Equivalent Full Load Hours		hrs		
Heating Savings	-	kWh		
COOLING - Heat Pump				
Cooling Capacity	-	btu/h		
Baseline Cooling EER	9.5		See Table Below	
Proposed Cooling EER	16.0		Equipment	
Equivalent Full Load Hours		hrs		
Cooling Savings	-	kWh		
SAVINGS				
Demand Savings	26.13	kW		
Energy Savings	108,576	kWh		
Cost Savings	$ 14,950			

Savings calculation formulas are taken from NJ Protocols document for Electric HVAC Equipment

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Replace Unitary HVAC Equipment With More Efficient Unitary Equipment - CE

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Existing RTU demolition	14	EA	$ 100	$ 250	$ 1,000	$ 1,438	$ 4,361	$ 15,736	$ 21,535	Estimated
(7) RTU, 6.0 ton RTU	7	EA	$ 5,000	$ 1,500		$ 35,945	$ 13,083	$ -	$ 49,028	RS Means 2015
(6) RTU, 5.0 ton RTU	6	EA	$ 4,000	$ 1,500		$ 24,648	$ 11,214	$ -	$ 35,862	RS Means 2015
(1) RTU, 4.0 ton RTU	1	EA	$ 3,500	$ 1,500		$ 3,595	$ 1,869	$ -	$ 5,464	RS Means 2015
duct adapters	14	EA	$ 1,000	$ 1,000		$ 14,378	$ 17,444	$ -	$ 31,822	Estimated
Electrical - misc.	1	LS	$ 250	$ 250		$ 257	$ 312	$ -	$ 568	Estimated

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 144,279	Subtotal
$ 50,497	35% Contingency
$ 194,800	**Total**

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-2: Kitchen Hood Control

Description: This ECM evaluates the thermal and electrical energy savings associated with the implementation of a variable flow controlled exhaust hood (Fan) and make-up air unit. The Hood controller uses infrared heat sensors to detect the level of smoke produced by the cooking operations and automatically adjsustes the

Item	Value	Units	Formula/Comments	
Fuel Cost	$ 0.86	/ Therm		
Electricity Cost	$ 0.16	/kWh		
FORMULA CONSTANTS				
Conversion	0.746	HP/kW		
Constant	24	hrs/day		
Constant	1.08	(btu/hr)/CFM·F		
Conversion	3,412	btu/kWh		
ELECTRIC FAN SAVINGS				
Facility Type	School			
Quantity of Kitchen Hood Fan Motors	1			Q
Kitchen Hood Fan Motor HP	5.0	HP		HP
Motor Load Factor	0.90		NJ Protocols	LF
Efficiency of Fan Motor(s)	85.0%			FEFF
Kitchen Hood Fan Run Hours	2,080			RH
Fan Motor Power Reduction (From VFD)	0.584			PR
Fan Electricity Savings	4,797	kWh		
HEATING SAVINGS				
Kitchen is Heated?	Y			
Square Footage of Kitchen	1,000	ft^2	Estimated	SF
Code Required Ventilation Rate	0.70	CFM/ft^2	NJ Protocols	CFM/SF
Ventilation Oversize Factor	1.40		NJ Protocols	OF
Flow Reductuion (from VFD/Control)	0.310			FR
Heating Degree Day	2,783		NJ Protocols Table	HDD
Heating System Efficiency	92%		AFUE (%)	HEFF
Heating Savings	238	MMbtu		
Heating Savings	2,382	Therms		
COOLING SAVINGS				
Kitchen is Cooled?	Y			
Cooling Degree Day	893		NJ Protocols Table	CDD
Cooling System Efficiency	3.00		COP	CEFF
Cooling Savings	687	kWh		
TOTAL SAVINGS				
Electricity Savings	5,484	kWh		
Fuel Savings	2,382	Therms		
Cost Savings	$ 2,952			

Savings calculation formulas are taken from NJ Protocols document for Kitchen Hood

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-2: Kitchen Hood Control - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Me-Link Kitchen Hood Control System	1	ls	$ 15,000	$ 2,000		$ 15,405	$ 2,492	$ -	$ 17,897	Vendor Estimation
Electrical - misc.	1	ls	$ 5,000	$ 5,000		$ 5,135	$ 6,230	$ -	$ 11,365	RS Means 2012
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 29,262	Subtotal
$ 10,242	35% Contingency
$ 39,504	**Total**

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-3: Dishwasher Booster Heater Conversion

Description: This ECM evaluates the energy savings associated with replacing an electrically powered dishwasher booster heater with and equivalently sized natural gas booster heater

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.86	/ Therm	
Electricity Cost	$ 0.14	$/kWh	
Demand Cost	$ 7.03	$/kWh	
FORMULA CONSTANTS			
CF	0.3		Coincidence Factor (NJ Protocols)
EFLH	1,000		Equivalent Full Load Hours (NJ Protocols)
PROPOSED EQUIPMENT			
Input Rating	105,000	btu/hr	
Efficiency	80%		
SAVINGS			
Electricity Savings	24,619	kWh	
Demand Savings	7	kW	
Fuel Usage	1,050	Therms	
Fuel Cost Savings	$ 2,493		

Savings calculation formulas are taken from NJ Protocols document for Booster Heater

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-3: Dishwasher Booster Heater Conversion - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Natural Gas Fired Booster Heater	1	EA	$ 7,500	$ 2,500		$ 7,703	$ 3,115	$ -	$ 10,818	RS Means 2012
Piping, .	1	LS	$ 500	$ 1,000		$ 514	$ 1,246	$ -	$ 1,760	RS Means 2012
Venting	1	LS	$ 1,000	$ 1,000		$ 1,027	$ 1,246	$ -	$ 2,273	RS Means 2012
electrical	1	LS	$ 250	$ 250		$ 257	$ 312	$ -	$ 568	RS Means 2012
						$ -	$ -	$ -	$ -	

$ 15,418	Subtotal
$ 5,396	35% Contingency
$ 20,800	**Total**

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-4: Re-Commission Building Controls System

Summary: During our site visit it was unseasonably warm. The heating system was operating to provide minimal heat. Air conditioning was also being operated to cool the cafeteria. This could have been accomplished with an economizer sequence. It is recommended to review the sequence of operations and re-program

Building Information:

271,520 Sq Footage

$0.16 $/kWh Blended
$0.86 $/Therm

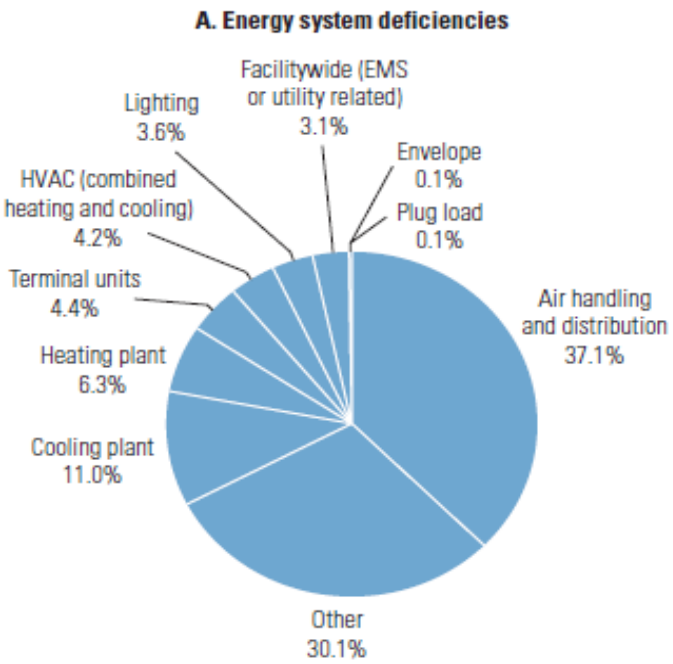
EXISTING CONDITIONS		
Existing Facility Total Electric usage	2,642,402	kWh
Existing Facility Total Gas usage	132,263	Therms
Existing Facility Cooling Electric usage	1,035,771	kWh[1]
Existing Facility Heating Natural Gas usage	104304.35	Therms[2]
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	51,789	kWh
Proposed Facility Natural Gas Savings	5215.2175	Therms
SAVINGS		
Retro-Commissioning Electric Savings	51,789	**kWh**
Retro-Commissioning Natural Gas Savings	5,215	**Therms**
Total cost savings	$ 12,947.48	

Assumptions

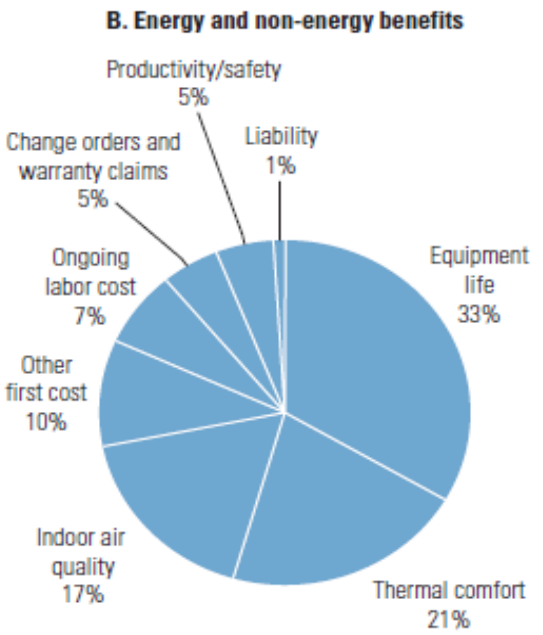
1 39% of facility total electricity dedicated to Cooling based on Building Utility Analysis
2 79% of facility total natural gas dedicated to Heating based on Building Utility Analysis
3 5% Typical Savings associated with Retro-Commissioning of controls based on EPA Energy Star Report (CH 5 - Retrocommissioning)

Figure 5.2: Retrocommissioning results

Building energy system deficiencies: A recent study of retrocommissioning revealed a wide variety of problems—those related to the overall HVAC system were the most common type (A). Energy and non-energy benefits: Retrocommissioning provided both energy and non-energy benefits—the most common of these, noted in one-third of the buildings surveyed, was the extension of equipment life (B).



Note: EMS = energy management system.



Courtesy: E SOURCE; data from Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., and Energy Systems Laboratory, Texas A&M University

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-4: Re-Commission Building Controls System - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Controls and Sensors Retro-Commissioning	271520	SF	$ 0.27	INC	INC	$ 75,290	INC	INC	$ 75,290	EPA Estimate
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 75,290	Subtotal
$ 26,351	35% Contingency
$ 101,641	**Total**

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-5: Walk-in Cooler & Freezer EC Motor Retrofits

ECM Description :
This kitchen contains one (1) 12x8 walk in freezer and one (1) 12x12 walke in cooler. For kitchens that contain walk-in coolers and freezers, CoolTrol is a controller that reduces energy consumption by controlling off of dewpoint temperature. Compressor cycling is reduced and the evaporator fans run 25% to 80% less. Door and frame heaters are also installed and controlled by store dew point temperature; this can reduce run time by up to 95% in coolers and 60% in freezers. The evaporator fan motors are also replaced with hi-efficiency fan motors saving 40% to 70% in energy. The proposed system comprises of an anti-sweat door controller, evaporator fan motor replacement and CoolTrol Cooler Control System.

Utility Cost

$0.16 $/kWh Blended

EXISTING CONDITIONS			
Walk-In Freezer(s)			
Existing Freezer Controls?	N		
Quantity of Walk-In Freezers	1		
Nameplate Amps of Freezer Evaporator Fan	4		AmpsEF
Nameplate Volts of Freezer Evaporator Fan	280		VoltsEF
Phase of Evaporator Fan	1		PhaseEF
Power Factor of Evaporator Fan	0.55		PFEF
Operating Hours	8,760	hrs	
Load Reduction	65%		LR
Electricity Savings (Evaporator Fan)	3,157	kWh	kWhEF
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	kWhRH
Total Walk-In Freezer(s) Electricity Savings	4,571	kWh	
Walk-In Cooler(s)			
Existing Cooler Controls?	N		
Quantity of Walk-In Coolers	1		
Nameplate Amps of Cooler Evaporator Fan	4		
Nameplate Volts of Cooler Evaporator Fan	280		
Phase of Evaporator Fan	1		
Power Factor of Evaporator Fan	0.55		
Operating Hours	8,760	hrs	
Load Reduction	65%		
Electricity Savings (Evaporator Fan)	3,157	kWh	
Electricity Savings (Evaporator Fan Reduced Heat)	1,414	kWh	
Total Walk-In Cooler(s) Electricity Savings	4,571	kWh	
SAVINGS			
Total Electricity Savings	**9,142**	**kWh**	
Total Cost Savings	**$ 1,490**		
Estimated Cost	$ 22,275		
Simple Payback	14.9	**years**	

Savings calculation formulas are taken from NJ Protocols document for Walk-in Controller

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

ECM-5: Walk-in Cooler & Freezer EC Motor Retrofits - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Turnkey Walk-In Controller & Equipment	1	EA	$ 10,000	$ 5,000	$ -	$ 10,270	$ 6,230	$ -	$ 16,500	Vendor Estimate
						$ -	$ -	$ -	$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

$ 16,500	Subtotal
$ 5,775	35% Contingency
$ 22,275	**Total**

East Brunswick BOE
CHA Project Number: 31007
Hammarskjold Middle School

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2015.
Building must have a minimum average electric demand of 200 kW and minimum area of building is 50,000 ft to be most cost-effective for commercial and industrial buildings. However, multifamily buildings with peak demand over 100kW are still eligible. Market manager has the discretion to approve applications that fall below 200kW minimum.

At a minimum, all recommended measures were used for this calculation. To qualify for P4P incentives, the following P4P requirements must be met:

- At least 15% source energy savings
- No more than 50% savings from lighting measures
- up to 70% of lighting savings may be considered but performance target will increase by 1% for each percent over 50%
- Scope should includes two or more unique measures
- Project has at least a 10% internal rate of return
- At least 50% of the source energy savings must come from investor-owned electricity and/or natural gas (note: exemption for fuel conversions)

Total Building Area (Square Feet)	271,520
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilites (BPU)

Incentive #1		
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$431,809	$114,261
Existing Usage (from utility)	2,642,402	132,263
Proposed Savings	491,762	6,547
Existing Total MMBtus	22,898	
Proposed Savings MMBtus	2,364	
% Energy Reduction	**10.3%**	
Proposed Annual Savings	$90,674	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm
Incentive #2	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.00	$0.00
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.00	$0.00

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$0
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$0**

Total Project Cost	$1,113,690

		Allowable Incentive
% Incentives #1 of Utility Cost*	0.0%	$0
% Incentives #2 of Project Cost**	0.0%	$0
% Incentives #3 of Project Cost**	0.0%	$0
Total Eligible Incentives***	**$0**	
Project Cost w/ Incentives	$1,113,690	

Project Payback (years)	
w/o Incentives	w/ Incentives
12.3	12.3

	Source to S
Electric Grid	3.14
Electric Onsite	1
Natural Gas	1.05
Fuel Oil/Propane	1.01
District Steam/HHW	1.2
District CHW	1
Other	1

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if LGEA is funded by NJBPU.
** Maximum allowable amount of Incentive #2 is 50% of total project cost.
**Maximum allowable amount of Incentive #3 is 50% of total project cost.
*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account; maximum 2 million per project

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	A101	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A102	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
275LED	Stair 1	Hallways	5	1T 24 W F 3 (ELE)	F23GHL	87	0.44	SW	2520	1,096	None	
35LED	A103	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A104	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A105	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A106	Classrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	A107	Classrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	A108	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A109	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
34LED	A114	Restrooms	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1680	297	None	
35LED	A113	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A115	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
34LED	A116	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	A111	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	A112	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
35LED	A110	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A119	Restrooms	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1680	297	None	
34LED	A118	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
34LED	A117	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	A122	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	A121	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
34LED	A120	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	A123	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A128	Offices	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	2520	149	None	
35LED	A127	Offices	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	2520	1,346	None	
35LED	A126	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A125	Classrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	A124	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
275LED	Stair 2	Hallways	3	1T 24 W F 3 (ELE)	F23GHL	87	0.26	SW	2520	658	None	
276LED	A137	Library	95	1T 54 P F 2 (ELE)	F42GHL	117	11.12	OCC	1680	18,673	None	
25	A138	Library	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.17	OCC	1680	282	None	
34LED	A155	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	A156	Library	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	A158	Library	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	A157	Library	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	A138	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	A139	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	A133	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
34LED	A131	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	A132	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
35LED	A134	Conference	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1050	187	None	
35LED	A136	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	A135	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
275LED	Stair 3	Hallways	2	1T 24 W F 3 (ELE)	F23GHL	87	0.17	SW	2520	438	None	
25	Stair 3	Hallways	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.06	SW	2520	141	None	
34LED	A140	Storage	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1800	319	None	
35LED	A141	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A142	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A134	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A129	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A130	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
275LED	Stair 4	Hallways	3	1T 24 W F 3 (ELE)	F23GHL	87	0.26	SW	2520	658	None	
34LED	A145	Hallways	11	1T 32 C F 2 (ELE)	F42ILL	59	0.65	SW	2520	1,635	None	
25	A145	Hallways	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.31	SW	2520	776	None	
254LED	A145	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	P109	Hallways	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	2520	1,784	None	
25	P109	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	
277LED	P109	Hallways	1	1T 54 C F 4 (ELE)	F44GHL	234	0.23	SW	2520	590	None	
34LED	P107	Hallways	5	1T 32 C F 2 (ELE)	F42ILL	59	0.30	SW	2520	743	None	
25	P107	Hallways	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.22	SW	2520	564	None	
254LED	P107	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	P108	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	P108	Hallways	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.08	SW	2520	212	None	
34LED	P104	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	P104	Hallways	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.17	SW	2520	423	None	
34LED	P103	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	P103	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
25	P101	Hallways	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.06	SW	2520	141	None	
34LED	P102	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
25	P102	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
254LED	P102	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	P106	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	P106	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
34LED	P105	Hallways	14	1T 32 C F 2 (ELE)	F42ILL	59	0.83	SW	2520	2,082	None	
35LED	B101	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B102	Classrooms	5	T 32 R F 3 (ELE)	F43ILL	89	0.45	OCC	1680	748	None	
35LED	B104	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	B103	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B105	Offices	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	2520	224	None	
35LED	B106	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B107	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
276LED	Stair 5	Hallways	3	1T 54 P F 2 (ELE)	F42GHL	117	0.35	SW	2520	885	None	
35LED	B110	Restrooms	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	1680	449	None	
34LED	B109	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	B108	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	B113	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	B111	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
34LED	B112	Classrooms	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1680	198	None	
35LED	B114	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	B115	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	B116	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	B117	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
34LED	B118	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	B119	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	B120	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	B121	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	B122	Restrooms	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	1680	449	None	
35LED	B123	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B124	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B125	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
34LED	B127	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	B127	Hallways	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.14	SW	2520	353	None	
34LED	B128	Hallways	14	1T 32 C F 2 (ELE)	F42ILL	59	0.83	SW	2520	2,082	None	
25	B129	Hallways	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.14	SW	2520	353	None	
34LED	B129	Hallways	7	1T 32 C F 2 (ELE)	F42ILL	59	0.41	SW	2520	1,041	None	
34LED	B130	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
25	B130	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	
34LED	B131	Hallways	10	1T 32 C F 2 (ELE)	F42ILL	59	0.59	SW	2520	1,487	None	
25	B131	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
34LED	B131	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
35LED	C101	Storage	14	T 32 R F 3 (ELE)	F43ILL	89	1.25	OCC	1800	2,243	None	
34LED	C102	Mechanical Room	9	1T 32 C F 2 (ELE)	F42ILL	59	0.53	OCC	1680	892	None	
35LED	C103	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
34LED	Stair 6	Hallways	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	SW	2520	446	None	
35LED	C104	Classrooms	27	T 32 R F 3 (ELE)	F43ILL	89	2.40	OCC	1680	4,037	None	
35LED	C105	Restrooms	7	T 32 R F 3 (ELE)	F43ILL	89	0.62	OCC	1680	1,047	None	
35LED	C106	Restrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	C107	Restrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	C108	Restrooms	7	T 32 R F 3 (ELE)	F43ILL	89	0.62	OCC	1680	1,047	None	
35LED	C109	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	C113	Storage	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	OCC	1800	850	None	
277LED	C112	Auditorium	34	1T 54 C F 4 (ELE)	F44GHL	234	7.96	SW	1680	13,366	None	
34LED	C111	Storage	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1800	319	None	
277LED	C140	Auditorium	1	1T 54 C F 4 (ELE)	F44GHL	234	0.23	SW	1680	393	None	
34LED	C114	Auditorium	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	SW	1680	99	None	
34LED	C116	Auditorium	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	SW	1680	99	None	
35LED	C117	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1800	160	None	
254LED	C137	Auditorium	8	CFQ26/2	CFQ26/2	66	0.53	SW	1680	887	None	
278LED	C137	Auditorium	41	Q400/1 T4 Frosted	H400/1	400	16.40	SW	1680	27,552	None	
25	C139	Auditorium	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.08	SW	1680	141	None	
35LED	C138	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1800	160	None	
34LED	C137	Auditorium	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	1680	396	None	
34LED	C119	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	C120	Auditorium	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	SW	1680	150	None	
34LED	C122	Auditorium	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	SW	1680	198	None	
278LED	C123	Classrooms	16	Q400/1 T4 Frosted	H400/1	400	6.40	SW	1680	10,752	None	
15LED	C123	Classrooms	18	S 32 C F 2 (ELE)	F42LL	60	1.08	SW	1680	1,814	None	
278LED	C132	Classrooms	16	Q400/1 T4 Frosted	H400/1	400	6.40	SW	1680	10,752	None	
34LED	C132	Classrooms	18	1T 32 C F 2 (ELE)	F42ILL	59	1.06	SW	1680	1,784	None	
35LED	C127	Auditorium	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	SW	1680	598	None	
34LED	C126	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	

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$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	C125	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1800	160	None	
35LED	C130	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1800	160	None	
34LED	C124	Linen/Utility/Wet/Janitor/Electrical	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1050	124	None	
34LED	C129	Linen/Utility/Wet/Janitor/Electrical	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1050	124	None	
35LED	C128	Auditorium	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	1680	299	None	
34LED	C134	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	C135	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1800	160	None	
35LED	C141	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	C142	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
252	C147	Gym	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.32	SW	1680	10,614	None	
34LED	C148	Gym	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	SW	1680	297	None	
35LED	C144	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	C145	Restrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	C146	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	C153	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
34LED	C151	Storage	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	OCC	1800	637	None	
34LED	C152	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
34LED	C149	Hallways	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	SW	2520	297	None	
34LED	C148	Storage	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	OCC	1800	425	None	
35LED	C154	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	C155	Restrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	C156	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
252	C160	Gym	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.32	SW	1680	10,614	None	
34LED	C157	Gym	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	SW	1680	297	None	
34LED	C158	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	C159	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
34LED	C162	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	C161	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
34LED	D136	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
254LED	D136	Hallways	7	CFQ26/2	CFQ26/2	66	0.46	SW	2520	1,164	None	
34LED	P119	Hallways	15	1T 32 C F 2 (ELE)	F42ILL	59	0.89	SW	2520	2,230	None	
254LED	P119	Hallways	8	CFQ26/2	CFQ26/2	66	0.53	SW	2520	1,331	None	
262LED	P119	Hallways	4	CF42/3	CF42/3-I	141	0.56	SW	2520	1,421	None	
25	P119	Hallways	7	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.20	SW	2520	494	None	
34LED	C164	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
254LED	C164	Hallways	8	CFQ26/2	CFQ26/2	66	0.53	SW	2520	1,331	None	
262LED	C164	Hallways	4	CF42/3	CF42/3-I	141	0.56	SW	2520	1,421	None	
34LED	C165	Hallways	20	1T 32 C F 2 (ELE)	F42ILL	59	1.18	SW	2520	2,974	None	
254LED	C165	Hallways	5	CFQ26/2	CFQ26/2	66	0.33	SW	2520	832	None	
35LED	D101	Restrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	D102	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	D103	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	D104	Restrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
276LED	D105	Cafeteria	182	1T 54 P F 2 (ELE)	F42GHL	117	21.29	SW	1680	35,774	None	
254LED	E138	Hallways	8	CFQ26/2	CFQ26/2	66	0.53	SW	2520	1,331	None	
254LED	Outside	Outdoor lighting	16	CFQ26/2	CFQ26/2	66	1.06	SW	2520	2,661	None	
254LED	P121	Hallways	25	CFQ26/2	CFQ26/2	66	1.65	SW	2520	4,158	None	
34LED	P121	Hallways	17	1T 32 C F 2 (ELE)	F42ILL	59	1.00	SW	2520	2,528	None	
35LED	D107	Cafeteria	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	SW	1680	1,794	None	
35LED	D108	Storage	9	T 32 R F 3 (ELE)	F43ILL	89	0.80	OCC	1800	1,442	None	
35LED	D109	Cafeteria	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	1680	299	None	
34LED	D110	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	D113	Storage	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1800	641	None	
34LED	D111	Restrooms	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1680	297	None	
35LED	D117	Storage	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1800	961	None	
35LED	D123-128	Cafeteria	24	T 32 R F 3 (ELE)	F43ILL	89	2.14	SW	1680	3,588	None	
35LED	D121	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	D119	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	SW	1800	160	None	
35LED	D114	Hallways	5	T 32 R F 3 (ELE)	F43ILL	89	0.45	SW	2520	1,121	None	
35LED	D118	Hallways	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	2520	449	None	
35LED	D135/134	Cafeteria	20	T 32 R F 3 (ELE)	F43ILL	89	1.78	SW	1680	2,990	None	
35LED	D120	Storage	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	SW	1800	160	None	
35LED	D132	Hallways	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	2520	449	None	
35LED	D129	Cafeteria	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	SW	1680	1,794	None	
35LED	D131	Cafeteria	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	SW	1680	449	None	
34LED	D130	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
254LED	E148	Hallways	37	CFQ26/2	CFQ26/2	66	2.44	SW	2520	6,154	None	
25	E148	Hallways	12	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.34	SW	2520	847	None	
34LED	E148	Hallways	18	1T 32 C F 2 (ELE)	F42ILL	59	1.06	SW	2520	2,676	None	
35LED	E140	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E150	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	E149	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	E148	Offices	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	2520	673	None	
35LED	E143	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	E142	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	E141	Offices	11	T 32 R F 3 (ELE)	F43ILL	89	0.98	OCC	2520	2,467	None	
35LED	E147	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
35LED	E139	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E135	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
34LED	E137	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	E133	Offices	8	T 32 R F 3 (ELE)	F43ILL	89	0.71	OCC	2520	1,794	None	
35LED	E134	Offices	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	2520	673	None	
34LED	E129	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
25	E134	Offices	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	OCC	2520	282	None	
35LED	E131	Offices	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	2520	224	None	
35LED	E122	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	E120	Classrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	E119	Classrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	E123	Hallways	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	SW	2520	897	None	
35LED	E124	Conference	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1050	561	None	
34LED	E125	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	E117	Classrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	E116	Classrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
34LED	E126	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	E115	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E114	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E127	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	E113	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E112	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E111	Hallways	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	2520	449	None	
35LED	E128	Hallways	8	T 32 R F 3 (ELE)	F43ILL	89	0.71	SW	2520	1,794	None	
35LED	E108	Hallways	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	SW	2520	1,346	None	
35LED	E104	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E105	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E106	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	E107	Offices	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	2520	897	None	
34LED	E154/155	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
254LED	E156	Hallways	8	CFQ26/2	CFQ26/2	66	0.53	SW	2520	1,331	None	
34LED	P128	Hallways	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2520	892	None	
254LED	P128	Hallways	3	CFQ26/2	CFQ26/2	66	0.20	SW	2520	499	None	
35LED	E103	Classrooms	20	T 32 R F 3 (ELE)	F43ILL	89	1.78	OCC	1680	2,990	None	
35LED	E163	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	E164	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	E103	Classrooms	20	T 32 R F 3 (ELE)	F43ILL	89	1.78	OCC	1680	2,990	None	
35LED	E161	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	E162	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	E103	Classrooms	20	T 32 R F 3 (ELE)	F43ILL	89	1.78	OCC	1680	2,990	None	
35LED	E160	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	E159	Classrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	A201	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A202	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	Stair 1	Hallways	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	SW	2520	1,346	None	
35LED	A203	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A204	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A205	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A206	Classrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	A207	Classrooms	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	OCC	1680	598	None	
35LED	A208	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A209	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
34LED	A214	Restrooms	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1680	297	None	
35LED	A213	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A215	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
34LED	A216	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	A211	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	A212	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
35LED	A210	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A219	Restrooms	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	OCC	1680	297	None	
34LED	A217	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
34LED	A218	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	A220	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	A222	Classrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
34LED	A221	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	A223	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	A228	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	A227	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A226	Classrooms	5	T 32 R F 3 (ELE)	F43ILL	89	0.45	OCC	1680	748	None	
35LED	A225	Classrooms	5	T 32 R F 3 (ELE)	F43ILL	89	0.45	OCC	1680	748	None	
35LED	A224	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	Stair 2	Hallways	4	T 32 R F 3 (ELE)	F43ILL	89	0.36	SW	2520	897	None	
35LED	A233	Classrooms	16	T 32 R F 3 (ELE)	F43ILL	89	1.42	OCC	1680	2,392	None	
35LED	A232	Classrooms	16	T 32 R F 3 (ELE)	F43ILL	89	1.42	OCC	1680	2,392	None	
35LED	A238	Classrooms	16	T 32 R F 3 (ELE)	F43ILL	89	1.42	OCC	1680	2,392	None	
35LED	A239	Classrooms	16	T 32 R F 3 (ELE)	F43ILL	89	1.42	OCC	1680	2,392	None	
34LED	B233	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	OCC	2520	595	None	
35LED	A236	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	A235	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	A236	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	A237	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
35LED	Stair 3	Hallways	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	2520	449	None	
25	Stair 3	Hallways	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.06	SW	2520	141	None	
34LED	A240	Classrooms	16	1T 32 C F 2 (ELE)	F42ILL	59	0.94	OCC	1680	1,586	None	
35LED	A241	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A242	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A231	Classrooms	16	T 32 R F 3 (ELE)	F43ILL	89	1.42	OCC	1680	2,392	None	
35LED	A229	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	A230	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	Stair 4	Hallways	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	SW	2520	449	None	
34LED	Hallway	Hallways	11	1T 32 C F 2 (ELE)	F42ILL	59	0.65	SW	2520	1,635	None	
25	Hallway	Hallways	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.31	SW	2520	776	None	
254LED	Hallway	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	Hallway	Hallways	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	2520	1,784	None	
25	Hallway	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	
277LED	Hallway	Hallways	1	1T 54 C F 4 (ELE)	F44GHL	234	0.23	SW	2520	590	None	
34LED	Hallway	Hallways	5	1T 32 C F 2 (ELE)	F42ILL	59	0.30	SW	2520	743	None	
25	Hallway	Hallways	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.22	SW	2520	564	None	
254LED	Hallway	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	Hallway	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	Hallway	Hallways	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.08	SW	2520	212	None	
34LED	Hallway	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	Hallway	Hallways	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.17	SW	2520	423	None	
34LED	Hallway	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	Hallway	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
25	Hallway	Hallways	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.06	SW	2520	141	None	
34LED	Hallway	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
25	Hallway	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	
254LED	Hallway	Hallways	1	CFQ26/2	CFQ26/2	66	0.07	SW	2520	166	None	
34LED	Hallway	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2520	1,189	None	
25	Hallway	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
34LED	Hallway	Hallways	14	1T 32 C F 2 (ELE)	F42ILL	59	0.83	SW	2520	2,082	None	
34LED	F137	Classrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	F128	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
34LED	F129	Classrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	F127	Classrooms	24	T 32 R F 3 (ELE)	F43ILL	89	2.14	OCC	1680	3,588	None	
35LED	F123	Classrooms	24	T 32 R F 3 (ELE)	F43ILL	89	2.14	OCC	1680	3,588	None	
35LED	F122	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	F126	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	F120	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	P129 - 132	Hallways	22	1T 32 C F 2 (ELE)	F42ILL	59	1.30	SW	2520	3,271	None	
254LED	P129 - 132	Hallways	12	CFQ26/2	CFQ26/2	66	0.79	SW	2520	1,996	None	
35LED	F107	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
34LED	F108	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
34LED	F109	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	F111	Restrooms	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1680	299	None	
35LED	F110	Restrooms	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	1680	449	None	
35LED	F105	Classrooms	27	T 32 R F 3 (ELE)	F43ILL	89	2.40	OCC	1680	4,037	None	
34LED	F106	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	F103	Classrooms	27	T 32 R F 3 (ELE)	F43ILL	89	2.40	OCC	1680	4,037	None	
34LED	F104	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	F112	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	F113	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
34LED	F114	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	F101	Classrooms	27	T 32 R F 3 (ELE)	F43ILL	89	2.40	OCC	1680	4,037	None	
34LED	F102	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
Existing Lighting & Audit Input

Cost of Electricity: **$0.136** **$/kWh**
$7.03 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
34LED	F115	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	F116	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	F117	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	F118	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	P133 - 136	Hallways	19	1T 32 C F 2 (ELE)	F42ILL	59	1.12	SW	2520	2,825	None	
254LED	P133 - 136	Hallways	13	CFQ26/2	CFQ26/2	66	0.86	SW	2520	2,162	None	
25	P133 - 136	Hallways	1	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.03	SW	2520	71	None	
34LED	P105	Hallways	14	1T 32 C F 2 (ELE)	F42ILL	59	0.83	SW	2520	2,082	None	
35LED	B201	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B202	Classrooms	5	T 32 R F 3 (ELE)	F43ILL	89	0.45	OCC	1680	748	None	
35LED	B203	Classrooms	6	T 32 R F 3 (ELE)	F43ILL	89	0.53	OCC	1680	897	None	
35LED	B204	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B205	Offices	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	2520	224	None	
35LED	B206	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B207	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	Stair 5	Hallways	7	T 32 R F 3 (ELE)	F43ILL	89	0.62	SW	2520	1,570	None	
35LED	B210	Restrooms	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	1680	449	None	
34LED	B208	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
35LED	B209	Restrooms	1	T 32 R F 3 (ELE)	F43ILL	89	0.09	OCC	1680	150	None	
35LED	B211	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	B213	Storage	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	1800	320	None	
34LED	B212	Classrooms	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1680	198	None	
35LED	B214	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	B215	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
35LED	B216	Offices	2	T 32 R F 3 (ELE)	F43ILL	89	0.18	OCC	2520	449	None	
34LED	B217	Storage	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	1800	212	None	
35LED	B218	Classrooms	18	T 32 R F 3 (ELE)	F43ILL	89	1.60	OCC	1680	2,691	None	
34LED	B219	Storage	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1800	106	None	
34LED	B220	Restrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	OCC	1680	99	None	
35LED	B221	Restrooms	3	T 32 R F 3 (ELE)	F43ILL	89	0.27	OCC	1680	449	None	
35LED	B225	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B226	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
35LED	B227	Classrooms	12	T 32 R F 3 (ELE)	F43ILL	89	1.07	OCC	1680	1,794	None	
34LED	P212	Hallways	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	OCC	2520	1,189	None	
25	P212	Hallways	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.14	SW	2520	353	None	
34LED	B230	Hallways	14	1T 32 C F 2 (ELE)	F42ILL	59	0.83	SW	2520	2,082	None	
25	B231	Hallways	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.14	SW	2520	353	None	
34LED	B231	Hallways	7	1T 32 C F 2 (ELE)	F42ILL	59	0.41	SW	2520	1,041	None	
34LED	B232	Hallways	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	2520	595	None	
25	B232	Hallways	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.28	SW	2520	706	None	
34LED	B233	Hallways	10	1T 32 C F 2 (ELE)	F42ILL	59	0.59	SW	2520	1,487	None	
25	B233	Hallways	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2520	282	None	
9	Parking	Outdoor lighting	46	High Bay MH 400 35 Feet High	MH400/1	458	21.07	SW	2520	53,091	None	
146	Parking	Outdoor lighting	24	High Bay MH 400	MH400/2	916	21.98	SW	2520	55,400	None	
102	Ext Wall	Outdoor lighting	34	O CF 26	CFQ26/1-L	27	0.92	SW	2520	2,313	None	
	Total		**3,136**				**325.98**			**633,621**		

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	A101	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A102	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
275LED	Stair 1	5	1T 24 W F 3 (ELE)	F23GHL	87	0.4	SW	2520	1,096	5	2T 25 R LED	2RTLED	25	0.1	None	2,520	315	781	0.3	$ 132.39	$ 1,012.50	$ 75	7.6	7.1
35LED	A103	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A104	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A105	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A106	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	A107	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	A108	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A109	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
34LED	A114	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
35LED	A113	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A115	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	A116	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	A111	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	A112	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
35LED	A110	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A119	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
34LED	A118	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	A117	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	A122	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	A121	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
34LED	A120	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	A123	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A128	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	2520	149	1	4 ft LED Tube	200732x2	30	0.0	None	2,520	76	73	0.0	$ 12.39	$ 233.70	$ 10	18.9	18.1
35LED	A127	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	2520	1,346	6	T 59 R LED	RTLED38	38	0.2	None	2,520	575	771	0.3	$ 130.69	$ 1,417.50	$ 90	10.8	10.2
35LED	A126	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A125	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	A124	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
275LED	Stair 2	3	1T 24 W F 3 (ELE)	F23GHL	87	0.3	SW	2520	658	3	2T 25 R LED	2RTLED	25	0.1	None	2,520	189	469	0.2	$ 79.44	$ 607.50	$ 45	7.6	7.1
276LED	A137	95	1T 54 P F 2 (ELE)	F42GHL	117	11.1	OCC	1680	18,673	95	4 ft LED Tube	200732x2	30	2.9	None	1,680	4,788	13,885	8.3	$ 2,585.62	$ 22,201.50	$ 950	8.6	8.2
25	A138	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	OCC	1680	282	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	1,680	282	-	0.0	$ -	$ -	$ -		
34LED	A155	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	A156	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	A158	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	A157	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	A138	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	A139	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	A133	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
34LED	A131	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	A132	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
35LED	A134	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1050	187	2	T 59 R LED	RTLED38	38	0.1	None	1,050	80	107	0.1	$ 23.17	$ 472.50	$ 30	20.4	19.1
35LED	A136	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	A135	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
275LED	Stair 3	2	1T 24 W F 3 (ELE)	F23GHL	87	0.2	SW	2520	438	2	2T 25 R LED	2RTLED	25	0.1	None	2,520	126	312	0.1	$ 52.96	$ 405.00	$ 30	7.6	7.1
25	Stair 3	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	141	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	141	-	0.0	$ -	$ -	$ -		
34LED	A140	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1800	319	3	4 ft LED Tube	200732x2	30	0.1	None	1,800	162	157	0.1	$ 28.64	$ 701.10	$ 30	24.5	23.4
35LED	A141	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A142	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A134	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A129	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A130	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
275LED	Stair 4	3	1T 24 W F 3 (ELE)	F23GHL	87	0.3	SW	2520	658	3	2T 25 R LED	2RTLED	25	0.1	None	2,520	189	469	0.2	$ 79.44	$ 607.50	$ 45	7.6	7.1
34LED	A145	11	1T 32 C F 2 (ELE)	F42ILL	59	0.6	SW	2520	1,635	11	4 ft LED Tube	200732x2	30	0.3	None	2,520	832	804	0.3	$ 136.24	$ 2,570.70	$ 110	18.9	18.1
25	A145	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	776	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	776	-	0.0	$ -	$ -	$ -		
254LED	A145	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	P109	12	1T 32 C F 2 (ELE)	F42ILL	59	0.7	SW	2520	1,784	12	4 ft LED Tube	200732x2	30	0.4	None	2,520	907	877	0.3	$ 148.62	$ 2,804.40	$ 120	18.9	18.1
25	P109	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -		
277LED	P109	1	1T 54 C F 4 (ELE)	F44GHL	234	0.2	SW	2520	590	1	T 74 R LED	RTLED50	50	0.1	None	2,520	126	464	0.2	$ 78.58	$ 236.25	$ 20	3.0	2.8
34LED	P107	5	1T 32 C F 2 (ELE)	F42ILL	59	0.3	SW	2520	743	5	4 ft LED Tube	200732x2	30	0.2	None	2,520	378	365	0.1	$ 61.93	$ 1,168.50	$ 50	18.9	18.1
25	P107	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	SW	2520	564	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	2,520	564	-	0.0	$ -	$ -	$ -		
254LED	P107	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	P108	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	P108	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	212	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	212	-	0.0	$ -	$ -	$ -		
34LED	P104	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	P104	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	SW	2520	423	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	2,520	423	-	0.0	$ -	$ -	$ -		
34LED	P103	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	P103	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
25	P101	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	141	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	141	-	0.0	$ -	$ -	$ -		
34LED	P102	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
25	P102	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -		
254LED	P102	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	P106	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	P106	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
34LED	P105	14	1T 32 C F 2 (ELE)	F42ILL	59	0.8	SW	2520	2,082	14	4 ft LED Tube	200732x2	30	0.4	None	2,520	1,058	1,023	0.4	$ 173.39	$ 3,271.80	$ 140	18.9	18.1
35LED	B101	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B102	5	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	748	5	T 59 R LED	RTLED38	38	0.2	None	1,680	319	428	0.3	$ 79.77	$ 1,181.25	$ 75	14.8	13.9
35LED	B104	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	B103	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B105	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	2520	224	1	T 59 R LED	RTLED38	38	0.0	None	2,520	96	129	0.1	$ 21.78	$ 236.25	$ 15	10.8	10.2
35LED	B106	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B107	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
276LED	Stair 5	3	1T 54 P F 2 (ELE)	F42GHL	117	0.4	SW	2520	885	3	4 ft LED Tube	200732x2	30	0.1	None	2,520	227	658	0.3	$ 111.47	$ 701.10	$ 30	6.3	6.0
35LED	B110	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
34LED	B109	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	B108	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	B113	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	B111	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
34LED	B112	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	198	2	4 ft LED Tube	200732x2	30	0.1	None	1,680	101	97	0.1	$ 18.14	$ 467.40	$ 20	25.8	24.7
35LED	B114	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	B115	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	B116	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	B117	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
34LED	B118	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	B119	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	B120	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	B121	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	B122	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
35LED	B123	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B124	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B125	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
34LED	B127	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	B127	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	353	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	353	-	0.0	$ -	$ -	$ -		
34LED	B128	14	1T 32 C F 2 (ELE)	F42ILL	59	0.8	SW	2520	2,082	14	4 ft LED Tube	200732x2	30	0.4	None	2,520	1,058	1,023	0.4	$ 173.39	$ 3,271.80	$ 140	18.9	18.1
25	B129	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	353	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	353	-	0.0	$ -	$ -	$ -		
34LED	B129	7	1T 32 C F 2 (ELE)	F42ILL	59	0.4	SW	2520	1,041	7	4 ft LED Tube	200732x2	30	0.2	None	2,520	529	512	0.2	$ 86.70	$ 1,635.90	$ 70	18.9	18.1
34LED	B130	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
25	B130	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -		
34LED	B131	10	1T 32 C F 2 (ELE)	F42ILL	59	0.6	SW	2520	1,487	10	4 ft LED Tube	200732x2	30	0.3	None	2,520	756	731	0.3	$ 123.85	$ 2,337.00	$ 100	18.9	18.1
25	B131	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
34LED	B131	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
35LED	C101	14	T 32 R F 3 (ELE)	F43ILL	89	1.2	OCC	1800	2,243	14	T 59 R LED	RTLED38	38	0.5	None	1,800	958	1,285	0.7	$ 235.02	$ 3,307.50	$ 210	14.1	13.2
34LED	C102	9	1T 32 C F 2 (ELE)	F42ILL	59	0.5	OCC	1680	892	9	4 ft LED Tube	200732x2	30	0.3	None	1,680	454	438	0.3	$ 81.65	$ 2,103.30	$ 90	25.8	24.7
35LED	C103	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
34LED	Stair 6	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	446	3	4 ft LED Tube	200732x2	30	0.1	None	2,520	227	219	0.1	$ 37.16	$ 701.10	$ 30	18.9	18.1
35LED	C104	27	T 32 R F 3 (ELE)	F43ILL	89	2.4	OCC	1680	4,037	27	T 59 R LED	RTLED38	38	1.0	None	1,680	1,724	2,313	1.4	$ 430.78	$ 6,378.75	$ 405	14.8	13.9
35LED	C105	7	T 32 R F 3 (ELE)	F43ILL	89	0.6	OCC	1680	1,047	7	T 59 R LED	RTLED38	38	0.3	None	1,680	447	600	0.4	$ 111.68	$ 1,653.75	$ 105	14.8	13.9
35LED	C106	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	C107	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	C108	7	T 32 R F 3 (ELE)	F43ILL	89	0.6	OCC	1680	1,047	7	T 59 R LED	RTLED38	38	0.3	None	1,680	447	600	0.4	$ 111.68	$ 1,653.75	$ 105	14.8	13.9
35LED	C109	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	C113	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	OCC	1800	850	8	4 ft LED Tube	200732x2	30	0.2	None	1,800	432	418	0.2	$ 76.37	$ 1,869.60	$ 80	24.5	23.4

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
ECM-L3 Lighting Replacements with Occupancy Sensors

	EXISTING CONDITIONS									RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
277LED	C112	34	1T 54 C F 4 (ELE)	F44GHL	234	8.0	SW	1680	13,366	34	T 74 R LED	RTLED50	50	1.7	None	1,680	2,856	10,510	6.3	$ 1,957.13	$ 8,032.50	$ 680	4.1	3.8
34LED	C111	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1800	319	3	4 ft LED Tube	200732x2	30	0.1	None	1,800	162	157	0.1	$ 28.64	$ 701.10	$ 30	24.5	23.4
277LED	C140	1	1T 54 C F 4 (ELE)	F44GHL	234	0.2	SW	1680	393	1	T 74 R LED	RTLED50	50	0.1	None	1,680	84	309	0.2	$ 57.56	$ 236.25	$ 20	4.1	3.8
34LED	C114	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	SW	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	C116	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	SW	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	C117	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
254LED	C137	8	CFQ26/2	CFQ26/2	66	0.5	SW	1680	887	8	EVO35/10	EVO35/10	39	0.3	None	1,680	524	363	0.2	$ 67.57	$ 3,510.00	$ 40	51.9	51.4
278LED	C137	41	Q400/1 T4 Frosted	H400/1	400	16.4	SW	1680	27,552	41	BAYLED78W	BAYLED78W	93	3.8	None	1,680	6,406	21,146	12.6	$ 3,937.72	$ 34,612.02	$ 6,150	8.8	7.2
25	C139	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	1680	141	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	1,680	141	-	0.0	$ -	$ -	$ -		
35LED	C138	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
34LED	C137	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	1680	396	4	4 ft LED Tube	200732x2	30	0.1	None	1,680	202	195	0.1	$ 36.29	$ 934.80	$ 40	25.8	24.7
34LED	C119	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	C120	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	SW	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
34LED	C122	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	SW	1680	198	2	4 ft LED Tube	200732x2	30	0.1	None	1,680	101	97	0.1	$ 18.14	$ 467.40	$ 20	25.8	24.7
278LED	C123	16	Q400/1 T4 Frosted	H400/1	400	6.4	SW	1680	10,752	16	BAYLED78W	BAYLED78W	93	1.5	None	1,680	2,500	8,252	4.9	$ 1,536.67	$ 13,507.13	$ 2,400	8.8	7.2
15LED	C123	18	S 32 C F 2 (ELE)	F42LL	60	1.1	SW	1680	1,814	18	4 ft LED Tube	200732x2	30	0.5	None	1,680	907	907	0.5	$ 168.93	$ 4,206.60	$ 180	24.9	23.8
278LED	C132	16	Q400/1 T4 Frosted	H400/1	400	6.4	SW	1680	10,752	16	BAYLED78W	BAYLED78W	93	1.5	None	1,680	2,500	8,252	4.9	$ 1,536.67	$ 13,507.13	$ 2,400	8.8	7.2
34LED	C132	18	1T 32 C F 2 (ELE)	F42ILL	59	1.1	SW	1680	1,784	18	4 ft LED Tube	200732x2	30	0.5	None	1,680	907	877	0.5	$ 163.30	$ 4,206.60	$ 180	25.8	24.7
35LED	C127	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	SW	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
34LED	C126	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	C125	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
35LED	C130	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
34LED	C124	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1050	124	2	4 ft LED Tube	200732x2	30	0.1	None	1,050	63	61	0.1	$ 13.18	$ 467.40	$ 20	35.5	34.0
34LED	C129	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1050	124	2	4 ft LED Tube	200732x2	30	0.1	None	1,050	63	61	0.1	$ 13.18	$ 467.40	$ 20	35.5	34.0
35LED	C128	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
34LED	C134	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	C135	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
35LED	C141	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	C142	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
252	C147	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.3	SW	1680	10,614	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.3	None	1,680	10,614	-	0.0	$ -	$ -	$ -		
34LED	C148	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
35LED	C144	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	C145	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	C146	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	C153	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
34LED	C151	6	1T 32 C F 2 (ELE)	F42ILL	59	0.4	OCC	1800	637	6	4 ft LED Tube	200732x2	30	0.2	None	1,800	324	313	0.2	$ 57.27	$ 1,402.20	$ 60	24.5	23.4
34LED	C152	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
34LED	C149	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	SW	2520	297	2	4 ft LED Tube	200732x2	30	0.1	None	2,520	151	146	0.1	$ 24.77	$ 467.40	$ 20	18.9	18.1
34LED	C148	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1800	425	4	4 ft LED Tube	200732x2	30	0.1	None	1,800	216	209	0.1	$ 38.18	$ 934.80	$ 40	24.5	23.4
35LED	C154	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	C155	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	C156	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
252	C160	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.3	SW	1680	10,614	18	T 54 W F 6 (ELE) (T-5)	F46GHL	351	6.3	None	1,680	10,614	-	0.0	$ -	$ -	$ -		
34LED	C157	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
34LED	C158	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	C159	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
34LED	C162	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	C161	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
34LED	D136	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
254LED	D136	7	CFQ26/2	CFQ26/2	66	0.5	SW	2520	1,164	7	EVO35/10	EVO35/10	39	0.3	None	2,520	688	476	0.2	$ 80.72	$ 3,071.25	$ 35	38.0	37.6
34LED	P119	15	1T 32 C F 2 (ELE)	F42ILL	59	0.9	SW	2520	2,230	15	4 ft LED Tube	200732x2	30	0.5	None	2,520	1,134	1,096	0.4	$ 185.78	$ 3,505.50	$ 150	18.9	18.1
254LED	P119	8	CFQ26/2	CFQ26/2	66	0.5	SW	2520	1,331	8	EVO35/10	EVO35/10	39	0.3	None	2,520	786	544	0.2	$ 92.25	$ 3,510.00	$ 40	38.0	37.6
262LED	P119	4	CF42/3	CF42/3-I	141	0.6	SW	2520	1,421	4	6BLMWLED	6BLMWLED	13	0.1	None	2,520	131	1,290	0.5	$ 218.66	$ 648.00	$ 20	3.0	2.9
25	P119	7	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	SW	2520	494	7	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	2,520	494	-	0.0	$ -	$ -	$ -		
34LED	C164	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
254LED	C164	8	CFQ26/2	CFQ26/2	66	0.5	SW	2520	1,331	8	EVO35/10	EVO35/10	39	0.3	None	2,520	786	544	0.2	$ 92.25	$ 3,510.00	$ 40	38.0	37.6
262LED	C164	4	CF42/3	CF42/3-I	141	0.6	SW	2520	1,421	4	6BLMWLED	6BLMWLED	13	0.1	None	2,520	131	1,290	0.5	$ 218.66	$ 648.00	$ 20	3.0	2.9
34LED	C165	20	1T 32 C F 2 (ELE)	F42ILL	59	1.2	SW	2520	2,974	20	4 ft LED Tube	200732x2	30	0.6	None	2,520	1,512	1,462	0.6	$ 247.71	$ 4,674.00	$ 200	18.9	18.1
254LED	C165	5	CFQ26/2	CFQ26/2	66	0.3	SW	2520	832	5	EVO35/10	EVO35/10	39	0.2	None	2,520	491	340	0.1	$ 57.66	$ 2,193.75	$ 25	38.0	37.6
35LED	D101	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	D102	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	D103	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	D104	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
276LED	D105	182	1T 54 P F 2 (ELE)	F42GHL	117	21.3	SW	1680	35,774	182	4 ft LED Tube	200732x2	30	5.5	None	1,680	9,173	26,601	15.8	$ 4,953.51	$ 42,533.40	$ 1,820	8.6	8.2
254LED	E138	8	CFQ26/2	CFQ26/2	66	0.5	SW	2520	1,331	8	EVO35/10	EVO35/10	39	0.3	None	2,520	786	544	0.2	$ 92.25	$ 3,510.00	$ 40	38.0	37.6
254LED	Outside	16	CFQ26/2	CFQ26/2	66	1.1	SW	2520	2,661	16	EVO35/10	EVO35/10	39	0.6	None	2,520	1,572	1,089	0.4	$ 184.50	$ 7,020.00	$ 80	38.0	37.6
254LED	P121	25	CFQ26/2	CFQ26/2	66	1.7	SW	2520	4,158	25	EVO35/10	EVO35/10	39	1.0	None	2,520	2,457	1,701	0.7	$ 288.28	$ 10,968.75	$ 125	38.0	37.6
34LED	P121	17	1T 32 C F 2 (ELE)	F42ILL	59	1.0	SW	2520	2,528	17	4 ft LED Tube	200732x2	30	0.5	None	2,520	1,285	1,242	0.5	$ 210.55	$ 3,972.90	$ 170	18.9	18.1
35LED	D107	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	SW	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	D108	9	T 32 R F 3 (ELE)	F43ILL	89	0.8	OCC	1800	1,442	9	T 59 R LED	RTLED38	38	0.3	None	1,800	616	826	0.5	$ 151.08	$ 2,126.25	$ 135	14.1	13.2
35LED	D109	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
34LED	D110	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	D113	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1800	641	4	T 59 R LED	RTLED38	38	0.2	None	1,800	274	367	0.2	$ 67.15	$ 945.00	$ 60	14.1	13.2
34LED	D111	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
35LED	D117	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1800	961	6	T 59 R LED	RTLED38	38	0.2	None	1,800	410	551	0.3	$ 100.72	$ 1,417.50	$ 90	14.1	13.2
35LED	D123-128	24	T 32 R F 3 (ELE)	F43ILL	89	2.1	SW	1680	3,588	24	T 59 R LED	RTLED38	38	0.9	None	1,680	1,532	2,056	1.2	$ 382.92	$ 5,670.00	$ 360	14.8	13.9
35LED	D121	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	D119	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	SW	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
35LED	D114	5	T 32 R F 3 (ELE)	F43ILL	89	0.4	SW	2520	1,121	5	T 59 R LED	RTLED38	38	0.2	None	2,520	479	643	0.3	$ 108.91	$ 1,181.25	$ 75	10.8	10.2
35LED	D118	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	D135/134	20	T 32 R F 3 (ELE)	F43ILL	89	1.8	SW	1680	2,990	20	T 59 R LED	RTLED38	38	0.8	None	1,680	1,277	1,714	1.0	$ 319.10	$ 4,725.00	$ 300	14.8	13.9
35LED	D120	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	SW	1800	160	1	T 59 R LED	RTLED38	38	0.0	None	1,800	68	92	0.1	$ 16.79	$ 236.25	$ 15	14.1	13.2
35LED	D132	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	D129	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	SW	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	D131	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	SW	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
34LED	D130	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
254LED	E148	37	CFQ26/2	CFQ26/2	66	2.4	SW	2520	6,154	37	EVO35/10	EVO35/10	39	1.4	None	2,520	3,636	2,517	1.0	$ 426.65	$ 16,233.75	$ 185	38.0	37.6
25	E148	12	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	847	12	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	847	-	0.0	$ -	$ -	$ -		
34LED	E148	18	1T 32 C F 2 (ELE)	F42ILL	59	1.1	SW	2520	2,676	18	4 ft LED Tube	200732x2	30	0.5	None	2,520	1,361	1,315	0.5	$ 222.94	$ 4,206.60	$ 180	18.9	18.1
35LED	E140	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E150	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E149	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	E148	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	2520	673	3	T 59 R LED	RTLED38	38	0.1	None	2,520	287	386	0.2	$ 65.34	$ 708.75	$ 45	10.8	10.2
35LED	E143	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	E142	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	E141	11	T 32 R F 3 (ELE)	F43ILL	89	1.0	OCC	2520	2,467	11	T 59 R LED	RTLED38	38	0.4	None	2,520	1,053	1,414	0.6	$ 239.59	$ 2,598.75	$ 165	10.8	10.2
35LED	E147	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	E139	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E135	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
34LED	E137	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	E133	8	T 32 R F 3 (ELE)	F43ILL	89	0.7	OCC	2520	1,794	8	T 59 R LED	RTLED38	38	0.3	None	2,520	766	1,028	0.4	$ 174.25	$ 1,890.00	$ 120	10.8	10.2
35LED	E134	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	2520	673	3	T 59 R LED	RTLED38	38	0.1	None	2,520	287	386	0.2	$ 65.34	$ 708.75	$ 45	10.8	10.2
34LED	E129	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
25	E134	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	OCC	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
35LED	E131	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	2520	224	1	T 59 R LED	RTLED38	38	0.0	None	2,520	96	129	0.1	$ 21.78	$ 236.25	$ 15	10.8	10.2
35LED	E122	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	E120	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	E119	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	E123	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	SW	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	E124	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1050	561	6	T 59 R LED	RTLED38	38	0.2	None	1,050	239	321	0.3	$ 69.51	$ 1,417.50	$ 90	20.4	19.1
34LED	E125	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	E117	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	E116	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
34LED	E126	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	E115	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E114	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E127	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	E113	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E112	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E111	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E128	8	T 32 R F 3 (ELE)	F43ILL	89	0.7	SW	2520	1,794	8	T 59 R LED	RTLED38	38	0.3	None	2,520	766	1,028	0.4	$ 174.25	$ 1,890.00	$ 120	10.8	10.2
35LED	E108	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	SW	2520	1,346	6	T 59 R LED	RTLED38	38	0.2	None	2,520	575	771	0.3	$ 130.69	$ 1,417.50	$ 90	10.8	10.2

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	E104	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E105	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E106	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	E107	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
34LED	E154/155	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
254LED	E156	8	CFQ26/2	CFQ26/2	66	0.5	SW	2520	1,331	8	EVO35/10	EVO35/10	39	0.3	None	2,520	786	544	0.2	$ 92.25	$ 3,510.00	$ 40	38.0	37.6
34LED	P128	6	1T 32 C F 2 (ELE)	F42ILL	59	0.4	SW	2520	892	6	4 ft LED Tube	200732x2	30	0.2	None	2,520	454	438	0.2	$ 74.31	$ 1,402.20	$ 60	18.9	18.1
254LED	P128	3	CFQ26/2	CFQ26/2	66	0.2	SW	2520	499	3	EVO35/10	EVO35/10	39	0.1	None	2,520	295	204	0.1	$ 34.59	$ 1,316.25	$ 15	38.0	37.6
35LED	E103	20	T 32 R F 3 (ELE)	F43ILL	89	1.8	OCC	1680	2,990	20	T 59 R LED	RTLED38	38	0.8	None	1,680	1,277	1,714	1.0	$ 319.10	$ 4,725.00	$ 300	14.8	13.9
35LED	E163	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	E164	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	E103	20	T 32 R F 3 (ELE)	F43ILL	89	1.8	OCC	1680	2,990	20	T 59 R LED	RTLED38	38	0.8	None	1,680	1,277	1,714	1.0	$ 319.10	$ 4,725.00	$ 300	14.8	13.9
35LED	E161	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	E162	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	E103	20	T 32 R F 3 (ELE)	F43ILL	89	1.8	OCC	1680	2,990	20	T 59 R LED	RTLED38	38	0.8	None	1,680	1,277	1,714	1.0	$ 319.10	$ 4,725.00	$ 300	14.8	13.9
35LED	E160	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	E159	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	A201	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A202	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	Stair 1	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	SW	2520	1,346	6	T 59 R LED	RTLED38	38	0.2	None	2,520	575	771	0.3	$ 130.69	$ 1,417.50	$ 90	10.8	10.2
35LED	A203	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A204	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A205	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A206	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	A207	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	598	4	T 59 R LED	RTLED38	38	0.2	None	1,680	255	343	0.2	$ 63.82	$ 945.00	$ 60	14.8	13.9
35LED	A208	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A209	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
34LED	A214	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
35LED	A213	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A215	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	A216	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	A211	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	A212	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
35LED	A210	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A219	3	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	1680	297	3	4 ft LED Tube	200732x2	30	0.1	None	1,680	151	146	0.1	$ 27.22	$ 701.10	$ 30	25.8	24.7
34LED	A217	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	A218	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	A220	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	A222	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
34LED	A221	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	A223	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	A228	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	A227	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A226	5	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	748	5	T 59 R LED	RTLED38	38	0.2	None	1,680	319	428	0.3	$ 79.77	$ 1,181.25	$ 75	14.8	13.9
35LED	A225	5	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	748	5	T 59 R LED	RTLED38	38	0.2	None	1,680	319	428	0.3	$ 79.77	$ 1,181.25	$ 75	14.8	13.9
35LED	A224	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	Stair 2	4	T 32 R F 3 (ELE)	F43ILL	89	0.4	SW	2520	897	4	T 59 R LED	RTLED38	38	0.2	None	2,520	383	514	0.2	$ 87.12	$ 945.00	$ 60	10.8	10.2
35LED	A233	16	T 32 R F 3 (ELE)	F43ILL	89	1.4	OCC	1680	2,392	16	T 59 R LED	RTLED38	38	0.6	None	1,680	1,021	1,371	0.8	$ 255.28	$ 3,780.00	$ 240	14.8	13.9
35LED	A232	16	T 32 R F 3 (ELE)	F43ILL	89	1.4	OCC	1680	2,392	16	T 59 R LED	RTLED38	38	0.6	None	1,680	1,021	1,371	0.8	$ 255.28	$ 3,780.00	$ 240	14.8	13.9
35LED	A238	16	T 32 R F 3 (ELE)	F43ILL	89	1.4	OCC	1680	2,392	16	T 59 R LED	RTLED38	38	0.6	None	1,680	1,021	1,371	0.8	$ 255.28	$ 3,780.00	$ 240	14.8	13.9
35LED	A239	16	T 32 R F 3 (ELE)	F43ILL	89	1.4	OCC	1680	2,392	16	T 59 R LED	RTLED38	38	0.6	None	1,680	1,021	1,371	0.8	$ 255.28	$ 3,780.00	$ 240	14.8	13.9
34LED	B233	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	OCC	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
35LED	A236	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	A235	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	A236	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	A237	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
35LED	Stair 3	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
25	Stair 3	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	141	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	141	-	0.0	$ -	$ -	$ -		
34LED	A240	16	1T 32 C F 2 (ELE)	F42ILL	59	0.9	OCC	1680	1,586	16	4 ft LED Tube	200732x2	30	0.5	None	1,680	806	780	0.5	$ 145.16	$ 3,739.20	$ 160	25.8	24.7
35LED	A241	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A242	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A231	16	T 32 R F 3 (ELE)	F43ILL	89	1.4	OCC	1680	2,392	16	T 59 R LED	RTLED38	38	0.6	None	1,680	1,021	1,371	0.8	$ 255.28	$ 3,780.00	$ 240	14.8	13.9
35LED	A229	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	A230	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	Stair 4	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	SW	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
34LED	Hallway	11	1T 32 C F 2 (ELE)	F42ILL	59	0.6	SW	2520	1,635	11	4 ft LED Tube	200732x2	30	0.3	None	2,520	832	804	0.3	$ 136.24	$ 2,570.70	$ 110	18.9	18.1
25	Hallway	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	776	11	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	776	-	0.0	$ -	$ -	$ -		
254LED	Hallway	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	Hallway	12	1T 32 C F 2 (ELE)	F42ILL	59	0.7	SW	2520	1,784	12	4 ft LED Tube	200732x2	30	0.4	None	2,520	907	877	0.3	$ 148.62	$ 2,804.40	$ 120	18.9	18.1
25	Hallway	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -		
277LED	Hallway	1	1T 54 C F 4 (ELE)	F44GHL	234	0.2	SW	2520	590	1	T 74 R LED	RTLED50	50	0.1	None	2,520	126	464	0.2	$ 78.58	$ 236.25	$ 20	3.0	2.8
34LED	Hallway	5	1T 32 C F 2 (ELE)	F42ILL	59	0.3	SW	2520	743	5	4 ft LED Tube	200732x2	30	0.2	None	2,520	378	365	0.1	$ 61.93	$ 1,168.50	$ 50	18.9	18.1
25	Hallway	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	SW	2520	564	8	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	2,520	564	-	0.0	$ -	$ -	$ -		
254LED	Hallway	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	Hallway	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	Hallway	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	212	3	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	212	-	0.0	$ -	$ -	$ -		
34LED	Hallway	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	Hallway	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	SW	2520	423	6	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.2	None	2,520	423	-	0.0	$ -	$ -	$ -		
34LED	Hallway	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	Hallway	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
25	Hallway	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	141	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	141	-	0.0	$ -	$ -	$ -		
34LED	Hallway	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
25	Hallway	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -		
254LED	Hallway	1	CFQ26/2	CFQ26/2	66	0.1	SW	2520	166	1	EVO35/10	EVO35/10	39	0.0	None	2,520	98	68	0.0	$ 11.53	$ 438.75	$ 5	38.0	37.6
34LED	Hallway	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	SW	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	Hallway	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -		
34LED	Hallway	14	1T 32 C F 2 (ELE)	F42ILL	59	0.8	SW	2520	2,082	14	4 ft LED Tube	200732x2	30	0.4	None	2,520	1,058	1,023	0.4	$ 173.39	$ 3,271.80	$ 140	18.9	18.1
34LED	F137	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	F128	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
34LED	F129	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	F127	24	T 32 R F 3 (ELE)	F43ILL	89	2.1	OCC	1680	3,588	24	T 59 R LED	RTLED38	38	0.9	None	1,680	1,532	2,056	1.2	$ 382.92	$ 5,670.00	$ 360	14.8	13.9
35LED	F123	24	T 32 R F 3 (ELE)	F43ILL	89	2.1	OCC	1680	3,588	24	T 59 R LED	RTLED38	38	0.9	None	1,680	1,532	2,056	1.2	$ 382.92	$ 5,670.00	$ 360	14.8	13.9
35LED	F122	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	F126	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
35LED	F120	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	P129 - 132	22	1T 32 C F 2 (ELE)	F42ILL	59	1.3	SW	2520	3,271	22	4 ft LED Tube	200732x2	30	0.7	None	2,520	1,663	1,608	0.6	$ 272.48	$ 5,141.40	$ 220	18.9	18.1
254LED	P129 - 132	12	CFQ26/2	CFQ26/2	66	0.8	SW	2520	1,996	12	EVO35/10	EVO35/10	39	0.5	None	2,520	1,179	816	0.3	$ 138.37	$ 5,265.00	$ 60	38.0	37.6
35LED	F107	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9
34LED	F108	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
34LED	F109	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	F111	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1680	299	2	T 59 R LED	RTLED38	38	0.1	None	1,680	128	171	0.1	$ 31.91	$ 472.50	$ 30	14.8	13.9
35LED	F110	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
35LED	F105	27	T 32 R F 3 (ELE)	F43ILL	89	2.4	OCC	1680	4,037	27	T 59 R LED	RTLED38	38	1.0	None	1,680	1,724	2,313	1.4	$ 430.78	$ 6,378.75	$ 405	14.8	13.9
34LED	F106	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	F103	27	T 32 R F 3 (ELE)	F43ILL	89	2.4	OCC	1680	4,037	27	T 59 R LED	RTLED38	38	1.0	None	1,680	1,724	2,313	1.4	$ 430.78	$ 6,378.75	$ 405	14.8	13.9
34LED	F104	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	F112	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	F113	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
34LED	F114	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	F101	27	T 32 R F 3 (ELE)	F43ILL	89	2.4	OCC	1680	4,037	27	T 59 R LED	RTLED38	38	1.0	None	1,680	1,724	2,313	1.4	$ 430.78	$ 6,378.75	$ 405	14.8	13.9
34LED	F102	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	F115	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	F116	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	F117	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	F118	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	P133 - 136	19	1T 32 C F 2 (ELE)	F42ILL	59	1.1	SW	2520	2,825	19	4 ft LED Tube	200732x2	30	0.6	None	2,520	1,436	1,389	0.6	$ 235.32	$ 4,440.30	$ 190	18.9	18.1
254LED	P133 - 136	13	CFQ26/2	CFQ26/2	66	0.9	SW	2520	2,162	13	EVO35/10	EVO35/10	39	0.5	None	2,520	1,278	885	0.4	$ 149.91	$ 5,703.75	$ 65	38.0	37.6
25	P133 - 136	1	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.0	SW	2520	71	1	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.0	None	2,520	71	-	0.0	$ -	$ -	$ -		
34LED	P105	14	1T 32 C F 2 (ELE)	F42ILL	59	0.8	SW	2520	2,082	14	4 ft LED Tube	200732x2	30	0.4	None	2,520	1,058	1,023	0.4	$ 173.39	$ 3,271.80	$ 140	18.9	18.1
35LED	B201	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B202	5	T 32 R F 3 (ELE)	F43ILL	89	0.4	OCC	1680	748	5	T 59 R LED	RTLED38	38	0.2	None	1,680	319	428	0.3	$ 79.77	$ 1,181.25	$ 75	14.8	13.9
35LED	B203	6	T 32 R F 3 (ELE)	F43ILL	89	0.5	OCC	1680	897	6	T 59 R LED	RTLED38	38	0.2	None	1,680	383	514	0.3	$ 95.73	$ 1,417.50	$ 90	14.8	13.9

Energy Audit of Hammarskjold Middle School
CHA Project No. 31007
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS							RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	B204	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B205	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	2520	224	1	T 59 R LED	RTLED38	38	0.0	None	2,520	96	129	0.1	$ 21.78	$ 236.25	$ 15	10.8	10.2
35LED	B206	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B207	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	Stair 5	7	T 32 R F 3 (ELE)	F43ILL	89	0.6	SW	2520	1,570	7	T 59 R LED	RTLED38	38	0.3	None	2,520	670	900	0.4	$ 152.47	$ 1,653.75	$ 105	10.8	10.2
35LED	B210	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
34LED	B208	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
35LED	B209	1	T 32 R F 3 (ELE)	F43ILL	89	0.1	OCC	1680	150	1	T 59 R LED	RTLED38	38	0.0	None	1,680	64	86	0.1	$ 15.95	$ 236.25	$ 15	14.8	13.9
35LED	B211	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	B213	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	1800	320	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	184	0.1	$ 33.57	$ 472.50	$ 30	14.1	13.2
34LED	B212	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	198	2	4 ft LED Tube	200732x2	30	0.1	None	1,680	101	97	0.1	$ 18.14	$ 467.40	$ 20	25.8	24.7
35LED	B214	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	B215	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
35LED	B216	2	T 32 R F 3 (ELE)	F43ILL	89	0.2	OCC	2520	449	2	T 59 R LED	RTLED38	38	0.1	None	2,520	192	257	0.1	$ 43.56	$ 472.50	$ 30	10.8	10.2
34LED	B217	2	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	212	2	4 ft LED Tube	200732x2	30	0.1	None	1,800	108	104	0.1	$ 19.09	$ 467.40	$ 20	24.5	23.4
35LED	B218	18	T 32 R F 3 (ELE)	F43ILL	89	1.6	OCC	1680	2,691	18	T 59 R LED	RTLED38	38	0.7	None	1,680	1,149	1,542	0.9	$ 287.19	$ 4,252.50	$ 270	14.8	13.9
34LED	B219	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1800	106	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	52	0.0	$ 9.55	$ 233.70	$ 10	24.5	23.4
34LED	B220	1	1T 32 C F 2 (ELE)	F42ILL	59	0.1	OCC	1680	99	1	4 ft LED Tube	200732x2	30	0.0	None	1,680	50	49	0.0	$ 9.07	$ 233.70	$ 10	25.8	24.7
35LED	B221	3	T 32 R F 3 (ELE)	F43ILL	89	0.3	OCC	1680	449	3	T 59 R LED	RTLED38	38	0.1	None	1,680	192	257	0.2	$ 47.86	$ 708.75	$ 45	14.8	13.9
35LED	B225	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B226	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
35LED	B227	12	T 32 R F 3 (ELE)	F43ILL	89	1.1	OCC	1680	1,794	12	T 59 R LED	RTLED38	38	0.5	None	1,680	766	1,028	0.6	$ 191.46	$ 2,835.00	$ 180	14.8	13.9
34LED	P212	8	1T 32 C F 2 (ELE)	F42ILL	59	0.5	OCC	2520	1,189	8	4 ft LED Tube	200732x2	30	0.2	None	2,520	605	585	0.2	$ 99.08	$ 1,869.60	$ 80	18.9	18.1
25	P212	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	353	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	353	-	0.0	$ -	$ -	$ -	-	-
34LED	B230	14	1T 32 C F 2 (ELE)	F42ILL	59	0.8	SW	2520	2,082	14	4 ft LED Tube	200732x2	30	0.4	None	2,520	1,058	1,023	0.4	$ 173.39	$ 3,271.80	$ 140	18.9	18.1
25	B231	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	353	5	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	353	-	0.0	$ -	$ -	$ -	-	-
34LED	B231	7	1T 32 C F 2 (ELE)	F42ILL	59	0.4	SW	2520	1,041	7	4 ft LED Tube	200732x2	30	0.2	None	2,520	529	512	0.2	$ 86.70	$ 1,635.90	$ 70	18.9	18.1
34LED	B232	4	1T 32 C F 2 (ELE)	F42ILL	59	0.2	SW	2520	595	4	4 ft LED Tube	200732x2	30	0.1	None	2,520	302	292	0.1	$ 49.54	$ 934.80	$ 40	18.9	18.1
25	B232	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2520	706	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	None	2,520	706	-	0.0	$ -	$ -	$ -	-	-
34LED	B233	10	1T 32 C F 2 (ELE)	F42ILL	59	0.6	SW	2520	1,487	10	4 ft LED Tube	200732x2	30	0.3	None	2,520	756	731	0.3	$ 123.85	$ 2,337.00	$ 100	18.9	18.1
25	B233	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2520	282	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	None	2,520	282	-	0.0	$ -	$ -	$ -	-	-
9	Parking	46	High Bay MH 400 35 Feet High	MH400/1	458	21.1	SW	2520	53,091	46	High Bay MH 400 35 Feet High	MH400/1	458	21.1	None	2,520	53,091	-	0.0	$ -	$ -	$ -	-	-
146	Parking	24	High Bay MH 400	MH400/2	916	22.0	SW	2520	55,400	24	High Bay MH 400	MH400/2	916	22.0	None	2,520	55,400	-	0.0	$ -	$ -	$ -	-	-
102	Ext Wall	34	O CF 26	CFQ26/1-L	27	0.9	SW	2520	2,313	34	O CF 26	CFQ26/1-L	27	0.9	None	2,520	2,313	-	0.0	$ -	$ -	$ -	-	-
															0	#N/A								#VALUE!
															0	#N/A								#VALUE!
S	Total	3,136				326.0			633,621	3,136				165.8			341,468		160.2	53,248	734,670	$45,920		
S																		Demand Savings		160.2	$13,515			
S																		kWh Savings		292,153	$39,733			
S																		Total Savings			$53,248		13.8	12.9

APPENDIX D

Photos

Hammarskjold Middle School

RTU

RTU


Benchmark
2.0
NJ105119-10H
NJ100773-07H
NJ000100773H
B-6
AERCO
113

Boiler

HHW Pumps

DHW Heater

Dishwasher

APPENDIX E

Photovoltaic Analysis

East Brunswick Schools
Hammarskjold Middle School

Cost of Electricity	$0.163	/kWh
Electricity Usage	2,642,402	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$2,040,000	**510.0**	**618,103**	**0**	**$100,751**	**0**	**$100,751**	**$0**	**$154,526**	**20.2**	**8.0**

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $250 /1000kwh

Area Output*
11,197 m2
120,524 ft2

Perimeter Output*
1,357 m
4,452 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
64,602 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes

8	watt/ft2	
516,817	DC watts	
510	kW	Enter into PV Watts

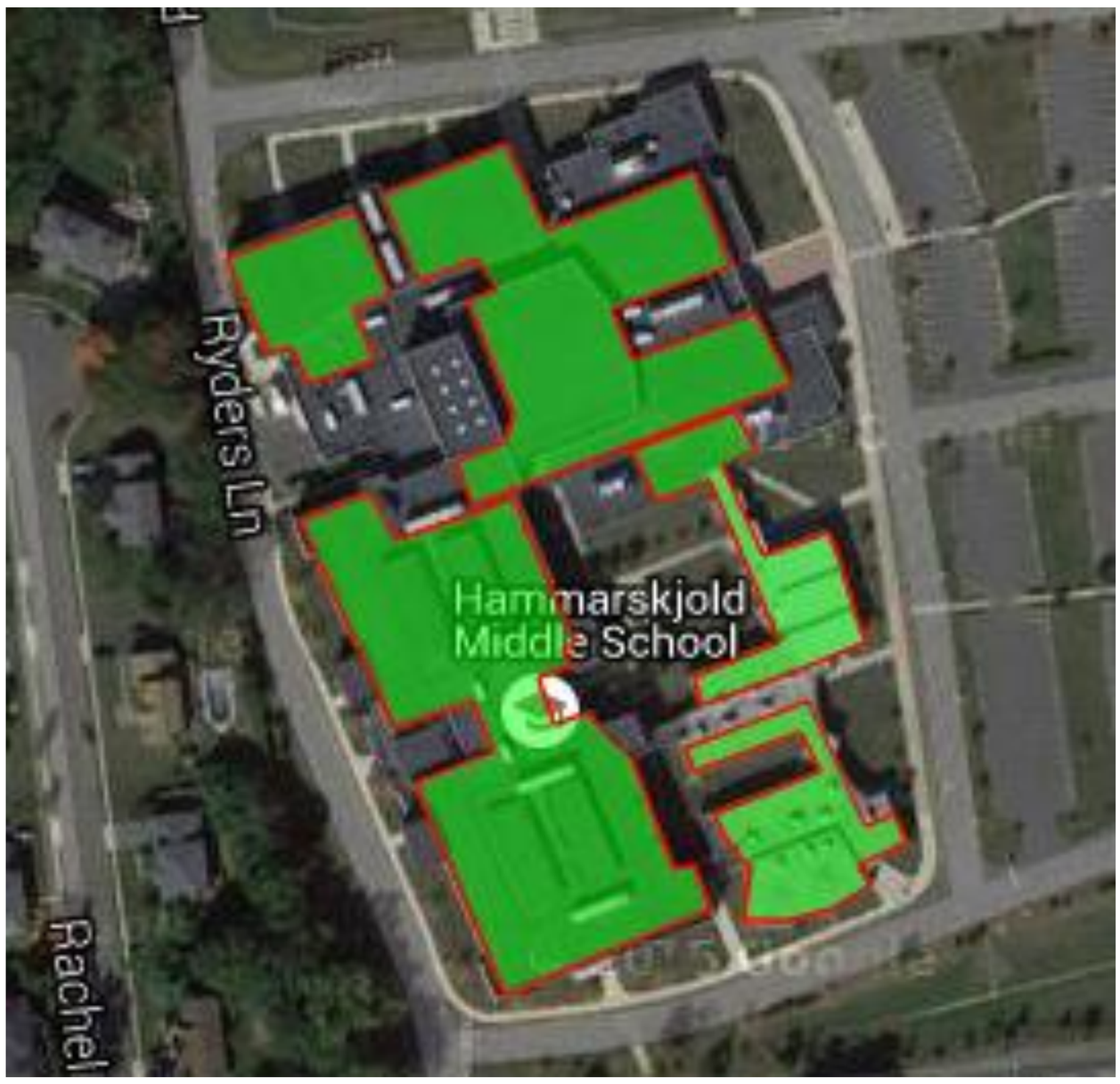
PV Watts Inputs***

Array Tilt Angle	10	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	175	Enter into PV Watts (default)
Zip Code	08816	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output
618,103 annual kWh calculated in PV Watts program

% Offset Calc

Usage	2,642,402	(from utilities)
PV Generation	618,103	(generated using PV Watts)
% offset	23%	



* http://www.freemaptools.com/area-calculator.htm
** http://www.flettexchange.com
*** http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at http://sam.nrel.gov) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

The energy output range is based on analysis of 30 years of historical weather data for nearby , and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

RESULTS

618,103 kWh per Year *

System output may range from 594,553 to 647,462kWh per year near this location.

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)	Energy Value ($)
January	2.39	32,634	5,319
February	3.16	38,808	6,326
March	4.07	54,123	8,822
April	4.83	60,180	9,809
May	5.70	71,144	11,596
June	5.94	69,941	11,400
July	5.76	69,341	11,303
August	5.38	64,262	10,475
September	4.65	55,233	9,003
October	3.61	45,635	7,438
November	2.35	29,869	4,869
December	2.01	26,934	4,390
Annual	4.15	618,104	$ 100,750

Location and Station Identification

Requested Location	730 18 north east brunswick, nj
Weather Data Source	(TMY2) NEWARK, NJ 23 mi
Latitude	40.7° N
Longitude	74.17° W

PV System Specifications *(Commercial)*

DC System Size	510 kW
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	10°
Array Azimuth	175°
System Losses	14%
Inverter Efficiency	96%
DC to AC Size Ratio	1.1

Initial Economic Comparison

Average Cost of Electricity Purchased from Utility	0.16 $/kWh
Initial Cost	4.00 $/Wdc
Cost of Electricity Generated by System	0.12 $/kWh

Selected Incentives

Residential Renewable Energy Tax Credit

Investment Tax Credit (ITC)	Percent of Cost: 30%

These values can be compared to get an idea of the cost-effectiveness of this system. However, system costs, system financing options (including 3rd party ownership) and complex utility rates can significantly change the relative value of the PV system.

APPENDIX F

EPA Benchmarking Report

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Hammarskjold Middle School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 271,520
Built: 2008

For Year Ending: March 31, 2015
Date Generated: February 05, 2016

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address
Hammarskjold Middle School
200 Rues Lane
East Brunswick, New Jersey 08816

Property ID: 4795907

Property Owner
_____
,
(____)____-_____

Primary Contact
____ _____
,
(____)____-_____
_____

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
81.9 kBtu/ft²

Source EUI
155.4 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	13,226,290 (60%)
Electric - Grid (kBtu)	9,015,876 (40%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	69.5
National Median Source EUI (kBtu/ft²)	131.8
% Diff from National Median Source EUI	18%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	1,909

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____Date: _____

Licensed Professional

____ _____
,
(____)____-_____
_____

Professional Engineer Stamp (if applicable)