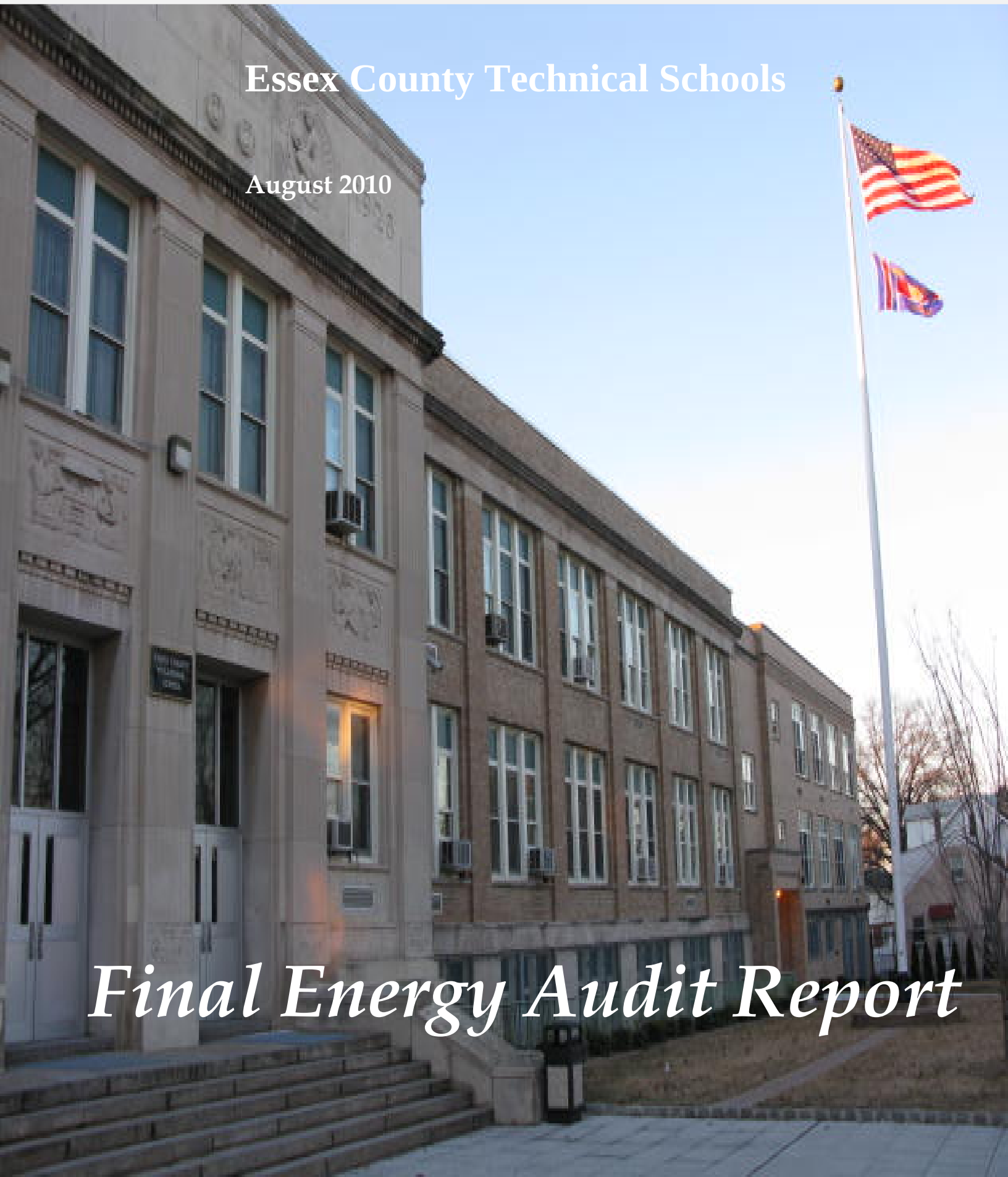
CDM



Essex County Technical Schools

August 2010

Final Energy Audit Report

Contents

Section 7 Available Grants, Incentives and Funding Sources

Executive Summary

As part of an initiative to reduce energy cost and consumption, the Essex County Technical Schools Board of Education has secured the services of Camp Dresser and McKee (CDM) to perform an energy audit for five (5) buildings which are owned and operated by the Board in an effort to develop comprehensive Energy Conservation and Retrofit Measures (ECRMs).

CDM's energy audit team visited the schools on February 8 and 9, 2010. As a result of the site visits and evaluation of the historical energy usage of the facilities, CDM was successful in identifying opportunities for energy savings measures.

CDM has also evaluated the potential for renewable energy technologies to be implemented at the Board's buildings to offset the electrical energy usage. Specifically, the use of solar electric photovoltaic panels, ground source heat pumps and wind turbines were investigated.

Potential energy cost savings may be available for the Board through the use of a third party electric or gas supplier. Additionally, there is potential for the Board to make money by participation in a Demand Response Program, as discussed in Section 5.

Not all ECRMs identified as a result of the energy audit are recommended. ECRMs must be economically feasible to be recommended for implementation. The feasibility of each ECRM was measured through a simple payback analysis. The simple payback period was determined after establishing Engineer's Opinion of Probable Construction Cost estimates, O&M estimates, projected annual energy savings estimates, and the potential value of New Jersey Clean Energy rebates, or Renewable Energy Credits, if applicable. ECRMs with a payback period of 20 years or less are recommended.

The payback periods presented herein do not account for additional cost savings associated with participation in the Clean Energy Programs, Pay for Performance Program or the Direct Install Program. The eligibility requirements for participation in these programs and the associated cost savings from these Programs are discussed in Section 7.2.

Historical Energy Usage

Table ES-1 summarizes the historical energy usage at each of the buildings as presented in Section 3. These values can serve as a bench-marking tool, along with the building profiles that have been established through the EPA's Portfolio Manager Program, to quantify the reduction in electrical energy and natural gas usage following the implementation of the recommended ECRMs.

Table ES-1: Summary of Annual Energy Usage & Cost						
	Electrical Energy Use (kWH)	Peak Summer Demand (kW)	Peak Winter Demand (kW)	Fuel Use for Entire Building (therms)	Cost for Electric Service	Cost for Fuel
Board of Education Office	275,840	-	-	10,732	$44,992	$17,783
West Caldwell Technical School	867,000	282	222	41,821	$131,660	$55,872
Bloomfield Technical High School	523,400	300	256	100,927	$87,658	$102,692
North 13th Street Technical School	934,940	219	213	112,343	$141,347	$116,380
Newark Technical High School	2,642,164	685	381	105,804	$424,505	$120,485

Recommended ECRMs

Table ES-2 presents the ranking of recommended ECRMs identified for the building lighting and HVAC systems based on the simple payback analysis. The lighting system improvements that include upgrades to both the interior and exterior lighting systems have been recommended. Although these measures have a longer payback period than improvements to the interior lighting system alone, implementing retrofits to both the interior and exterior lighting systems results in a greater energy savings.

Additional ECRMs associated with the building envelope and other miscellaneous appliances were identified and evaluated, as discussed in Sections 2 and 4; however, were not recommended due to longer payback periods. This table includes the total construction cost, projected annual energy cost savings, projected annual energy usage savings, and total simple payback period for each recommended ECRM. The ECRMs are ranked based on payback period.

Table ES-3 summarizes the Total Engineer's Opinion of Probable Construction Cost, annual energy savings, projected annual energy and O&M cost savings and the payback period based on the implementation of all recommended ECRMs.

Table ES-2 Ranking of Energy Savings Measures Summary					
Overall Ranking[3]	**ECRM**	**Total Cost[1]**	**Energy Savings**	**Annual Fiscal Savings[2]**	**Simple Payback (Years)**
1	**North 13th Street School – Lighting System**	$58,898	98,688 kWh	$17,093	**3.4**
2	**Board Office – Lighting System**	$16,912	20,816 kWh	$4,577	**3.7**
3	**Bloomfield Technical School – Lighting System**	$43,379	55,160 kWh	$10,880	**4.0**
4	**Newark Technical School – DDC BMS**	$159,855	10,010 Therms 145,330 kWh	$35,626	**4.5**
5	**Newark Technical School – Lighting System**	$88,711	101,428 kWh	$17,900	**5.0**
6	**West Caldwell School – Lighting System**	$39,526	43,876 kWh	$7,612	**5.2**
7	**West Caldwell School – DDC BMS**	$69,425	3,940 Therms 29,280 kWh	$8,850	**7.8**
8	**Newark Technical School – Boiler Upgrade**	$316,376	33,100 Therms	$38,572	**8.2**
9	**Board Office – Boiler Upgrade**	$65,353	3,557 Therms	$6,835	**9.6**

1. Total Cost takes into account Engineers Probable Construction Cost minus any applicable rebates.
2. Annual Fiscal Savings takes into account additional O&M cost or savings associated with the measure.
3. Overall Ranking is based on the simple payback period.

Table ES-3: Recommended ECRM's			
Total Engineer's Opinion of Probable Construction Cost	**Projected Annual Energy Savings (kWh or therms)**	**Annual Fiscal Savings**	**Simple Payback Period (years)**
$858,435	494,578 kWh 50,607 Therms	$147,945	**5.8**

Renewable Energy Technologies

Solar Energy

Section 4 of the report provides for an economic evaluation of a solar energy system recommended to be installed at several of the Board's facilities. The evaluation covered the economic feasibility of the Board installing a solar energy system under a typical construction contract and to assume full responsibility of the operation of such a system.

Based on a simple payback model, summarized in Table ES-4, it would benefit the Board to further investigate the installation of a solar energy system at the five (5) buildings. This is primarily based on the initial upfront capital investment required for a solar energy system installation and the 11 to 12 year payback periods. This payback period may justify installing the solar energy system. Other options such as Power Purchase Agreements are potentially available as well to help finance the project. Solar technology is constantly changing and will most likely continue to lower in price.

Two major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions and Solar Renewable Energy Credit (SREC) rates, with the largest impact to the payback model being the SREC credit pricing. For the payback model, conservative estimates of the SREC's market value over a 25 year period were assumed, as discussed in Section 4.

Table ES-4 includes a simple payback analysis for the installation of a solar energy system at the five (5) school buildings.

Table ES-4: Simple Payback Analysis for Solar Energy Systems

Estimated Budgetary Project Cost	**$9,836,727**
1st Year Production	1,003,546 kWh
Annual Electric Savings	$165,009.9
Annual Estimated SREC Revenue	$717,393
Project Simple Payback	**11.1**

Wind Power Generation

Section 4.3.1 of the report provides for an economic evaluation of a wind turbine energy system recommended to be installed on the Board Office, West Caldwell School, and Bloomfield Technical School grounds. The evaluation covered the economic feasibility of furnishing and installing a wind turbine energy system under a typical construction contract and to assume full responsibility of the operation of such a system.

CDM completed a preliminary desktop wind power production analysis and has concluded that an additional on-site feasibility study is warranted and recommended. Such a feasibility study would include the installation of a wind test rig to measure actual wind conditions as observed on-site.

Wind power as a renewable energy source also qualifies for Renewable Energy Certificates (REC's). The prevailing energy market, Renewable Energy Incentive

Program (REIP) and REC's comprise the major factors influencing a wind turbine energy system installation. Other options, such as government bonds or a Power Purchase Agreement, are potentially available and can assist with the financing of this project.

Table ES-5 includes a typical simple payback analysis for the installation of a wind turbine energy system at the three (3) locations. Refer to Appendix K for a more detailed wind energy financing spreadsheet.

Table ES-5: Ranking of Energy Savings Measures Summary – Wind Turbine Energy System

Parameter	Wind Turbine (Minimum Site Wind Speed – 8.4 mph)	Wind Turbine (Maximum Site Wind Speed – 12.1 mph)	Wind Turbine (Average Site Wind Speed – 10.5 mph)
Engineer's Opinion of Probable Cost	$68,489.69	$68,489.69	$68,489.69
Renewable Energy Incentive Program **	-$17,395.00	-$50,890.00	-$33,082.00
Total Cost	$51,094.69	$17,599.69	$35,407.69
1st Year Production	5,436 kWh	15,380 kWh	10,338 kWh
Annual Estimated Electric Savings	$858.30	$2,428.50	$1,632.4
Annual Estimated REC Revenue	$136.00	$385.00	$258.00
Project Simple Payback	**51.4 Years**	**6.3 Years**	**18.7 Years**

** REIP incentive is calculated for only the first year and is applied as a deduction.

Section 1
Introduction

1.1 General

As part of an initiative to reduce energy cost and consumption, Essex County Technical School Board of Education has secured the services of Camp Dresser and McKee (CDM) to perform an energy audit at five (5) buildings in an effort to develop comprehensive energy conservation initiatives.

The performance of an Energy Audit requires a coordinated phased approach to identify, evaluate and recommend energy conservation and retrofit measures (ECRM). The various phases conducted under this Energy Audit included the following:

- Gather preliminary data on all facilities;
- Facility inspection;
- Identify and evaluate potential ECRMs and evaluate renewable/distributed energy measures;
- Develop the energy audit report.

Figure 1-1 is a schematic representation of the phases utilized by CDM to prepare the Energy Audit Report.

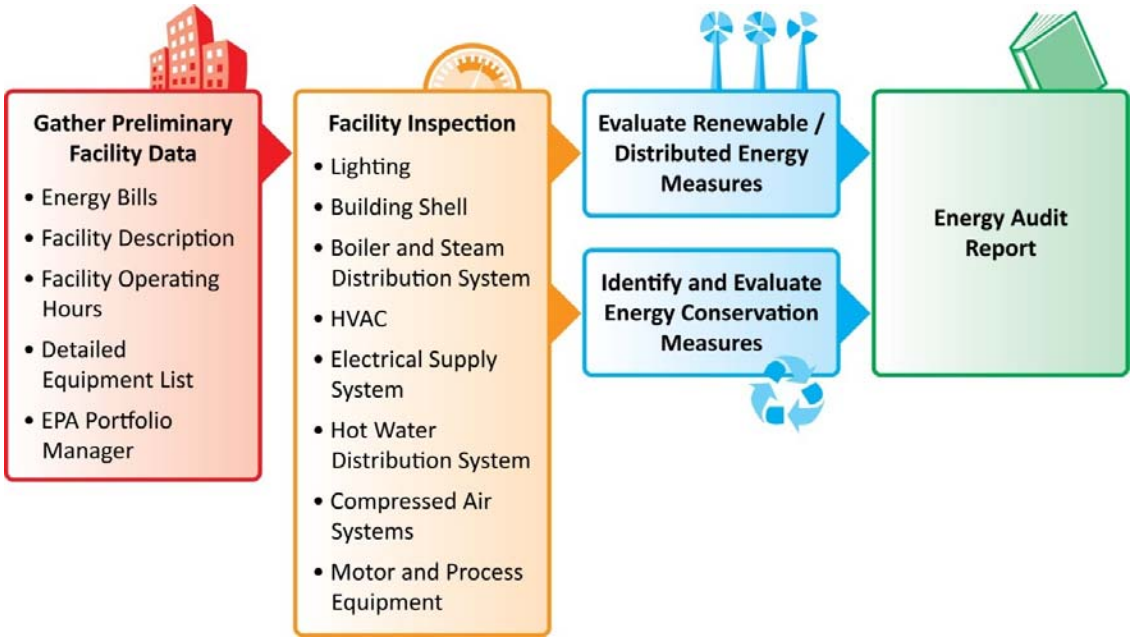


Figure 1-1: Energy Audit Phases

1.2 Background

The buildings that were included in the energy audit for the Essex County Technical Schools were the Board of Education Office building, West Caldwell Technical School, Bloomfield Technical High School, Newark Gymnasium and the Newark Technical High School.

The Board of Education Office is located in a 15,000 ft² building that was built in 1970. The building consists of office space, break areas and office space for the Department of Public Works employees. The building is occupied by 55 employees from 8:00 am to 6:00 pm during the week.

The West Caldwell Technical School is an 80,493 ft² building that was originally built in 1963, with additions in 1976 and 2007. The high school consists of office areas, class rooms, gym, auditorium space and a nurse's office. The school is occupied by ~700 students and 59 faculty and staff members. The school is occupied from 7:00 am to 7:00 pm during the week and is partially occupied on weekends.

The Bloomfield Technical High School is a 93,831 ft² building that was originally built in 1931, with an addition constructed in 2000 to provide additional classroom space. The high school consists of office areas, class rooms, gym, auditorium space and a nurse's office. The school is occupied ~700 students and 63 faculty and staff members. The high school is occupied from 7:00 am to 7:00 pm during the week and is partially occupied on weekends.

The North 13th Street Technical School (Newark Gymnasium) is a 194,772 ft² building that was originally built in 1925, with an addition in 1929. The high school consists of office areas, class rooms, gym, auditorium space and a nurse's office. The school is occupied by ~700 students and 109 faculty and staff members. The school is occupied from 7:00 am to 7:00 pm during the week and is partially occupied on weekends.

The Newark Technical High School is an 185,339 ft² building that was originally built in 1972, with an addition is 2007. The high school consists of office areas, class rooms, gym, auditorium space and a nurse's office. The school is occupied by ~700 students and 112 faculty and staff members. The school is occupied from 7:00 am to 7:00 pm during the week and is partially occupied on weekends.

1.3 Purpose and Scope

The objective of the energy audit is to identify energy conservation and retrofit measures to reduce energy usage and to develop an economic basis to financially validate the planning and implementation of identified energy conservation and retrofit measures.

Significant energy savings may be available with retrofits to the buildings' envelopes, heating and cooling systems and lighting systems. It should be noted that the magnitude of energy savings available is not only dependent on the type of heating,

lighting or insulation systems in use, but also on the age and condition of the equipment and the capital available to implement major changes. Due to the rising cost of power and the desire to minimize dependence on foreign oil supplies, energy consumption is taking a higher priority across the nation and feasible alternatives for reducing energy consumption and operating costs must be evaluated on a case-by-case basis.

The purpose of this energy audit is to identify the various critical building comfort systems that are major consumers of electrical and thermal energy and are clear candidates for energy savings measures. In addition, potential on-site energy generation systems such as solar electric, ground source heat pumps, and wind energy systems were also evaluated. A discussion on these technologies is included in Section 4, Energy Conservation and Retrofit Measures (ECRM).

In addition to identifying ECRMs and the potential for on-site energy generation, the potential cost savings available for the Board by utilizing third party electric or gas suppliers is discussed in Section 5.

Section 2
Facility Description

2.1 Board Office

2.1.1 Description of Building Envelope

The energy audit included an evaluation of the building envelope (exterior shell) to determine the components' effective R-values to be utilized in the building model and to locate and fix any thermal weaknesses that may be present. The components of a building envelope include the exterior walls, foundation and roof. The construction and material, age, and general condition of these components, including exterior windows and doors, impact the building's energy use.

Back of Board Office

The Board Office is in the same building as the Department of Public Works. The building is a single story, slab on grade construction. The walls are concrete cavity walls consisting of brick façade, cavity, and CMU backup blocks. The roof is a BUR system that was replaced around 2008.

The windows throughout the building are single pane with metal frames. While replacement of the windows with new high-performance, double pane, low-E, air tight window models will be better energy efficiency performers, the cost of window replacement is rarely justified by energy savings alone.

Alternatively, as the windows in the Board Office are not rotted or in extremely poor shape (cracked or broken panes), the application of exterior or interior storm windows, new weather-stripping or 'shrink-to-fit' plastic films for making temporary interior windows will also increase energy efficiency, minimize infiltration and improve building occupant comfort. The most effective way to caulk around windows is where the window frame meets the interior wallboard. It is important to note that the application of new weather-stripping or 'shrink-to-fit' plastic film for making temporary interior windows will require adjustment each season to ensure that the windows are well sealed. These improvements will be less costly with similar results to complete replacement.

The exterior doors of the Board Office and DPW are glass panel with steel frames. Replacement of exterior doors does not offer as much energy-savings opportunity as replacement of windows mainly due to the smaller total area. However, doors may leak even more than windows. Therefore, installation of new weather-stripping and flexible door sweeps is highly recommended.

2.1.2 Description of Building HVAC

A Burnham firetube hot water boiler provides heating for the Board Office building. Hot water generated by the boiler is distributed among fin tube radiators located at the perimeter walls of the building and to a main air handling unit which provides tempered air to the office areas. An additional air handling unit was noted, which conditions the Public Works-operated side of the building. This air handler gets heat from the boiler-hot water system as well.

A chiller, located in the basement boiler room, provides chilled water directly to the air handling units to cool the entire building.

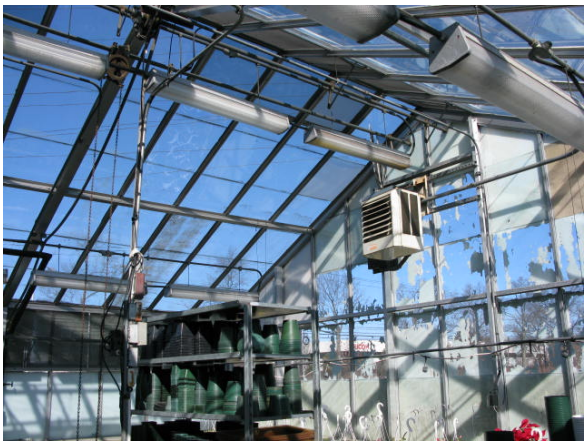
2.1.3 Description of Building Lighting

The Board Office has already converted most of the building's lighting to energy efficient T8 lamps, with electronic ballasts. The Board Office's existing lighting system consists of 2X2 (2 and 3 lamp), 1X4 (2 lamp), 2X4 (3 and 4 lamp) T8 linear fluorescent fixtures with electronic ballasts, 1X4 (2 lamp), 2X4 (4 lamp) T12 standard efficiency linear fluorescent fixtures with magnetic ballasts, circular fluorescent fixtures, and various wattage incandescent fixtures. Existing exterior lighting consists of High Pressure Sodium wall packs, and incandescent fixtures. Refer to Section 4 for a more detailed description.

2.2 West Caldwell School

2.2.1 Description of Building Envelope

The walls of the West Caldwell School are concrete cavity walls consisting of brick façade, cavity and CMU backup blocks. The roofing systems consist of black EPDM membrane and ballasted built up asphalt roofing by the gym, over flat roof decks. The EPDM membrane sections were replaced this past year and the gym was constructed in 2007. The roofs are in good condition.



West Caldwell Greenhouse

The majority of the windows are insulating double pane windows. It was noted that the greenhouse is constructed of single pane glass. While replacement of this single pane glass with high performance, air tight glass panels will be better energy efficiency performers, the cost is not expected to be justified through the energy savings alone. Water storage tubes (such as Sun-Lite Thermal Storage Tubes) may be added to the space to provide a simple means of stabilizing temperature and savings radiated solar energy.

The exterior doors of the West Caldwell School are FRP. FRP doors are highly recommended on an energy efficiency level. FRP doors are made out of a high strength, light weight material with energy saving insulation and good sealing ability, as the doors will not expand or contract with changing climates.

It was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.2.2 Description of Building HVAC

Hot water generated by a Kewanee firetube hot water boiler and Aerco condensing boiler heat much of the building. This hot water is distributed to fin tube radiators located at the perimeter walls of the building. Additionally, several rooftop units have gas-fired furnaces to provide warm air to occupied spaces.

Cooling is provided by several roof top units packaged with DX evaporators and condensers.

2.2.3 Description of Building Lighting

The West Caldwell School has already converted most of the building lighting to energy efficient T8 lamps, with electronic ballasts. The School's existing lighting system consists of 2X2 (2 and 3 lamp), 1X4 (2 lamp), 2X4 (2, 3, and 4 lamp) T8 linear fluorescent fixtures with electronic ballasts, 2X2 (2 lamp), 1X4 (1 lamp) T12 standard efficiency linear fluorescent fixtures with magnetic ballasts, compact and circular fluorescent fixtures, and various wattage incandescent fixtures. Existing exterior lighting consists of 1X4 (2 lamp) T8 linear fluorescent fixtures with electronic ballasts, Quartz Tungsten wall packs, High Pressure Sodium parking lights, compact fluorescent, and incandescent fixtures. Refer to Section 4 for a more detailed description.

2.3 Newark Technical School

2.3.1 Description of Building Envelope

The walls of the Newark Technical School are concrete cavity walls consisting of brick façade, cavity and CMU backup blocks. The efflorescence that is evident on the brick facing of the gymnasium, constructed in 2007, is currently not a concern because efflorescence will commonly appear within the first few years of a building's construction. The efflorescence is a result of the moisture locked within the masonry and mortar that is drawn to the surface, evaporating and leaving behind the

Efflorescence on Gym Walls

salts contained in the brick and mortar. Efflorescence will continue to accumulate until the initial water supply is exhausted. If salts (efflorescence) continue to accumulate on the mortar surface as a result of moisture, this can lead to damaged interior sheetrock, insulation and the growth of mold. If this condition continues, the efflorescence should be cleaned and the brick surface sealed.

The roofing systems at Newark Tech consist of insulation and EPDM or BUR materials over flat roof decks. The windows throughout the building vary. There are sections of the building with single pane, double pane glass and acrylic windows on the fourth floor. While replacement of the windows with new high-performance, double pane, low-E, air tight window models will be better energy efficiency performers, the cost of window replacement is rarely justified by energy savings alone. More cost effective options include the application of new weather-stripping, 'shrink-to-fit' plastic films for making temporary interior windows, or the installation of storm windows. These measures are recommended as temporary solutions to minimize infiltration and improve building occupant comfort.

Main Entrance Way

The exterior doors throughout the building are FRP or glass panel with metal frames. Replacement of exterior doors does not offer as much energy-savings opportunity as replacement of windows, mainly due to the smaller total area. However, doors may leak even more then windows. Therefore, installation of new weather-stripping and flexible door sweeps is highly recommended.

It was also noted that there are a few window AC units. It is recommended that the air conditioning sleeves be checked for a tight seal. Since the AC units are left in place through the winter, AC covers should be purchased and installed. An outdoor AC cover covers the top and sides of the unit to stop drafts. Window and through-wall AC covers are UV resistant, water repellent PVC vinyl with elasticized corners and straps for a tight fit. Outdoor or indoor

Example of an Outdoor AC Cover

AC covers can also be customized. A standard outdoor AC cover can cost around $15. The impact on the overall building heating load will be minimal; however, there will be a direct impact on the occupants comfort.

2.3.2 Description of Building HVAC

Steam generated by two (2) Superior firetube boilers interacts with a building hot water system in a steam-hot water heat exchanger, located in the boiler room. This hot water is then distributed to four main air handling units, also in the boiler room, and fin tube radiators located around the perimeter walls of the building. The four main air handling units provide tempered air to all areas of the building with the exception of the new gymnasium, which is heated by gas-fired rooftop units.

A chiller, located in the boiler room, provides chilled water to the four main air handling units to cool all areas of the building, except the gymnasium which is cooled by the aforementioned packaged rooftop units. The chiller is water cooled, with a condenser water system interacting with a cooling tower on the building roof.

2.3.3 Description of Building Lighting

The Newark Technical School has already converted most of the building's lighting to energy efficient T8 lamps, with electronic ballasts. The School's existing lighting system consists of 2X2 (2 and 3 lamp), 1X4 (1 and 2 lamp), 2X4 (2, 3, and 4 lamp) T8 linear fluorescent fixtures with electronic ballasts, 1X2 (1 lamp), 1X4 (1 and 2 lamp) T12 standard efficiency linear fluorescent fixtures with magnetic ballasts, circular fluorescent fixtures, metal halide fixtures, and various wattage incandescent fixtures. Existing exterior lighting consists of HID canopy fixtures and wall packs, metal halide parking lot fixtures, and incandescent canopy fixtures. Refer to Section 4 for a more detailed description.

2.4 Bloomfield Technical School

2.4.1 Description of Building Envelope

The walls of the Bloomfield Technical School are concrete cavity walls consisting of brick façade, cavity and CMU backup blocks. The roofing system consists of insulation and EPDM membrane over flat roof decks. The roof was observed to be in good condition, with minimal pooling and no interior signs of leakage.

Window AC Units

The windows throughout the building are insulating double pane windows. The exterior doors are FRP.

There are window air conditioners in place and as such, it is recommended that the air conditioning sleeves be checked for a tight seal. Since the AC units

are left in place through the winter, AC covers should be purchased and installed. An outdoor AC cover covers the top and sides of the unit to stop drafts. Window and through-wall AC covers are UV resistant, water repellent PVC vinyl with elasticized corners and straps for a tight fit. Outdoor or indoor AC covers can also be customized. A standard outdoor AC cover can cost around $15. The impact on the overall building heating load will be minimal; however, there will be a direct impact on the occupants comfort.

Overall, it was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.4.2 Description of Building HVAC

The Bloomfield Technical School is heated by a steam system, with radiators located throughout the building. Two (2) cast iron Weil McLain boilers generate the steam necessary to heat the building. Three (3) electric unit heaters were noted in the gymnasium to supplement the steam heat provided to this room.

Cooling is provided to a few classrooms and offices via window air conditioners. The remainder of the building is un-cooled.

2.4.3 Description of Building Lighting

The Bloomfield Technical School has already converted most of the building lighting to energy efficient T8 lamps, with electronic ballasts. The School's existing lighting system consists of 2X2 (2 lamp), 1X4 (1, 2, and 4 lamp), 2X4 (2, 3, and 4 lamp) T8 linear fluorescent fixtures with electronic ballasts, 1X8 (2 lamp) T12 standard efficiency linear fluorescent fixtures with magnetic ballasts, circular fluorescent fixtures, metal halide fixtures, and various wattage incandescent fixtures. Existing exterior lighting consists of HID canopy fixtures and wall packs, and HID parking lot fixtures. Refer to Section 4 for a more detailed description.

2.5 North 13th Street School

2.5.1 Description of Building Envelope

The walls of the North 13th Street School are concrete cavity walls consisting of brick façade, cavity and CMU backup blocks. The roofing system consists of insulation and EPDM membrane over flat roof decks. The roof was observed to be in good condition, with minimal pooling and no interior signs of leakage.

The windows throughout the building vary between single and double pane windows. The exterior doors are FRP.

There are window air conditioners in place and as such, it is recommended that the air conditioning sleeves be checked for a tight seal. Since the AC units are left in place

through the winter, AC covers should be purchased and installed. An outdoor AC cover covers the top and sides of the unit to stop drafts. Window and through-wall AC covers are UV resistant, water repellent PVC vinyl with elasticized corners and straps for a tight fit. Outdoor or indoor AC covers can also be customized. A standard outdoor AC cover can cost around $15. The impact on the overall building heating load will be minimal; however, there will be a direct impact on the occupants comfort.

Overall it was determined that the building envelope is in good condition and is currently providing a high level of insulation. As such, any modifications to the insulation system would not prove to be cost effective from an energy savings stand-point.

2.5.2 Description of Building HVAC

The North 13th Street School is heated primarily by a steam system, with radiators and unit ventilators located throughout the building. Two (2) cast iron Weil McLain boilers generate steam for this system. Two (2) additional cast iron hot water Weil McLain boilers were noted. It was not determined specifically which areas of the building are heated via hot water, in lieu of steam.

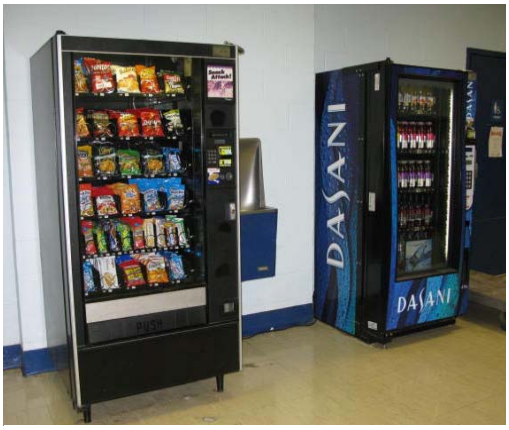
Cooling is provided to a few classrooms and offices via window air conditioners. The remainder of the building is un-cooled.

2.5.3 Description of Building Lighting

The North 13th Street School has already converted most of the building lighting to energy efficient T8 lamps, with electronic ballasts. The School's existing lighting system consists of 2X2 (2 and 3 lamp), 1X4 (1 and 2 lamp), 2X4 (2, 3, and 4 lamp) T8 linear fluorescent fixtures with electronic ballasts, 1X2 (2 lamp), 1X8 (2 lamp), 2X4 (4 lamp) T12 standard efficiency linear fluorescent fixtures with magnetic ballasts, compact and circular fluorescent fixtures, metal halide fixtures, and various wattage incandescent fixtures. Existing exterior lighting consists of HID canopy fixtures and wall packs, and HID parking lot fixtures. Refer to Section 4 for a more detailed description.

2.6 Miscellaneous Equipment

It is recommended that the Board consider the standardized use of Energy Star appliances. In addition to the use of Energy Star copiers and printers, Energy Star refrigerators and freezers, for example, use up to 40% less energy than models built in 2001. Energy Star appliances will not only reduce the Board's utility bills, but will also outperform standard appliances due to the improved design and advanced technologies.



Vending Machines at West Caldwell

In addition to replacing old appliances with Energy Star appliances, the following two maintenance procedures can work to save the energy consumed by the Board's refrigerators. One is cleaning dirty condenser coils twice a year. A refrigerator's condenser coils and cooling fins are located either under the unit behind a grille in the front or on the back of the appliance. The coils can be cleaned with a brush or vacuum cleaner hose. The second source of wasted energy associated with a refrigerator is the door seal. Realigning the door or replacing a no longer airtight door seal will work to improve energy efficiency.

It may also be considered that the 'Vending Misers' be purchased and utilized for vending machines throughout the Board's facilities. A 'Vending Miser' powers down a vending machine when the surrounding area is unoccupied and automatically repowers when the area is occupied, utilizing an infrared sensor. Similarly to occupancy sensors on lighting fixtures; however, the vending miser also monitors the ambient temperature while the vending machine is powered down and uses this as sort of an internal thermostat to power up the machine and ensure that the drinks remain cold. The implementation of a 'Vending Miser' also reduces maintenance costs and extends the life of the machine, by reducing the number of compressor cycles. A 'Vending Miser' is a $180 investment, but has been found to reduce power consumption of a cold drink vending machine by an average of 46%.

Section 3
Baseline Energy Use

3.1 Utility Data Analysis

The first step in the energy audit process is the compilation and quantification of the facility's current and historical energy usage and associated utility costs. It is important to establish the existing patterns of electric and gas usage in order to be able to identify areas in which energy consumption can be reduced.

For this study, the monthly gas and electric bills per facility were analyzed and unit costs of energy were obtained. The unit cost of energy, as determined from the information provided by the Board, was utilized in determining the feasibility of switching from one energy source to another or reducing the demand on that particular source of energy to create annual cost savings for the Board.

3.1.1 Electric Charges

It is also important to understand how the utilities charge for the service. The majority of the energy consumed is electric as a result of both indoor and outdoor lighting and appliances, such as kitchen appliances, computers, printers and projectors. Electricity is charged by three basic components: electrical consumption (kWh), electrical demand (kW) and power factor (kVAR) (reactive power). The cost for electrical consumption is similar to the cost for fuel and the monthly consumption appears on the utility bill as kWh (kilowatt-hours) consumed per month with a cost figure associated with it. The service connections are either billed on a flat rate or time of day rates per kWh.

Electrical demand can be as much as 50 percent or more of the electric bill. The electrical demand that the utility charges for is the maximum demand measured over a consecutive 15 minute period during the billing period. The maximum demand (kW) during the billing period is multiplied by the demand cost factor and the result is added to the electric bill. It is often possible to decrease the electric bill by 15 – 25 percent by reducing the demand, while still using the same amount of energy.

The power factor (reactive power) is the power required to energize electric and magnetic fields that result in the production of real power. Power factor is important because transmission and distribution systems must be designed and built to manage the need for real power, as well as the reactive power component (the total power). If the power factor is low, then the total power required can be greater than 50 percent or more than the real power alone. The power factor charge is a penalty for having a low power factor. Fortunately, this penalty charge does not impact the Board.

The other parts of the electric bill are the supply charges, delivery charges, system benefits, transmission revenue adjustments, state and municipality tariff surcharges and sales taxes, which cannot be avoided.

PSE&G is the current supplier and distributor of electric energy for the Board's Technical Schools and Board office.

3.1.2 Natural Gas Charges

PSE&G is also the current supplier and distributor of natural gas for the Board's facilities covered under this audit. The Board is charged for the cost of the natural gas, a delivery charge and a customer charge, which covers gas administration charges.

3.2 Facility Results

3.2.1 Board Office

Electric power for the Board of Education Office Building is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-1 illustrates the average monthly total energy consumption from January 2008 through November 2009. For example, for the month of October, the bar graph represents average energy consumption for October 2008 and October 2009. This same graphical representation approach has been carried through for all months and is typical for all graphs presented in this Section. Electrical usage has been averaged by month for the above referenced time period to portray a more encompassing monthly usage trend.

From this graph, it can be determined that the average annual electrical consumption for the Board of Education Building is approximately 23,000 kWh/month.

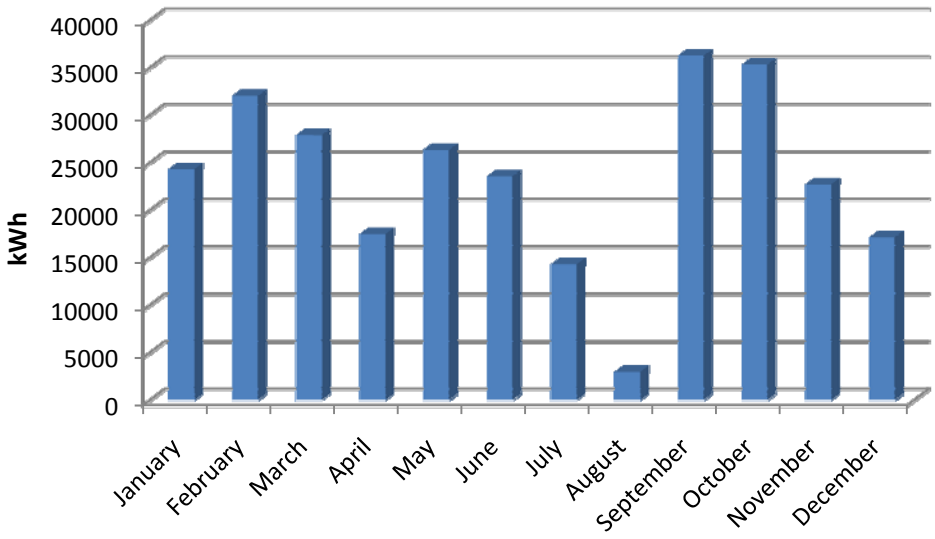


Figure 3.2-1: Board of Education Building Electrical Usage

The Board of Education is located in the same building as the Department of Public Works. As such, a summary of the yearly usage was supplied by the DPW for the Board's use in this audit. As such, a review of the current tariff rates is not included for this building.

Refer to Table 3.3-1, in Section 3.3 for the average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Figure 3.2 -2 illustrates the Board Office building's monthly average natural gas consumption for 2009.

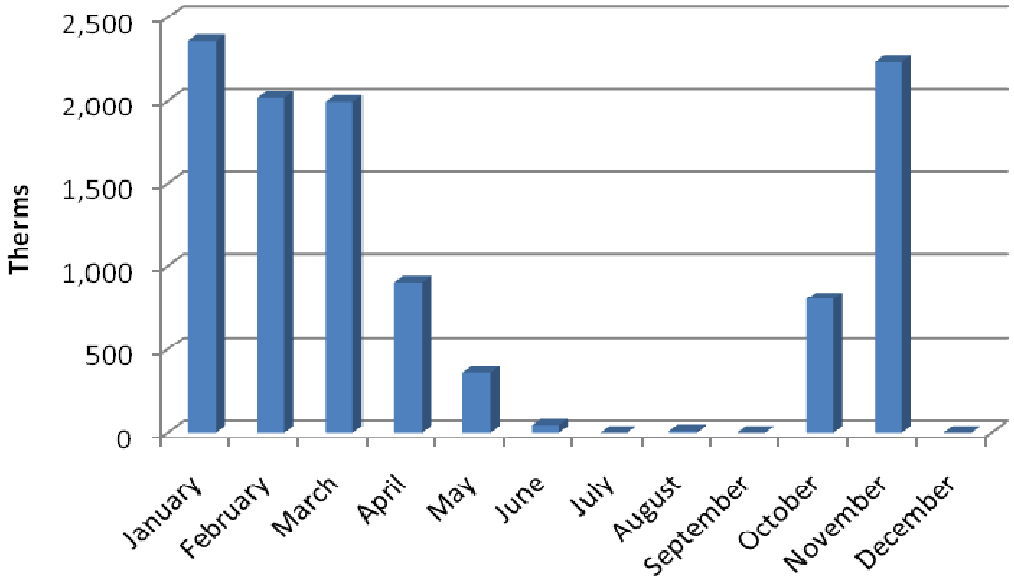


Figure 3.2-2: Board of Education Building Gas Usage

For more on the building's gas usage, refer to Section 4.2.

3.2.2 West Caldwell School

Electric power for the West Caldwell Technical School is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-3 illustrates the average monthly total energy consumption from January 2008 through November 2009. From this graph, it can be determined that the average annual electrical consumption for the West Caldwell School is approximately 75,000 kWh/month.

Figure 3.2-4 illustrates the monthly demand load for the West Caldwell Technical School from January 2008 through November 2009.

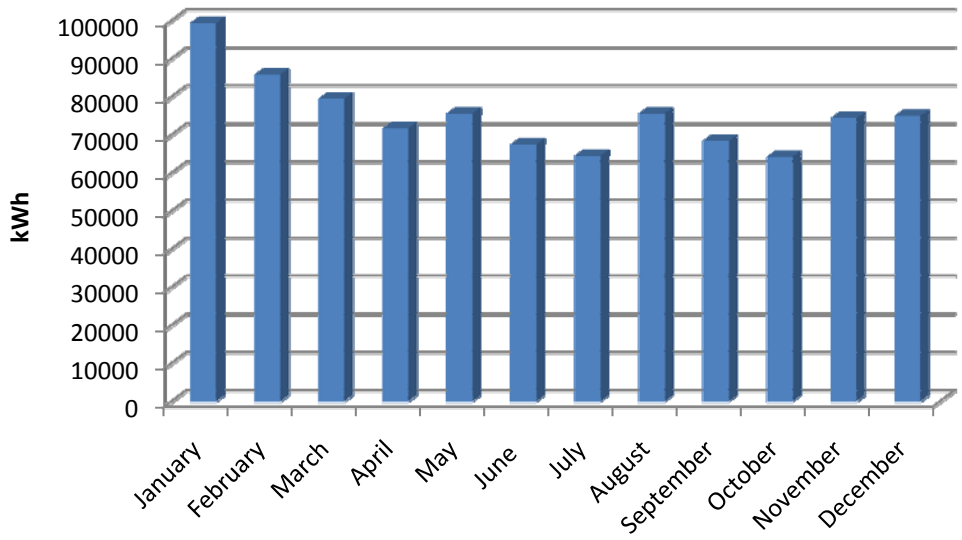


Figure 3.2-3: West Caldwell Technical School Electrical Usage

The most recent tariff rates available at the time of this audit, are as follows:

	Acct #: 12 429 160 16
DELIVERY CHARGES	
Service Charge:	$657.40
Distribution Charges	
Annual Demand:	$5.698235294/kW
kWh on-peak:	$0.004543220/kWh on-peak
kWh off-peak:	$0.004543301/kWh off-peak
Societal Benefits:	$0.007508030/kWh
Securitization Transition:	$0.010254166/kWh
SUPPLY CHARGES	
Generation:	$8.246424993/kW
Transmission:	$2.896018984/kW
kWh on-peak:	$0.105718220/kWh on-peak
kWh off-peak:	$0.069971242/kWh off-peak

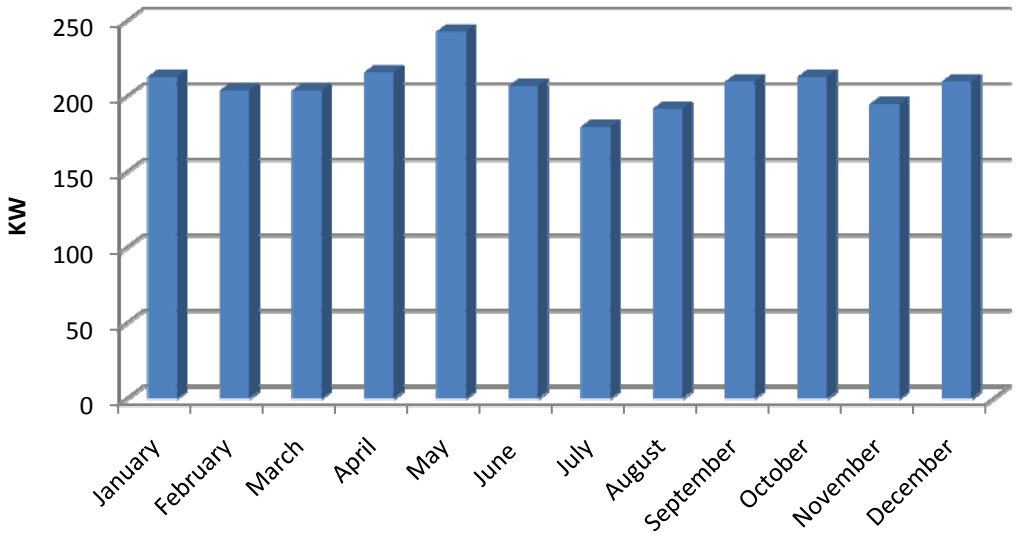


Figure 3.2-4: West Caldwell Technical School
Maximum Monthly Demand

Refer to Table 3.3-1, in Section 3.3 for average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Figure 3.2 -5 illustrates the West Caldwell School's monthly average natural gas consumption from December 2008 through February 2010.

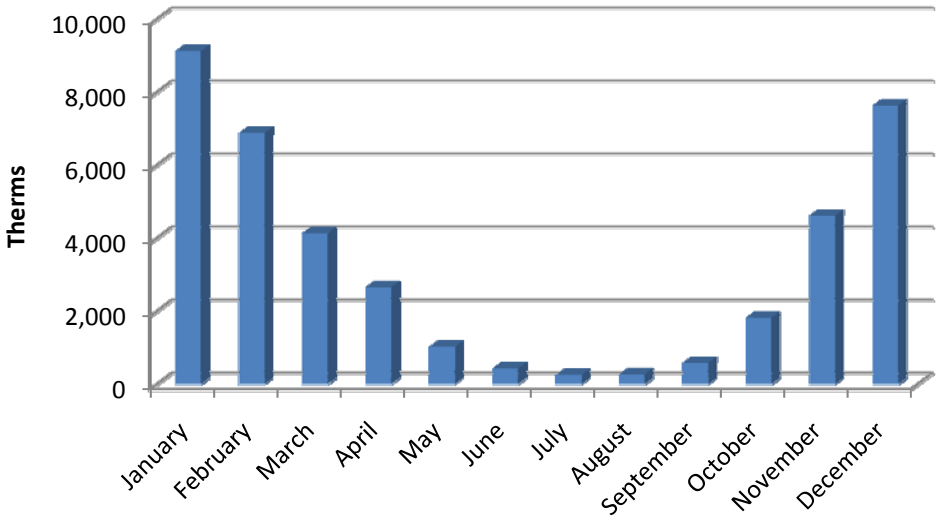


Figure 3.2-5: West Caldwell's Gas Usage

For more on West Caldwell's gas usage, refer to Section 4.2.

3.2.3 Newark Technical High School

Electric power for the Newark Technical High School is fed from two General Secondary Service single phase lines from PSE&G. Figure 3.2-12 illustrates the average monthly total energy consumption from both service accounts from March 2008 through May 2010. From this graph, it can be determined that the average annual electrical consumption for the Newark Technical High School is approximately 220,000 kWh/month.

Figure 3.2-13 illustrates the monthly demand load for the Newark Technical High School from March 2008 through May 2010.

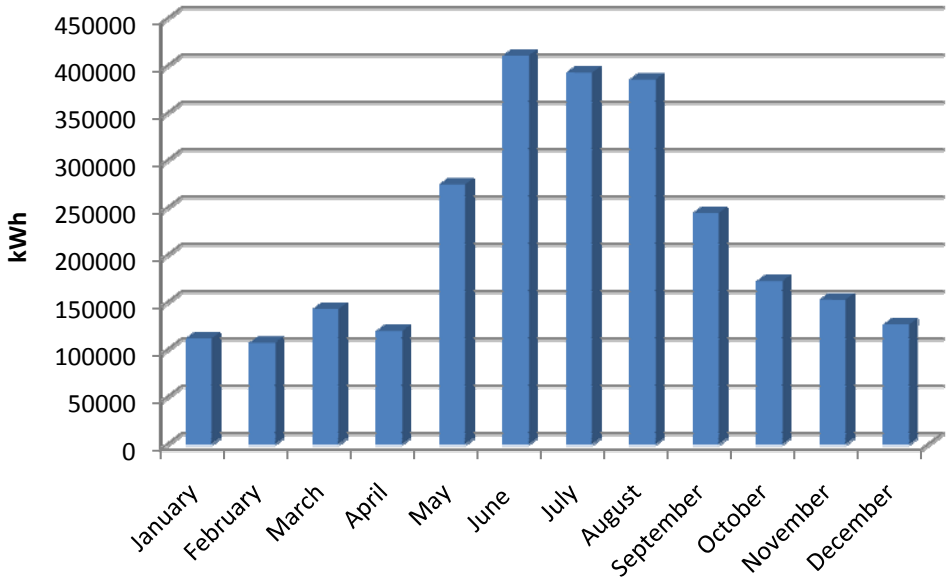


Figure 3.2-12: Newark Technical High School's Electrical Usage

The most recent tariff rates available at the time of this audit for the Newark Technical High School service, are as follows:

	Acct #: 42 067 526 05	Acct #: 42 005 702 03
DELIVERY CHARGES	**Meter # 778017617**	**Meter #: 778015734**
Service Charge:	$372.11	$372.11
Distribution Charges		
Annual Demand:	$3.341029412/kW	$3.341010720/kW
kWh on-peak:	$0.005104968/kWh on-peak	$0.005105027/kWh on-peak
kWh off-peak:	$0.005105324/kWh off-peak	$0.005105006/kWh off-peak
Societal Benefits:	$0.007568182/kWh	$0.007568022/kWh
Securitization Transition:	$0.012068182/kWh	$0.012067976/kWh

SUPPLY CHARGES		
Generation:	$5.123186946/kW	$5.123194575/kW
Transmission:	$1.962996435/kW	$1.963001884/kW
kWh on-peak:	$0.102740385/kWh on-peak	$0.102839158/kWh on-peak
kWh off-peak:	$0.071208333/kWh off-peak	$0.073316969/kWh off-peak

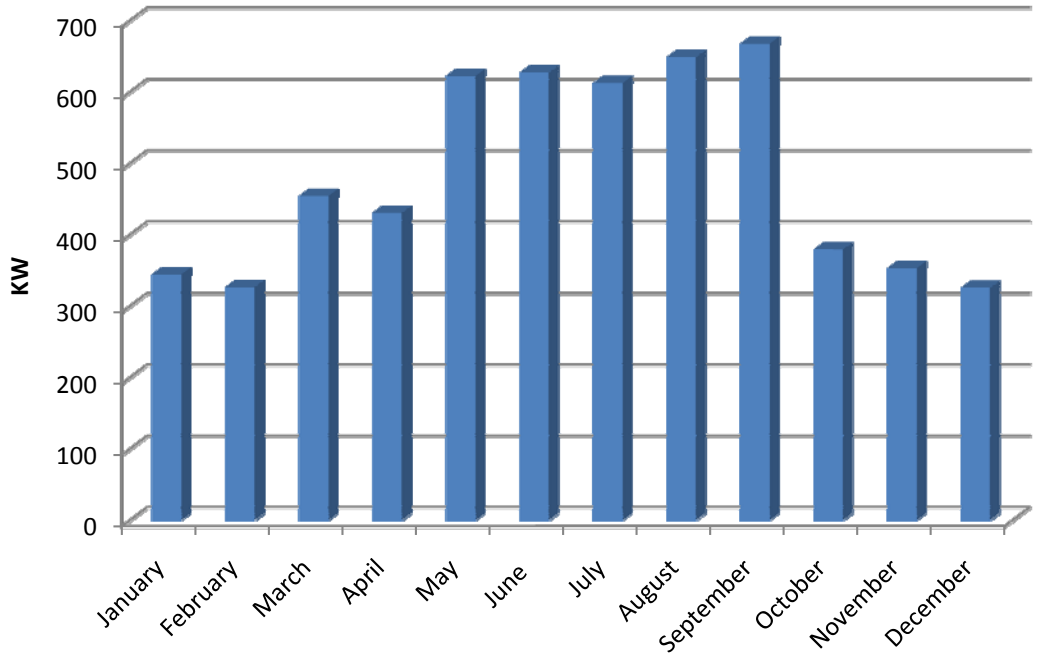


Figure 3.2-13: Newark Tech High School's Maximum Monthly Demand

Refer to Table 3.3-1, in Section 3.3, for average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Figure 3.2 -14 illustrates the Newark Technical High School's monthly average natural gas consumption from March 2008 through January 2010.

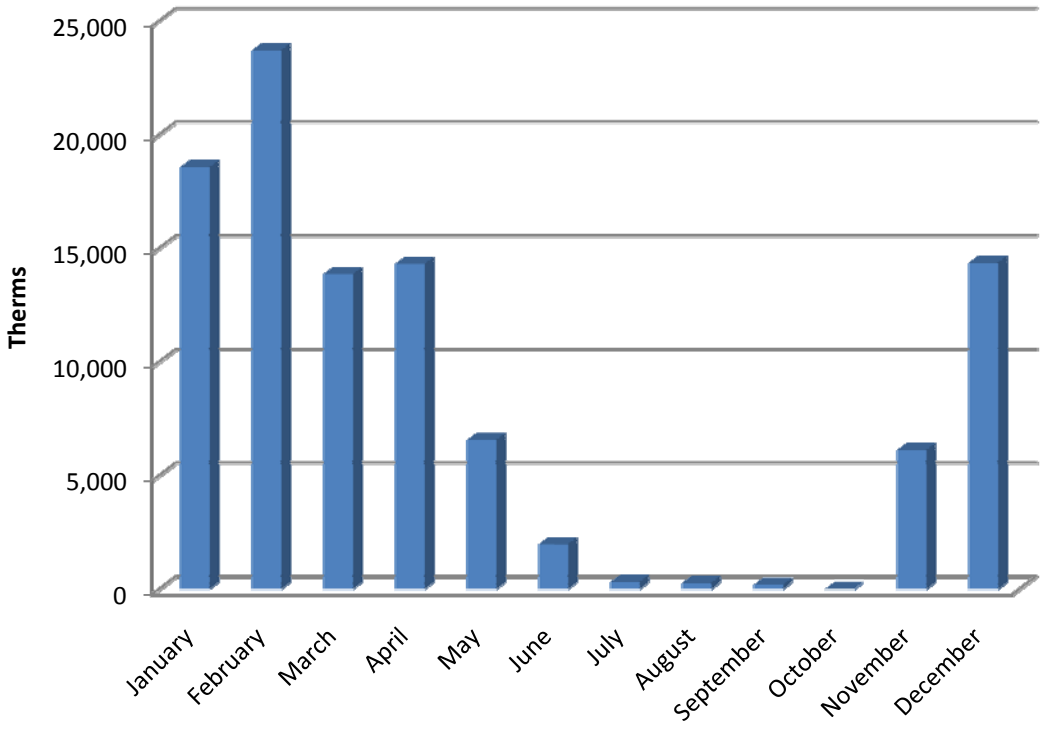


Figure 3.2-14: Newark Technical High School's Gas Usage

For more on the gas usage at the Newark Technical High School, refer to Section 4.2.

3.2.4 Bloomfield Technical School

Electric power for the Bloomfield Technical High School is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-6 illustrates the average monthly total energy consumption from February 2008 through January 2010. From this graph, it can be determined that the average annual electrical consumption for Bloomfield Technical is approximately 40,000 kWh/month.

Figure 3.2-7 illustrates the monthly demand load for Bloomfield Tech from February 2008 through January 2010.

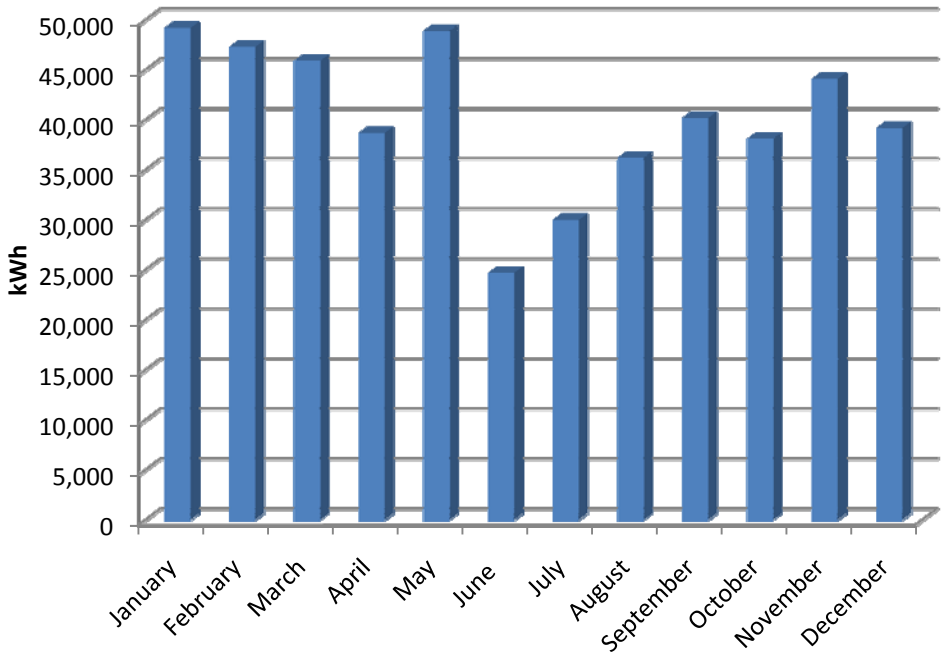


Figure 3.2-6: Bloomfield Technical High School's Electrical Usage

The most recent tariff rates available at the time of this audit for the High School Building, are as follows:

	Acct #: 12 416 012 08
DELIVERY CHARGES	
Service Charge:	$297.69
Distribution Charges	
Annual Demand:	$2.580298507/kW
kWh on-peak:	$0.004535185/kWh on-peak
kWh off-peak:	$0.004535088/kWh off-peak
Societal Benefits:	$0.007507971/kWh
Securitization Transition:	$0.010119927/kWh
SUPPLY CHARGES	
Generation:	$3.738074097/kW
Transmission:	$1.252104961/kW
kWh on-peak:	$0.103360494/kWh on-peak
kWh off-peak:	$0.067614035/kWh off-peak

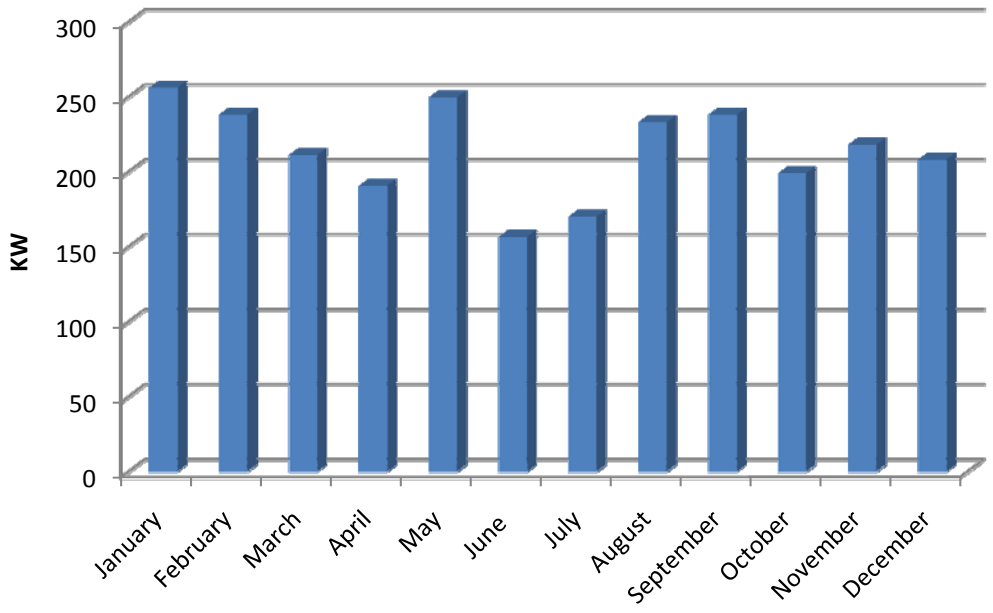


Figure 3.2-7: Bloomfield Tech High School's Maximum Monthly Demand

Refer to Table 3.3-1, in Section 3.3, for average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for a complete Historical Data Analysis.

Figure 3.2 -8 illustrates Bloomfield Tech's monthly average natural gas consumption from January 2008 through January 2010.

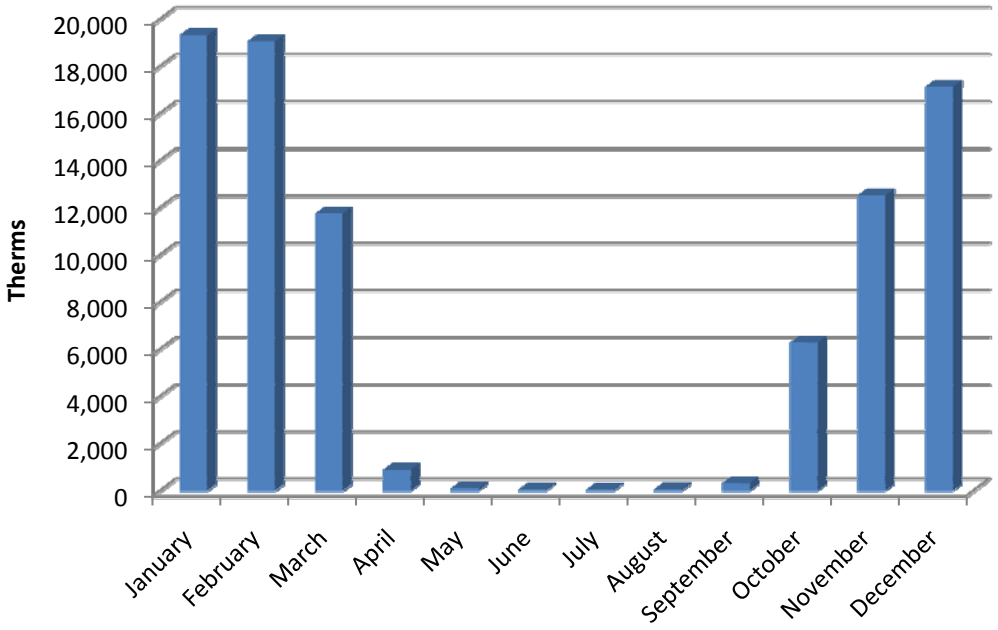


Figure 3.2-8: Bloomfield Technical High School's Gas Usage

For more on the gas usage at Bloomfield Technical High School, refer to Section 4.2.

3.2.5 North 13th Street Technical School

Electric power for North 13th Street Technical School is fed from one General Secondary Service three phase line from PSE&G. Figure 3.2-9 illustrates the average monthly total energy consumption from February 2008 through February 2010. From this graph, it can be determined that the average annual electrical consumption for the North 13th Street School is approximately 74,000 kWh/month.

Figure 3.2-10 illustrates the monthly demand load for the North 13th Street Technical School from February 2008 through February 2010.

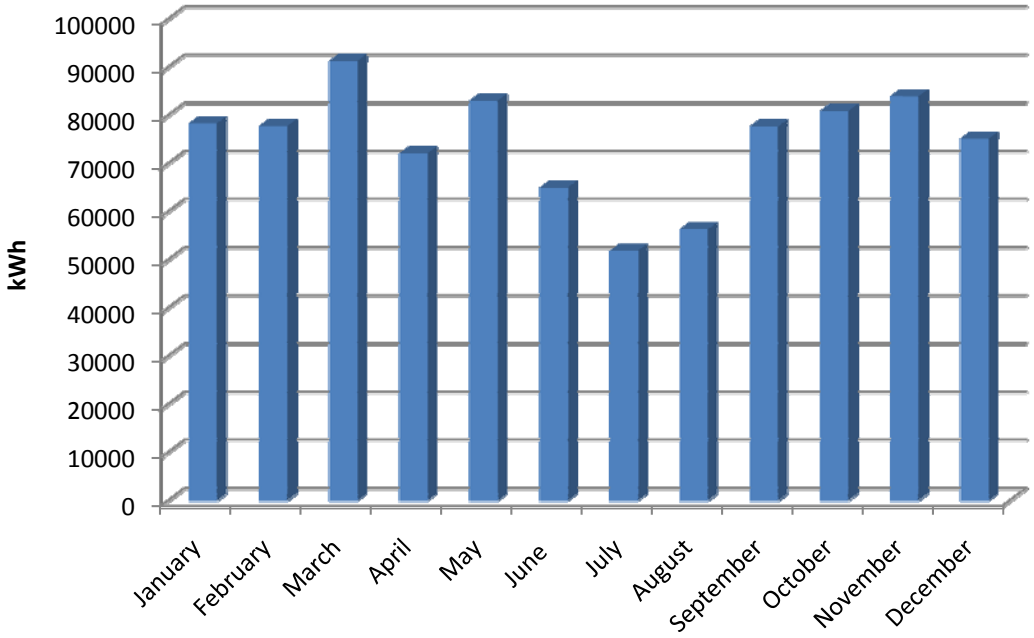


Figure 3.2-9: North 13th Street Technical School's Electrical Usage

The most recent tariff rates available at the time of this audit for the North 13th Street Technical School service, are as follows:

	Acct #: 11 047 081 08
DELIVERY CHARGES	
Service Charge:	$372.11
Distribution Charges	
Annual Demand:	$3.225396825/kW
kWh on-peak:	$0.004548431/kWh on-peak
kWh off-peak:	$0.004548611/kWh off-peak

	Acct #: 11 047 081 08
DELIVERY CHARGES	
Societal Benefits:	$0.007508064/kWh
Securitization Transition:	$0.010340860/kWh
SUPPLY CHARGES	
Generation:	$4.664688779/kW
Transmission:	$1.655360160/kW
kWh on-peak:	$0.105287338/kWh on-peak
kWh off-peak:	$0.069540331/kWh off-peak

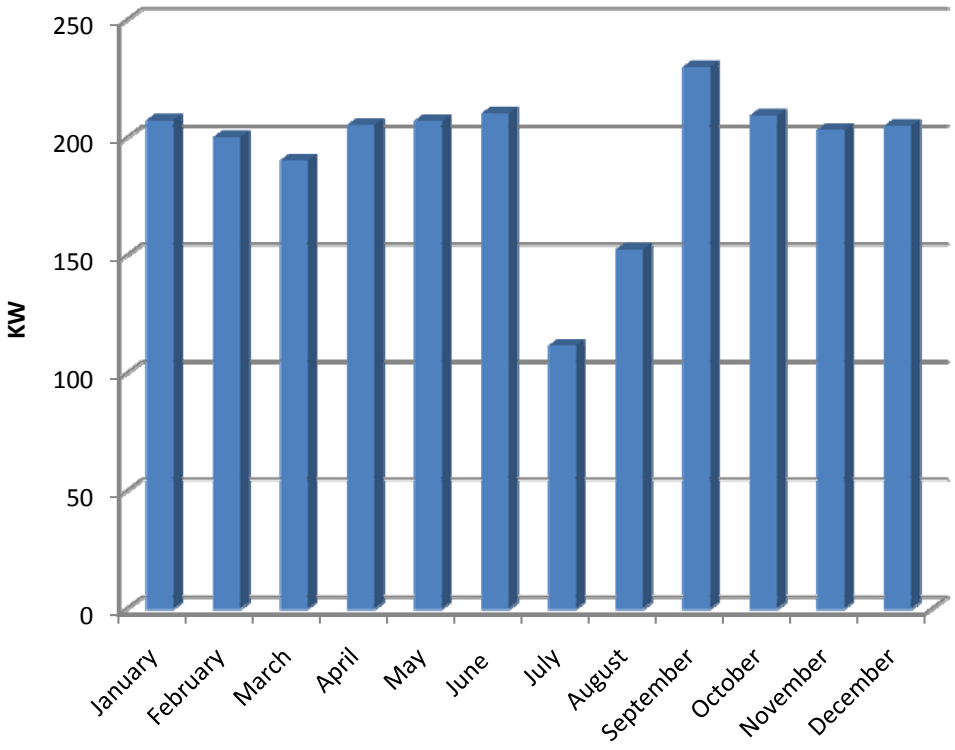


Figure 3.2-10: North 13th Street Technical School
Maximum Monthly Demand

Refer to Table 3.3-1, in Section 3.3, for average electrical aggregate cost. These tariffs are subject to change quite frequently. Refer to Appendix A for complete Historical Data Analysis.

Figure 3.2 -11 illustrates the North 13th Street Technical School's monthly average natural gas consumption from February 2008 through February 2010.

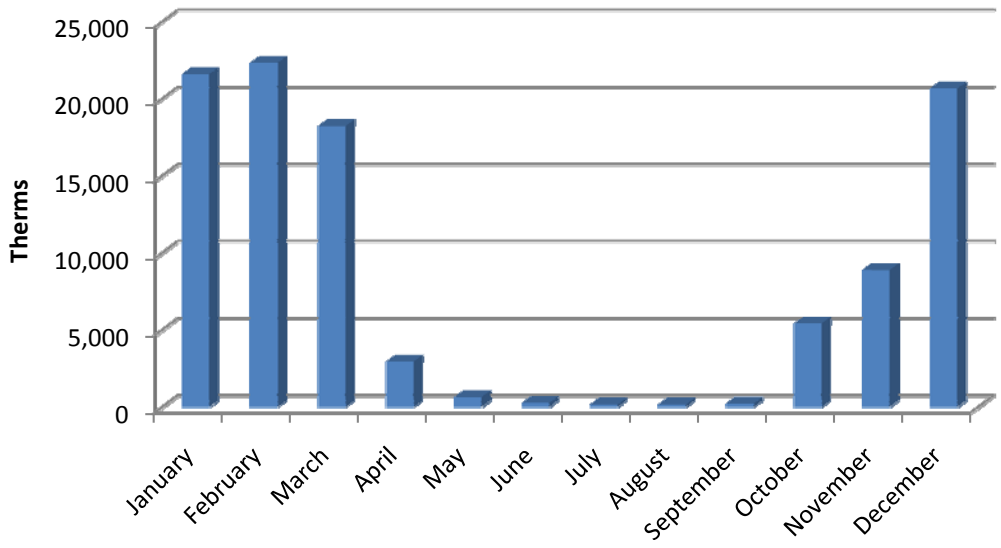


Figure 3.2-11: North 13th Street Technical School's Gas Usage

For more on the gas usage at the North 13th Street Technical School, refer to Section 4.2.

3.3 Aggregate Costs

For the purposes of computing energy savings for all identified energy conservation and retrofit measures, aggregate unit costs for electrical energy and fuel, in terms of cost/kWh and cost/therm, were determined for each service location and utilized in the simple payback analyses discussed in subsequent sections. The aggregate unit cost accounts for all distribution and supply charges for each location. Table 3.3-1 and Table 3.3-2 summarize the aggregate costs for electrical energy consumption and therms utilized, respectively.

Table 3.3-1: Electrical Aggregate Unit Costs

Service Location	Aggregate $ / kW-hr
Board Office	$0.1629
West Caldwell Technical School	$0.1623
Bloomfield Technical High School	$0.1742
North 13th Street Technical School	$0.1536
Newark Technical High School	$0.1680

Table 3.3-2: Natural Gas Aggregate Unit Costs

Service Location	Aggregate $ / therm
Board Office	$1.50
West Caldwell Technical School	$1.04
Bloomfield Technical High School	$1.38
North 13th Street Technical School	$0.96
Newark Technical High School	$1.12

3.4 Portfolio Manager

3.4.1 Portfolio Manager Overview

Portfolio Manager is an interactive energy management tool that allows the Board to track and assess energy consumption at the facilities in a secure online environment. Portfolio Manager can help the Board set investment priorities, verify efficiency improvements, and receive EPA recognition for superior energy performance.

3.4.2 Energy Performance Rating

For many facilities, you can rate their energy performance on a scale of 1–100 relative to similar facilities nationwide. Your facility is *not* compared to the other facilities entered into Portfolio Manager to determine your ENERGY STAR rating. Instead, statistically representative models are used to compare your facility against similar facilities from a national survey conducted by the Department of Energy's Energy Information Administration. This national survey, known as the Commercial Building Energy Consumption Survey (CBECS), is conducted every four years, and gathers data on building characteristics and energy use from thousands of facilities across the United States. Your facility's peer group of comparison is those facilities in the CBECS survey that have similar facility and operating characteristics. A rating of 50 indicates that the facility, from an energy consumption standpoint, performs better than 50% of all similar facilities nationwide, while a rating of 75 indicates that the facility performs better than 75% of all similar facilities nationwide.

3.4.3 Portfolio Manager Account Information

A Portfolio Manager account has been established for the Board, which includes a profile for the five (5) buildings. Information entered into this Portfolio Manager Facility profile, including electrical energy consumption and natural gas consumption has been used to establish a performance baseline.

It is recommended that the information be updated to track the buildings' energy usage. At the time of the audit, the schools and Board Office building received the following ratings:

Board of Education Office Building – 17
West Caldwell Technical School – 53
Bloomfield Technical High School – 54
North 13th Street Technical School – 87
Newark Technical High School – 21

Appendix B contains the Statement of Energy Performance developed for each of the buildings and a Portfolio Manager Reference sheet.

The following website link, username and password shall be used to access the Portfolio Manager account and building profiles that has been established for the Board:

https://www.energystar.gov/istar/pmpam/

USERNAME: ECTechSchools
PASSWORD: EnergyStar

Section 4
Energy Conservation and Retrofit Measures (ECRM)

The following is a summary of how Annual Return on Investment (AROI), Internal Rate of Return (IRR), and Net Present Value (NPV) will be broken down in the cost analysis for all ECRMs recommended in this report.

Included in the simplified payback analysis summary table is the 'Annual Return on Investment' (AROI) values. This value is a performance measure used to evaluate the efficiency of an investment and is calculated using the following equation:

$$AROI = \frac{AECS + OCS}{NET\ ECM\ Cost} - \frac{1}{Lifetime}$$

Where OCS = Operating Cost Savings, and AECS = Annual Energy Cost Savings.

Also included in the table are net present values for each option. The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (DR) (assume bond rate of 3%). NPV is calculated using the following equation:

$$NPV = \sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$$

Where C_n=Annual cash flow, and N = number of years.

The IRR expresses an annual rate that results in a break-even point for the investment. If the Board is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the Board to compare ECRM's against each other to determine the most appealing choices.

$$IRR \rightarrow 0 = \sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$$

Where C_n=Annual cash flow, and N = number of years.

The lifetime energy savings represents the cumulative energy savings over the assumed life of the ECRM.

4.1 Building Lighting Systems

The goal of this section is to present any lighting energy conservation measures that may also be cost beneficial. It should be noted that replacing current bulbs with more energy-efficient equivalents will have a small effect on the building heating and cooling loads. The building cooling load will see a small decrease from an upgrade to more efficient bulbs and the heating load will see a small increase, as the more energy efficient bulbs give off less heat.

Two options are offered for most buildings. The first option will be for upgrading existing interior lighting, if applicable. The second option will be for upgrading existing exterior lighting, if applicable. A total cost for upgrading both options at the same time will be presented. Retrofitting of existing fluorescent fixtures includes upgrading both ballasts and lamps for the fixture. Refer to Appendix D for more information.

For facilities described herein, it was noted that there were no interior occupancy sensors installed. Installing occupancy sensors will typically increase energy savings; however, if the space is not occupied often in the first place, there will be little savings by installing occupancy sensors. However, certain areas of the facilities could benefit from installation of occupancy sensors. Therefore, occupancy sensor installation has been recommended in this report. Refer to Appendix D for occupancy sensor locations and quantities.

Please note that the Engineer's Estimate of Probable Construction Costs presented herein are estimates based on historic data compiled from similar installations and engineering opinions. Additional engineering will be required for each measure identified in this report and final scope of work and budget cost estimates will need to be confirmed prior to the coordination of project financing or the issuance of a Request for Proposal.

4.1.1 Board Office

It is recommended that the existing lighting system at the Board Office Building be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaires to the existing lighting systems. Options for improving the interior and exterior lighting for the Board Office Building are listed in Table 4.1-1.

Table 4.1-1 **Board Office Building Lighting System Improvements**	
Interior Lighting	High Performance T8 Retrofit, Incandescent to Compact Fluorescent
Exterior Lighting	Induction Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for these options are as follows:

Interior Lighting: 4.7kW, 18,670.2 kWh and $3,041.37
Exterior Lighting: 0.5kW, 2,146.2 kWh and $349.62

The following table, Table 4.1-2, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Board Office Building.

Table 4.2-2
Board Office Building Lighting System Improvements***

	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	$15,453.84	$3,044.63	$18,498.47
New Jersey SmartStart Rebate	-$1,306*	-$280*	-$1,586*
Total Cost	$14,147.84	$2,764.63	$16,912.47
Annual Energy Savings	$3,041.37	$349.62	$3,390.99
Annual Maintenance Cost Savings (AMCS)	$1,134.30	$51.33	$1,185.64
Simple Payback	**3.4 years**	**6.9 years**	**3.7 years**
Annual Return on Investment (AROI)	22.85%	7.84%	20.39%
Lifetime Energy Savings (15 years)**	$56,566.18	$6,502.55	$63,068.73
Internal Rate of Return (IRR)	31.78%	14.56%	29.15%
Net Present Value (NPV)	$46,662.89	$3,074.45	$49,737.34

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.
**3% yearly inflation on electricity costs
***See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" in Appendix D.

4.1.2 West Caldwell School

It is recommended that the existing lighting system at the West Caldwell School Building be upgraded to high efficiency standards to create lighting uniformity throughout the buildings. In general, the recommended lighting upgrade, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaires to the existing lighting systems. Options for improving the interior and exterior lighting for the West Caldwell School Building are listed in Table 4.1-3.

Table 4.1-3
West Caldwell School Building Lighting System Improvements

Interior Lighting	High Performance T8 Retrofit, Incandescent to CFL
Exterior Lighting	Induction Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for these options are as follows:

Interior Lighting: 3.8kW, 33,648.2 kWh and $5,461.11
Exterior Lighting: 2.3kW, 10,227.3 kWh and $1,659.89

The following table, Table 4.1-4, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the West Caldwell School Building.

Table 4.1-4
West Caldwell School Building Lighting System Improvements***

	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	$32,401.25	$9,890.00	$42,291.25
New Jersey SmartStart Rebate	-$2,275*	-$490*	-$2,765*
Total Cost	$30,126.25	$9,400.00	$39,526.25
Annual Energy Savings	$5,461.11	$1,659.89	$7,121.00
Annual Maintenance Cost Savings (AMCS)	$430.32	$60.47	$490.80

Table 4.1-4 West Caldwell School Building Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Simple Payback	**5.1 years**	**5.5 years**	**5.2 years**
Annual Return on Investment (AROI)	12.89%	11.64%	12.59%
Lifetime Energy Savings (15 years)**	$101,570.71	$30,872.15	$132,442.87
Internal Rate of Return (IRR)	20.76%	19.27%	20.41%
Net Present Value (NPV)	$55,671.27	$15,653.79	$71,325.06

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs

***See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.3 Newark Technical School

It is recommended that the existing lighting system at the Newark Technical School Building be upgraded to high efficiency standards to create lighting uniformity throughout the building. In general, the recommended lighting upgrade, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaires to the existing lighting systems. The proposed option for improving the exterior lighting for the Newark Technical School Building is listed in Table 4.1-5.

Table 4.1-5 Newark Technical School Building Lighting System Improvements	
Interior Lighting	High Performance T8 Retrofit, Incandescent to CFL, Metal Halide to Fluorescent
Exterior Lighting	Induction Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for this option is as follows:

Interior Lighting: 7.3kW, 79,536.9 kWh and $13,362.19
Exterior Lighting: 5.0kW, 21,891.2 kWh and $3,677.73

The following table, Table 4.1-6, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Newark Technical School Building.

Table 4.1-6
Newark Technical School Building Lighting System Improvements***

	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	$67,011.94	$31,395	$98,406.94
New Jersey SmartStart Rebate	-$7,596*	-$2,100*	-$9,696*
Total Cost	$59,415.94	$29,295.00	$88,710.94
Annual Energy Savings	$13,362.19	$3,677.73	$17,039.92
Annual Maintenance Cost Savings (AMCS)	$634.12	$225.51	$859.64
Simple Payback	**4.2 years**	**7.5 years**	**5.0 years**
Annual Return on Investment (AROI)	16.89%	6.66%	13.51%
Lifetime Energy Savings (15 years)**	$248,522.22	$68,401.78	$316,924.00
Internal Rate of Return (IRR)	25.31%	13.01%	21.48%
Net Present Value (NPV)	$144,413.82	$27,548.30	$171,962.12

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.

**3% yearly inflation on electricity costs

***See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.4 Bloomfield Technical School

It is recommended that the existing lighting system at the Bloomfield Technical School Building be upgraded to high efficiency standards to create lighting uniformity throughout the buildings. In general, the recommended lighting upgrade, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaires to the existing lighting systems. Options for improving the interior and exterior lighting for the Bloomfield Technical School Building are listed in Table 4.1-7.

Table 4.1-7 **Bloomfield Technical School Building Lighting System Improvements**	
Interior Lighting	High Performance T8 Retrofit, Incandescent to CFL
Exterior Lighting	Induction Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for these options are as follows:

Interior Lighting: 9.3kW, 46,259.5 kWh and $8,058.40
Exterior Lighting: 2.0kW, 8,900.2 kWh and $1,550.41

The following table, Table 4.1-8, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the Bloomfield Technical School Building.

Table 4.1-8 **Bloomfield Technical School Building Lighting System Improvements***			
	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	$33,590.06	$13,388.88	$46,978.94
New Jersey SmartStart Rebate	-$2,900*	-$700*	-$3,600*
Total Cost	$30,690.06	$12,688.88	$43,378.94
Annual Energy Savings	$8,058.40	$1,550.41	$9,608.81
Annual Maintenance Cost Savings (AMCS)	$1,258.59	$12.85	$1,271.44
Simple Payback	**3.3 years**	**8.1 years**	**4.0 years**
Annual Return on Investment (AROI)	23.69%	5.65%	18.42%
Lifetime Energy Savings (15 years)**	$149,877.49	$28,835.94	$178,713.43
Internal Rate of Return (IRR)	32.68%	11.64%	27.00%
Net Present Value (NPV)	$104,994.26	$10,077.04	$115,071.30

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.
**3% yearly inflation on electricity costs
***See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.1.5 North 13th Street School

It is recommended that the existing lighting system at the 13th Street School Building be upgraded to high efficiency standards to create lighting uniformity throughout the buildings. In general, the recommended lighting upgrade, as presented in Appendix D, involves replacing existing inefficient bulbs, and installing new energy-efficient luminaires to the existing lighting systems. Options for improving the interior and exterior lighting for the 13th Street School Building are listed in Table 4.1-9.

Table 4.1-9
13th Street School Building Lighting System Improvements

Interior Lighting	Incandescent to CFL, High Performance T8 Retrofit
Exterior Lighting	Induction Retrofit of Exterior Fixtures

The strategies included in this section focus on maximizing energy savings and maintaining or exceeding existing lighting levels, while also maintaining the existing look of each fixture; therefore, proposed lamp styles remain consistent with existing lamp styles. Please refer to Appendix D for a line-by-line proposed detailed lighting upgrades list.

The annual energy savings for these options are as follows:

Interior Lighting: 18.9kW, 89,626.2 kWh and $13,766.59
Exterior Lighting: 2.1kW, 9,062.2 kWh and $1,391.96

The following table, Table 4.1-10, summarizes a simple payback analysis assuming the implementation of all recommended lighting system improvements at the 13th Street School Building.

Table 4.1-10
13th Street School Building Lighting System Improvements***

	Interior Lighting	Exterior Lighting	Total
Engineer's Opinion of Probable Cost	$51,593.31	$12,204.38	$63,797.69
New Jersey SmartStart Rebate	-$4,410*	-$490*	-$4,900*
Total Cost	$47,183.31	$11,714.38	$58,897.69
Annual Energy Savings	$13,766.59	$1,391.96	$15,158.55
Annual Maintenance Cost Savings (AMCS)	$1,921.02	$13.02	$1,934.04

Table 4.1-10
13th Street School Building Lighting System Improvements***

	Interior Lighting	Exterior Lighting	Total
Simple Payback	**3.0 years**	**8.3 years**	**3.4 years**
Annual Return on Investment (AROI)	26.58%	5.33%	22.35%
Lifetime Energy Savings (15 years)**	$256,043.62	$25,888.94	$281,932.57
Internal Rate of Return (IRR)	35.72%	11.18%	31.26%
Net Present Value (NPV)	$181,277.03	$8,746.49	$190,023.52

* Additional incentives, based on eligibility, are available through the New Jersey SmartStart Program, see Appendix G.
**3% yearly inflation on electricity costs
***See Appendix H & I for ECRM Financial Analyses

It should be noted that the Annual Energy Savings assume the annual hours per year of operation as outlined under the columns entitled "Proposed Operational Hours without Sensors" and "Proposed Operational Hours with Sensors" in Appendix D.

4.2 HVAC Systems

The goal of this section is to present any heating and cooling energy reduction and cost saving measures that may also be cost beneficial. Where possible, measures will be presented with a life-cycle cost analysis. This analysis displays a payback period based on weighing the capital cost of the measure against predicted annual fiscal savings. To do this, the buildings have been modeled as accurately as possible to predict energy usage for space heating and cooling, as well as domestic hot water use.

Each building is modeled using software called eQuest, a Department of Energy-sponsored energy modeling program, to establish a baseline space heating and cooling energy usage. Climate data from Newark, NJ was used for analyses. From this, the model may be calibrated, using historical utility bills, to predict the impact of theoretical energy savings measures.

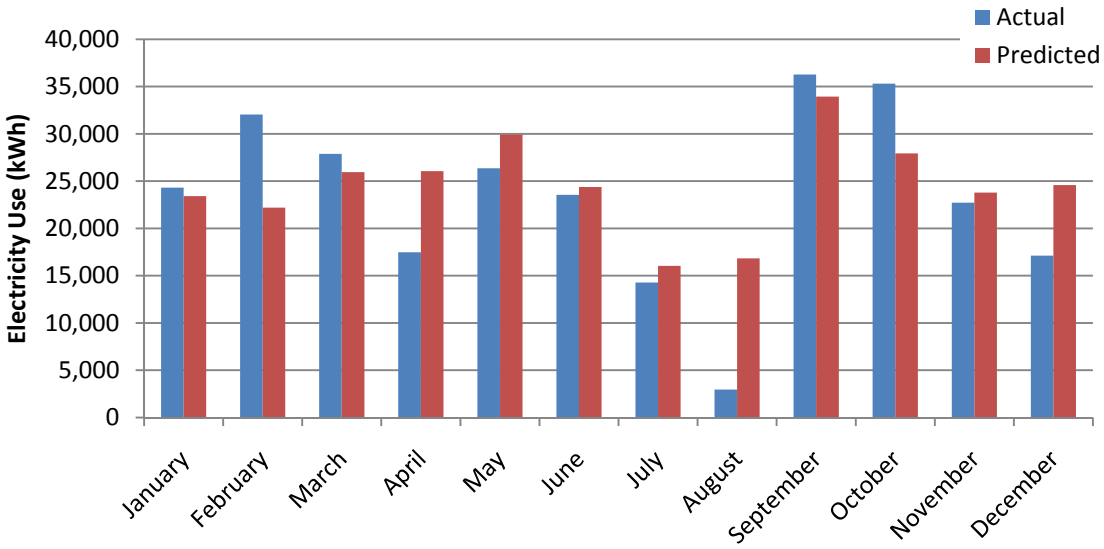
Once annual energy savings from a particular measure have been predicted and the initial capital cost has been estimated, payback periods may be approximated. Equipment cost estimate calculations are provided in Appendix H.

4.2.1 Board Office

A model of the Board Office was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity usage data from January, 2008 through November, 2009, and natural gas usage data from January, 2009 through December, 2009. Figure 4.2-1 below compares actual monthly electricity usages, with those predicted by the eQuest model. Historical monthly usages were averaged for each month observed over multiple years. For example, usage during

the month of June was averaged for the three years, to yield an approximate average usage during the month of June.

Figure 4.2-1: Board Office Electricity Usage



Once the eQuest model was calibrated, it could be used to predict approximate major usage categories, such as lighting, plug loads (miscellaneous), ventilation, and cooling. It should be noted that these are only estimated usages based on information gathered during CDM's field audit. Figure 4.2-2 presents this information to help the Board visualize where CDM anticipates the electricity is ultimately being used.

Figure 4.2-2: Board Office Electricity Usage Breakdown

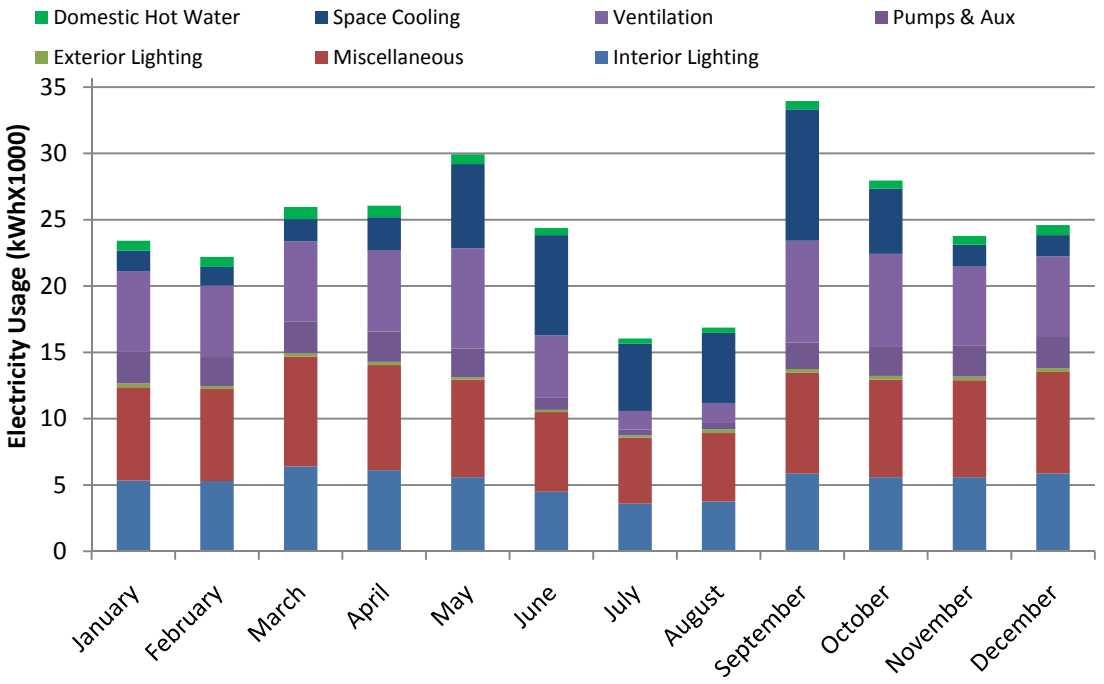
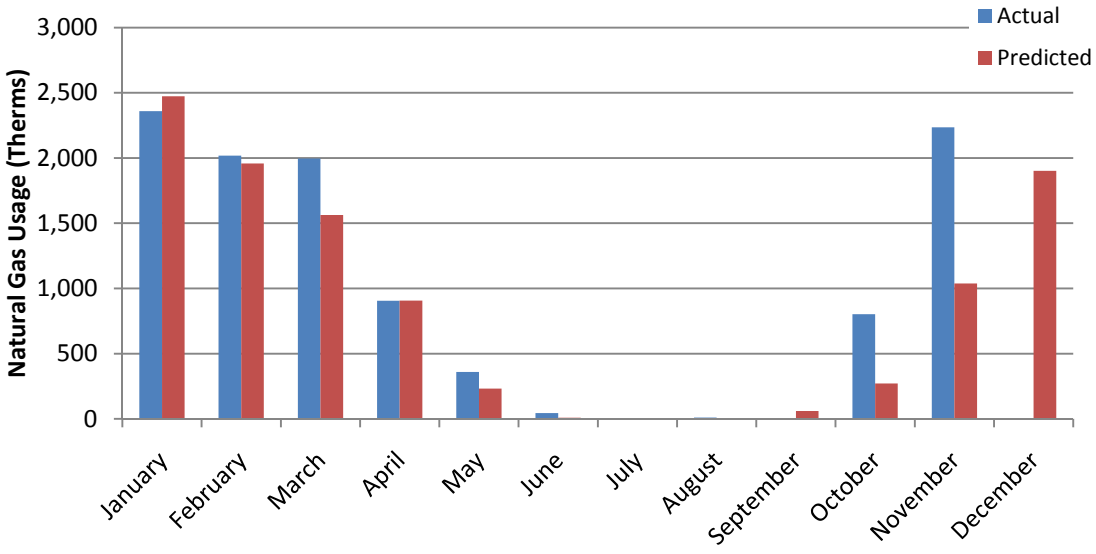


Figure 4.2-3 below compares actual natural gas usage to model-predicted natural gas use.

Figure 4.2-3: Board Office Natural Gas Usage

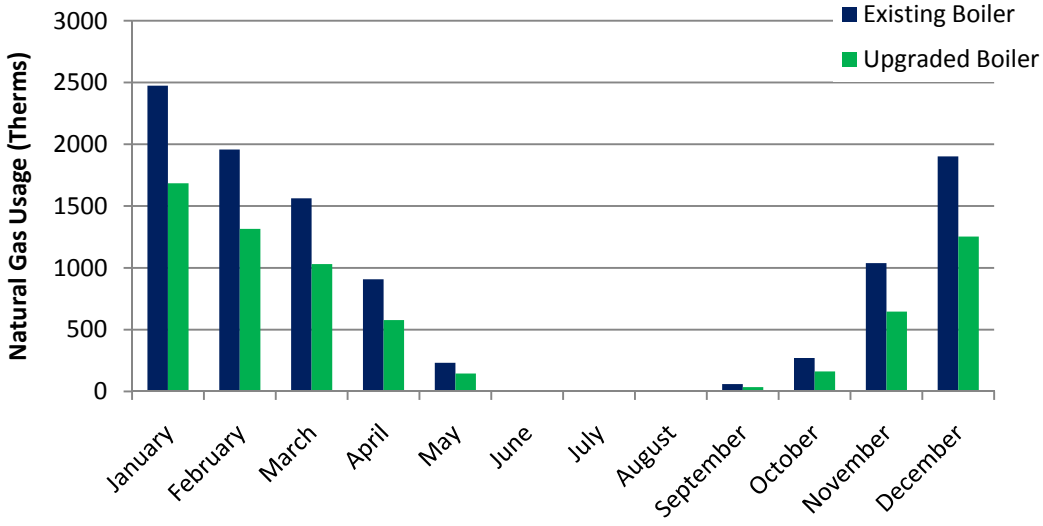


Currently, the heating system utilizes one Burnham firetube boiler with a gross input capacity 1,430 MBH. CDM conservatively estimates this boiler to be 75% efficient.

CDM recommends replacing this boiler with a high-efficiency, condensing boiler. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a building peak heating load of 1,590 MBH.

Figure 4.2-4 compares current gas usage with predicted gas usage resulting from a switch to a high-efficiency, condensing boiler. Condensing boilers are modeled with a full-load efficiency of ~90% and return water temperature of 120°F.

Figure 4.2-4: Board Office – Boiler Upgrade - Natural Gas Usage



Fiscal savings from such an upgrade are then identified in Table 4.2-1 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical firetube boilers. CDM estimates a firetube boiler system will typically cost around $3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around $2,000 per year. Therefore, replacing the existing boiler with a condensing boiler should result in an operation and maintenance cost savings of $1,500 per year.

Table 4.2-1: Board Office Boiler Upgrade Payback

Predicted Annual Savings (Therms)	3,557
Total Annual Savings	$5,335
Initial Capital Cost of Upgrade	$67,343
Incentives**	$2,000
Cost of Upgrade	$65,353
Annual Maintenance Cost Savings (AMCS)	$1,500
Simple Payback	**9.6**
Lifetime Energy Savings (24 years)*	$162,301
Annual Return on Investment (AROI)	6.29%
Internal Rate of Return (IRR)	12.08%
Net Present Value (NPV)	$93,909

*Assumes 2% yearly inflation on natural gas costs
**Incentives, per New Jersey Clean Energy Program, are $1.00 per MBH

Over several decades, ASHRAE has compiled data pertaining to service lives of most HVAC related equipment. From this, ASHRAE indicates a median service life (life until replacement) for HVAC related equipment that may be used as an estimate for the useful life of HVAC equipment currently in service. For example, ASHRAE indicates a window air conditioning unit has a median service life of 10 years. Therefore, if a window unit has been in service for more than 10 years, the owner may want to consider replacement. Not only will a replacement ensure minimal downtime between units (the unit is replaced before it ceases to function), but it will also maintain rated system efficiency, as efficiency tends to decrease with age.

All major equipment noted during CDM's on site audit is listed in Table 4.2-2 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included. Where equipment ages were not found on the equipment tags, they have been estimated based on the unit appearance or approximate renovation dates. In some cases, service locations may have been estimated based on unit proximity. Additionally, in cases where a unit's manufacturer and/or model could not be

determined due to an unreadable, faded, destroyed, or lost tag, manufacturer and model number information has been represented as "unknown".

Table 4.2-2 Board Office HVAC Equipment Service Lives

Description [Tag ID]	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	ASHRAE Expected Life (Years)
Air Handling Unit (AHU)	Boiler Room	Board Offices	Trane	Climate Changer	N/A*	>25	25
AHU	Boiler Room	DPW Offices	Trane	Climate Changer	N/A*	>25	25
Chiller	Boiler Room	Entire Building	Trane	A518	1.0-1.2 kW/ton	52	20
Boiler, Firetube	Boiler Room	Entire Building	Burnham	BSM40	75%	53	25

It may be seen that the chiller at the Board Office has significantly exceeded its ASHRAE-expected service life. CDM was not able to accurately determine the capacity or efficiency of this chiller. However, from historical electricity usage and the building model, CDM estimates the chiller to have a cooling efficiency of approximately 1.1 kW/ton. Additionally, from the building model, it was noted that the building requires approximately 15-20 tons of cooling.

While replacement of this unit is strongly recommended, historical energy usage data indicates that cooling in this building is likely minimal. Therefore, while a replacement should mitigate future maintenance costs and reduce unit downtimes, it may not provide significant energy savings.

CDM also creates an inventory of observed domestic water heaters. This will attempt to inform the Board of any water heaters that are in need of replacement. Equipment observed to be in poor or aging condition would warrant replacement, as they are likely not operating at peak efficiency. This domestic water heater inventory may be seen as Table 4.2-3 below.

Table 4.2-3 Board Office Domestic Water Heaters

Location	Make	Storage Capacity (Gallons)	Model Number	Type	Heating Capacity	Observed Condition
Boiler Room	Rheem	40	81V40D C	Electric	4.5 kW	Good

4.2.2 West Caldwell School

A model of the West Caldwell School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity bills from October, 2007 through February, 2010, and natural gas bills from December, 2007 through February, 2010. Figure 4.2-5 below compares actual monthly electricity usages, with those predicted by the eQuest model. Historical monthly usages were averaged for each month observed over multiple years.

Figure 4.2-5: West Caldwell School Electricity Usage

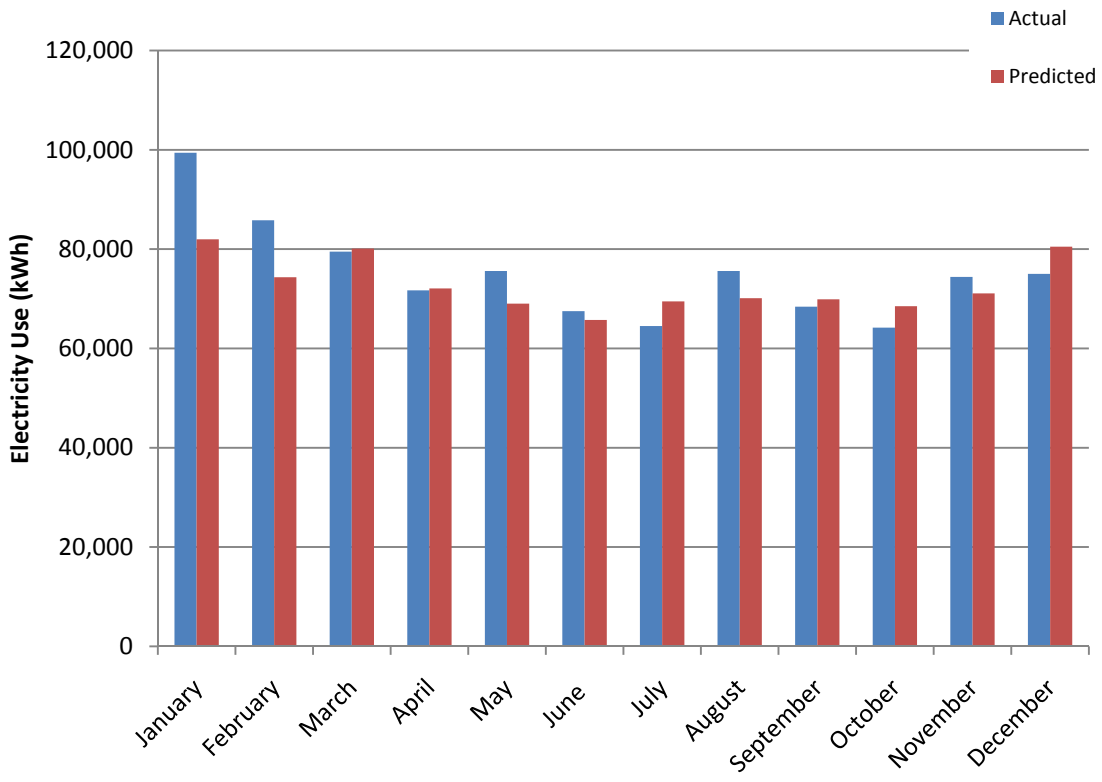


Figure 4.2-6 presents an end-usage breakdown to help the Board visualize where CDM anticipates the electricity is ultimately being used. It should be noted that these are only estimated usages based on information gathered during CDM's field audit.

Figure 4.2-6: West Caldwell School Electricity Usage Breakdown

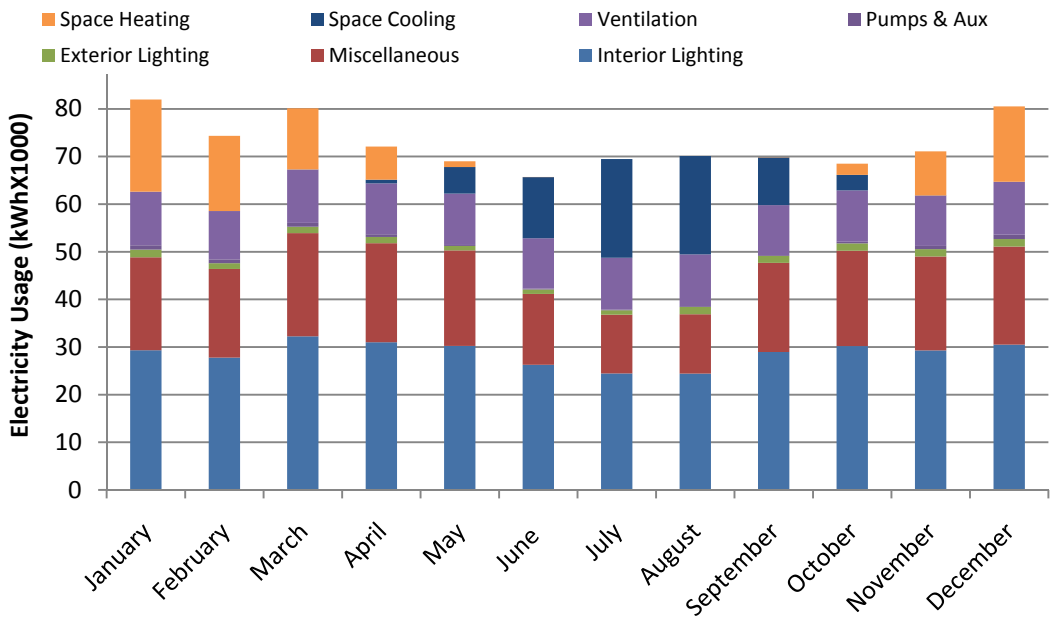
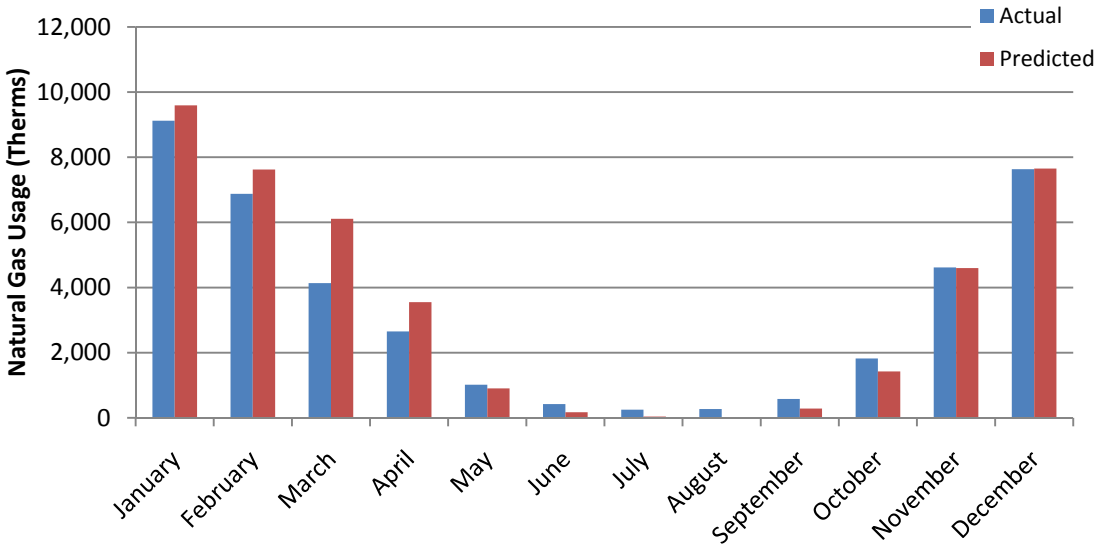


Figure 4.2-7 below compares actual natural gas usage to model-predicted natural gas use.

Figure 4.2-7: West Caldwell School Natural Gas Usage



Due to the large number of separate HVAC systems at the West Caldwell School, implementation of a direct digital control (DDC) building management system (BMS) may provide significant savings. A DDC BMS like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize staff and student comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the West Caldwell School to save, on average, 10% of the energy being used for HVAC. Table 4.2-4 demonstrates the potential payback from such an implementation.

Table 4.2-4: West Caldwell School BMS Payback

Predicted Annual Savings (Therms)	3,940
Annual Savings (Natural Gas)	$4,098
Predicted Annual Savings (kWh)***	29,280
Annual Savings (Electricity)	$4,752
Total Annual Savings	$8,850
Initial Capital Cost of Upgrade	$69,425
Incentives**	$0
Cost of Upgrade	$69,425
Annual Maintenance Cost Savings (AMCS)	$0
Simple Payback	**7.8**
Lifetime Energy Savings (15 years)*	$159,250
Annual Return on Investment (AROI)	6.08%
Internal Rate of Return (IRR)	12.23%
Net Present Value (NPV)	$59,459

*Assumes 2% yearly inflation on natural gas costs, 3% inflation on electricity costs
**No Incentives found for this upgrade
***Assumes 10% of electricity utilized for space cooling, heating, ventilation and pumps (as modeled)

All major equipment noted during CDM's on site audit is listed in Table 4.2-5 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Table 4.2-5 West Caldwell School HVAC Equipment Service Lives

Description [Tag ID]	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	ASHRAE Expected Life (Years)
Packaged Air Conditioning Rooftop Unit (RTU)	Outside	Gym	Lennox	LGA360HH3Y	80% Heat EER 10.1	<15	15
RTU	Outside	Gym	Lennox	LGA360HH3Y	80% Heat EER 10.1	<15	15
RTU	Roof	Reading Room	Trane	YCD060C3H0BE	80% Heat EER 10	13	15
RTU	Roof	Kitchen	York	D2EG150N20025STD	80% Heat EER 9-10	~15	15
RTU	Roof	Kitchen	Burner	Unknown	80% Heat EER Unknown	**>15**	**15**
RTU	Roof	Cafeteria	York	D1EG090N16525ECF	80% Heat EER 9-10	<15	15
RTU	Roof	Supermarket Careers	York	D2EG060N09925EBE	80% Heat EER 9-10	<15	15
RTU	Roof	204	Trane	Unknown	80% Heat EER 8-9	**>15**	**15**
RTU	Roof	Art Shop	Lennox	LGA060HH2Y	80% Heat EER 11	<15	15
RTU	Roof	116	Trane	YCD075C3LABE	80% Heat EER 9-10	12	15
RTU	Roof	Classroom adjacent to Office Occupation	Trane	YCD075C3LDBD	80% Heat EER 9-10	15	15
RTU	Roof	Health Classroom	Lennox	LGA060HH2Y	80% Heat EER 11	<15	15
RTU	Roof	Office Occupation Room	Lennox	LGA060HH2Y	80% Heat EER 11	<15	15
RTU	Roof	Mod. Academic Classroom	Lennox	LCA240H2BNH	100% Heat (Electrical) EER 11	<15	15

Table 4.2-5 West Caldwell School HVAC Equipment Service Lives							
ACCU	Roof	Nurse's Suite	Lennox	HP26-060-1Y	EER 9-10	<20	20
RTU	Roof	205 & 306	Unknown	Unknown	80% Heat EER Unknown	>15	15
RTU	Roof	308, 310, 311, &312	Lennox	LGC156HS1Y	80% Heat EER 12	<15	15
RTU	Roof	306, 307, 309	Lennox	LGC156HS1Y	80% Heat EER 12	<15	15
Boiler, Firetube	Boiler Room	Entire Building	Kewanee	L3S-80-G0	75%	>25	25
Boiler, Condensing	Boiler Room	Entire Building	Aerco	KC Series	85%	<24	24

A domestic water heater inventory may be seen as Table 4.2-6 below.

Table 4.2-6 West Caldwell School Domestic Water Heaters						
Location	Make	Storage Capacity (Gallons)	Model Number	Type	Heating Capacity	Observed Condition
Maintenance Room	Bock	100	241PG	Gas	277 MBH	Good
Maintenance Room	Rheem	65	RD 360-65	Gas	360 MBH	Good
Gym Storage	AO Smith	80	DVD 80 916	Electric	18 kW	Good

4.2.3 Newark Technical School

A model of the Newark Technical School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity bills from March, 2008 through February, 2010, and natural gas bills from March, 2008 through February, 2010. Figure 4.2-8 below compares actual monthly electricity usages, with those predicted by the eQuest model. Historical monthly usages were averaged for each month observed over multiple years.

Figure 4.2-8: Newark Technical School Electricity Usage

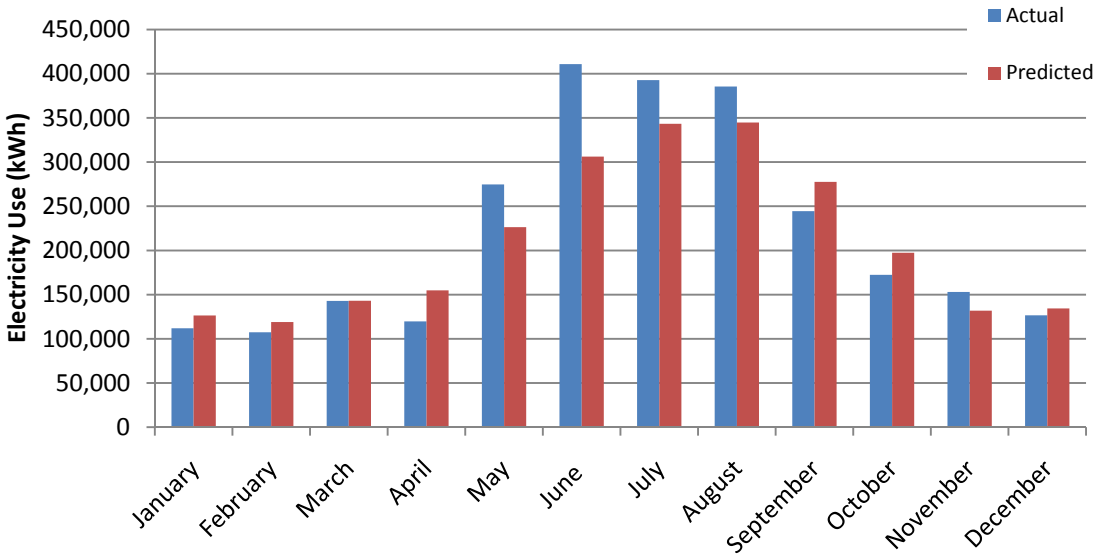


Figure 4.2-9 presents an end-usage breakdown to help the Board visualize where CDM anticipates the electricity is ultimately being used. It should be noted that these are only estimated usages based on information gathered during CDM's field audit.

Figure 4.2-9: Newark Technical School Electricity Usage Breakdown

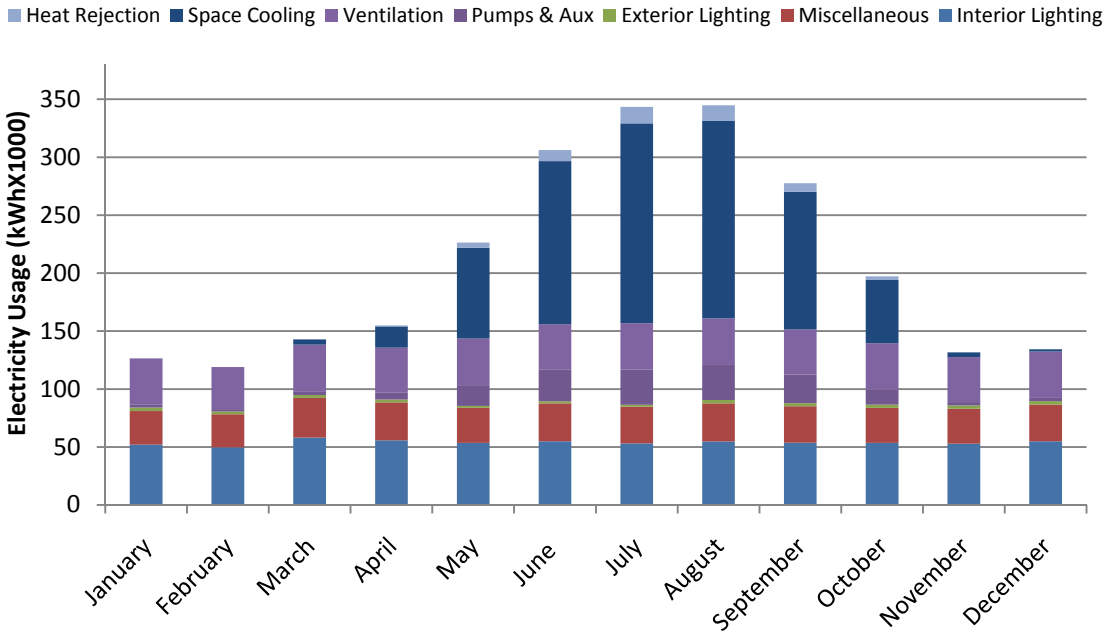
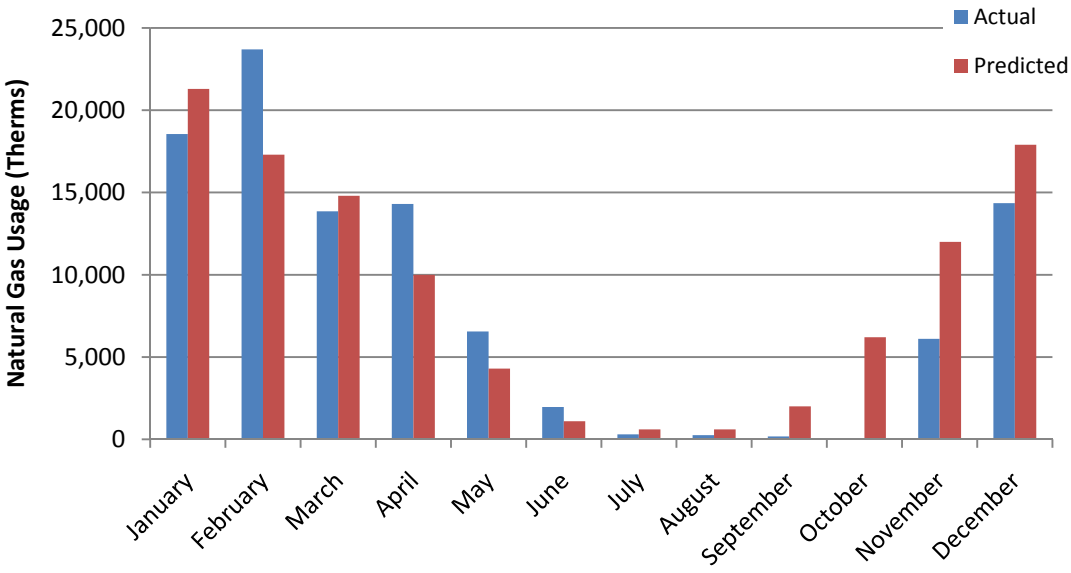


Figure 4.2-10 below compares actual natural gas usage to model-predicted natural gas use.

Figure 4.2-10: Newark Technical School Natural Gas Usage

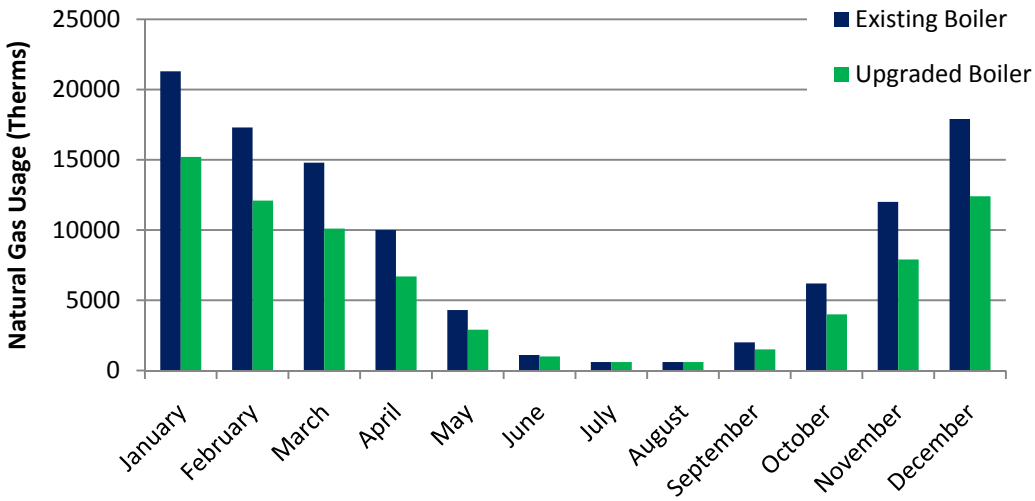


Currently, the heating system utilizes two Superior firetube steam boilers, each with a gross capacity of approximately 13,000 MBH. CDM conservatively estimates these boilers to be 75% efficient.

CDM recommends replacing these boilers with a system of high-efficiency, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a building peak heating load of 8,200 MBH.

Figure 4.2-11 compares current gas usage with predicted gas usage resulting from a switch to a system of high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~90% and return water temperature of 120°F.

Figure 4.2-11: Newark Technical School – Boiler Upgrade - Natural Gas Usage



Fiscal savings from such an upgrade are then identified in Table 4.2-7 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to

note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical firetube boilers. CDM estimates a firetube boiler system will typically cost around $3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around $2,000 per year. Therefore, replacing the existing boilers with a system of condensing boilers should result in an operation and maintenance cost savings of $1,500 per year.

Table 4.2-7: Newark Technical School Boiler Upgrade Payback	
Predicted Annual Savings (Therms)	33,100
Total Annual Savings	$37,072
Initial Capital Cost of Upgrade	$359,438
Incentives**	$10,000
Cost of Upgrade	$349,438
Annual Maintenance Cost Savings (AMCS)	$1,500
Simple Payback	**9.1**
Lifetime Energy Savings (24 years)*	$1,127,799
Annual Return on Investment (AROI)	6.87%
Internal Rate of Return (IRR)	9.82%
Net Present Value (NPV)	$549,327

*Assumes 2% yearly inflation on natural gas costs

**Incentives, per New Jersey Clean Energy Program, are $1.00 per MBH

Due to the significant amount of energy utilized for heating, ventilating and cooling at this school, implementation of a DDC BMS may provide significant savings. A DDC BMS like this would monitor and control all HVAC equipment, allowing maintenance staff to operate systems and adjust climate control in real time to maximize staff and customer comfort, while minimizing unnecessary heating and cooling.

Typically implementation of a BMS will save the owner 5-15% of the energy devoted to HVAC. As all systems are currently independently monitored and controlled, CDM conservatively estimates that implementing a DDC BMS will allow the Newark Technical School to save, on average, 10% of the energy being used for HVAC. Table 4.2-8 demonstrates the potential payback from such an implementation.

Table 4.2-8: Newark Technical School BMS Payback	
Predicted Annual Savings (Therms)	10,010
Annual Savings (Natural Gas)	$11,211
Predicted Annual Savings (kWh)***	145,330

Table 4.2-8: Newark Technical School BMS Payback	
Annual Savings (Electricity)	$24,415
Total Annual Savings	$35,626
Initial Capital Cost of Upgrade	$159,855
Incentives**	$0
Cost of Upgrade	$159,855
Annual Maintenance Cost Savings (AMCS)	$0
Simple Payback	**4.5**
Lifetime Energy Savings (15 years)*	$647,969
Annual Return on Investment (AROI)	15.62%
Internal Rate of Return (IRR)	23.89%
Net Present Value (NPV)	$358,970

*Assumes 2% yearly inflation on natural gas costs, 3% inflation on electricity costs
**No Incentives found for this upgrade
***Assumes 10% of electricity utilized for space cooling, heating, ventilation and pumps (as modeled)

All major equipment noted during CDM's on site audit is listed in Table 4.2-9 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Table 4.2-9 Newark Technical School HVAC Equipment Service Lives							
Description [Tag ID]	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	ASHRAE Expected Life (Years)
RTU	Gym Roof	Stage	Trane	YHC102A4RHA2 GH0B0A1B00300	80% Heat EER 13	4	15
RTU	Gym Roof	Gym	Trane	SFHGD114P186CCCD1E 1A0C0000000RT0060	80% Heat EER 9-10	4	15
RTU	Gym Roof	Gym	Trane	YHC092A4RHA2 HH1B0A1B00300	80% Heat EER 13	4	15
RTU	Gym Roof	Gym	Trane	Unknown	Unknown	4	15
RTU	Roof	Science Lab	Reznor	RXE175-6-SMVJE	Unknown	>15	15
RTU	Roof	Science Lab	Reznor	RXE175-6-SMVJE	Unknown	>15	15

Table 4.2-9 Newark Technical School HVAC Equipment Service Lives							
AHU [AHU-1]	4th Floor Mechanical Room	1st & 2nd Floors, North End	Trane	Climate Changer	N/A*	>25	25
AHU [AHU-2]	4th Floor Mechanical Room	3rd & 4th Floors, North End	Trane	Climate Changer	N/A*	>25	25
AHU [AHU-3]	4th Floor Mechanical Room	1st & 2nd Floors, South End	Trane	Climate Changer	N/A*	>25	25
AHU [AHU-4]	4th Floor Mechanical Room	3rd & 4th Floors, South End	Trane	Climate Changer	N/A*	>25	25
Chiller	4th Floor Mechanical Room	Air Handling Units	Trane	CVHE-071F-AF-2RB2555CF1A11CE1E000	1.0 kW/Ton	10-15	20
Cooling Tower	Roof	Chiller	Baltimore Aircoil	3373-2P	N/A	<20	20
Boiler, Firetube	4th Floor Mechanical Room	Entire Building	Superior	Unknown	75%	38	25
Boiler, Firetube	4th Floor Mechanical Room	Entire Building	Superior	Unknown	75%	38	25

A domestic water heater inventory may be seen as Table 4.2-10 below.

Table 4.2-10 Newark Technical School Domestic Water Heaters						
Location	**Make**	**Storage Capacity (Gallons)**	**Model Number**	**Type**	**Heating Capacity**	**Observed Condition**
Gym Mechanical Room	AO Smith	600	BTP600-720000	Gas	720 MBH	Good
4th Floor Mechanical Room	Vanguard	91	6E743A	Gas	199 MBH	Good
4th Floor Mechanical	American Standard	100	D100-270-HS	Gas	270 MBH	Good

Table 4.2-10 Newark Technical School Domestic Water Heaters						
Room						
4th Floor Mechanical Room	American Standard	100	D100-270-HS	Gas	270 MBH	Good

An inventory of compressors for pneumatic HVAC control systems may be seen as Table 4.2-11 below.

Table 4.2-11 Newark Technical School HVAC Control Compressors					
Location	**Make**	**Tank Capacity (Gallons)**	**Model Number**	**Motor Horsepower [Quantity X HP]**	**Observed Condition**
4th Floor Mechanical Room	Champion	80	HR315 D-8CC	2 X 5	Good

4.2.4 Bloomfield Technical School

A model of the Bloomfield Technical School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity bills from January, 2008 through January, 2010, and natural gas bills from January, 2008 through January, 2010. Figure 4.2-12 below compares actual monthly electricity usages, with those predicted by the eQuest model. Historical monthly usages were averaged for each month observed over multiple years.

Figure 4.2-12: Bloomfield Technical School Electricity Usage

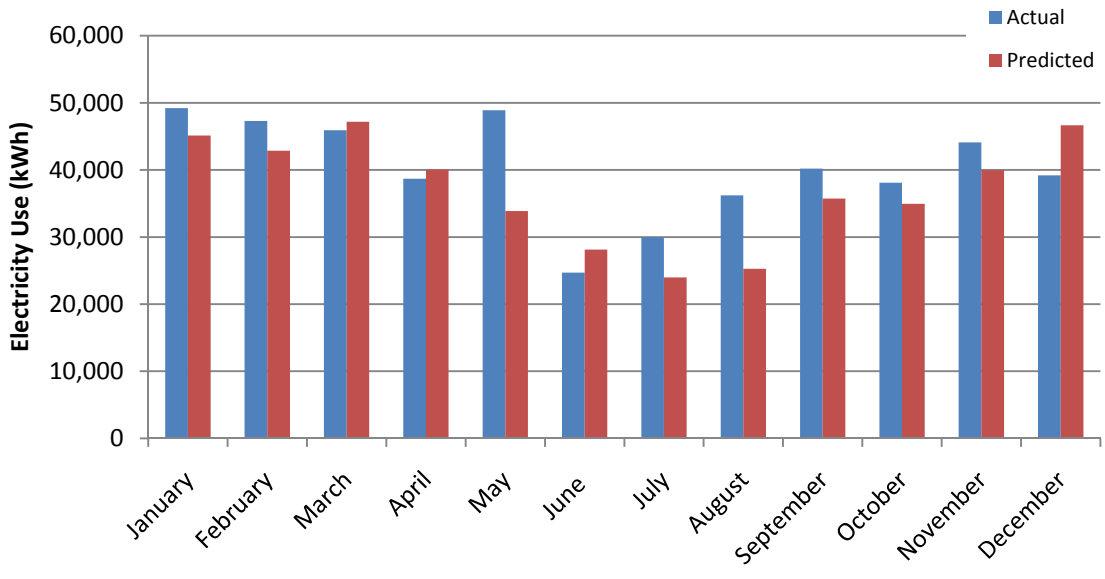


Figure 4.2-13 presents an end-usage breakdown to help the Board visualize where CDM anticipates the electricity is ultimately being used. It should be noted that these are only estimated usages based on information gathered during CDM's field audit.

Figure 4.2-13: Bloomfield Technical School Electricity Usage Breakdown

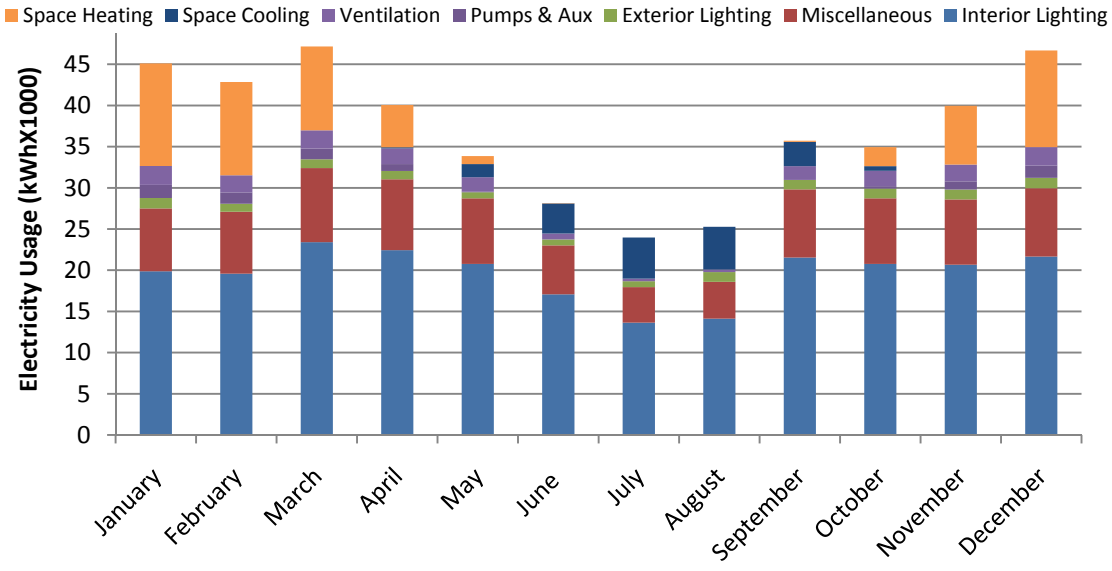
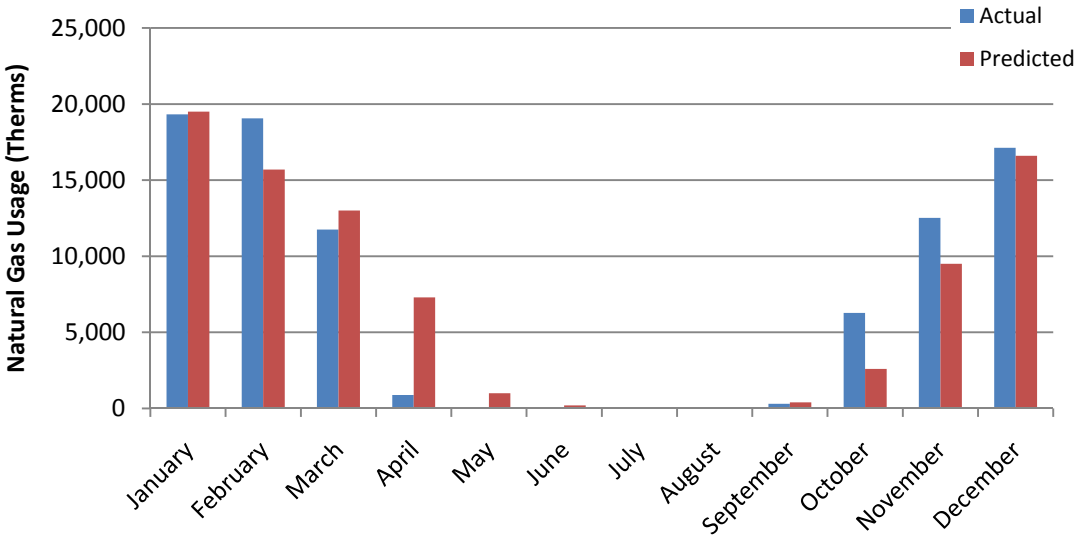


Figure 4.2-14 below compares actual natural gas usage to model-predicted natural gas use.

Figure 4.2-14: Bloomfield Technical School Natural Gas Usage



All major equipment noted during CDM's on site audit is listed in Table 4.2-12 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Table 4.2-12 Bloomfield Technical School HVAC Equipment Service Lives							
Description [Tag ID]	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	ASHRAE Expected Life (Years)
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	1894 Series	75%	3	35
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	1894 Series	75%	3	35

The Bloomfield Technical School is heated by steam. Unlike hot water systems, steam systems cannot capitalize on the extra efficiency offered by condensing boilers.

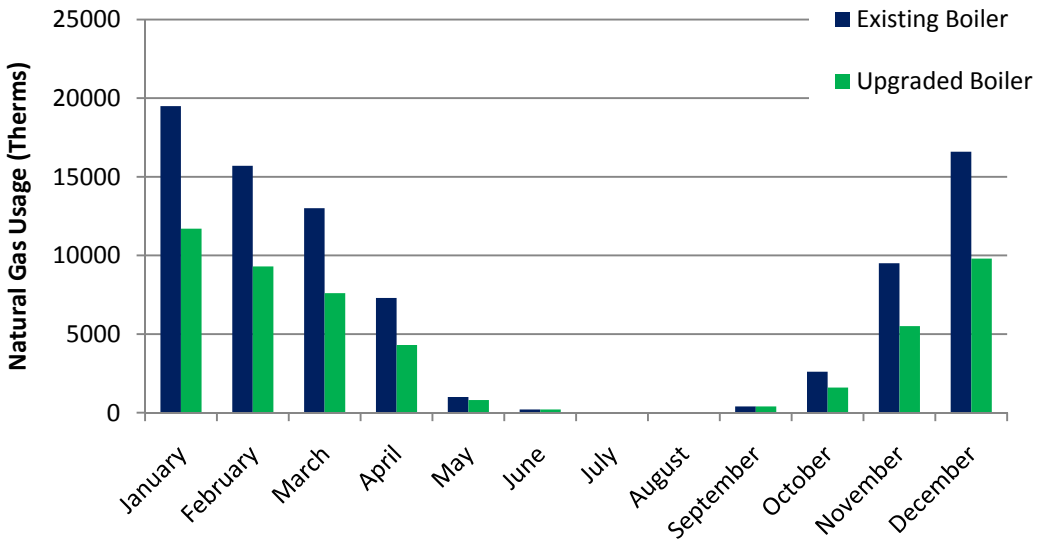
CDM has therefore analyzed savings from a switch to a hot water system for the entire school.

Currently, the heating system utilizes two Weil McLain cast iron steam boilers, each with a gross capacity of approximately 6,100 MBH. CDM estimates these boilers to be 70% efficient.

CDM recommends replacing these boilers with a system of high-efficiency, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a building peak heating load of 6,140 MBH.

Figure 4.2-15 compares current gas usage with predicted gas usage resulting from a switch to a system of high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~90% and return water temperature of 120°F.

Figure 4.2-15: Bloomfield Technical School – Hot Water System with Condensing Boilers - Natural Gas Usage



Fiscal savings from such an upgrade are then identified in Table 4.2-13 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical cast iron boilers. CDM estimates a cast iron boiler system will typically cost around $3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around $2,000 per year. Therefore, replacing the existing boilers with a system of condensing boilers should result in an operation and maintenance cost savings of $1,500 per year.

Table 4.2-13: Bloomfield Technical School Hot Water System with Condensing Boilers Payback

Predicted Annual Savings (Therms)	34,600
Total Annual Savings	$47,748
Initial Capital Cost of Upgrade	$2,047,627
Incentives**	$8,000
Cost of Upgrade	$2,039,627
Annual Maintenance Cost Savings (AMCS)	$1,500
Simple Payback	**41.4**
Lifetime Energy Savings (24 years)*	$1,452,583
Annual Return on Investment (AROI)	(1.75%)
Internal Rate of Return (IRR)	(8.23%)
Net Present Value (NPV)	($892,101)

*Assumes 2% yearly inflation on natural gas costs
**Incentives, per New Jersey Clean Energy Program, are $1.00 per MBH

It can be seen that a switch to a hot water heating system likely wouldn't be cost beneficial. However, the importance of regular steam system and trap inspection and maintenance should be stressed. Regular maintenance on steam systems will help to ensure that energy is not being wasted through leaks or open traps in the system.

A domestic water heater inventory may be seen as Table 4.2-14 below.

Table 4.2-14 Bloomfield Technical School Domestic Water Heaters						
Location	Make	Storage Capacity (Gallons)	Model Number	Type	Heating Capacity	Observed Condition
1st Floor Kitchen	Reliance	30	63020RS	Electric	4.5 kW	Aging-Good
Boiler Room	Rheem	91	G91-200-1	Gas	199 MBH	Good
Boiler Room	Vanguard	91	6E743A	Gas	199 MBH	Good

4.2.5 North 13th Street School

A model of the North 13th Street School was created in eQuest to predict heating and cooling loads for the building. To calibrate this model, CDM used electricity bills from February, 2008 through March, 2010, and natural gas bills from February, 2008 through March, 2010. Figure 4.2-16 below compares actual monthly electricity usages, with those predicted by the eQuest model. Historical monthly usages were averaged for each month observed over multiple years.

Figure 4.2-16: North 13th Street School Electricity Usage

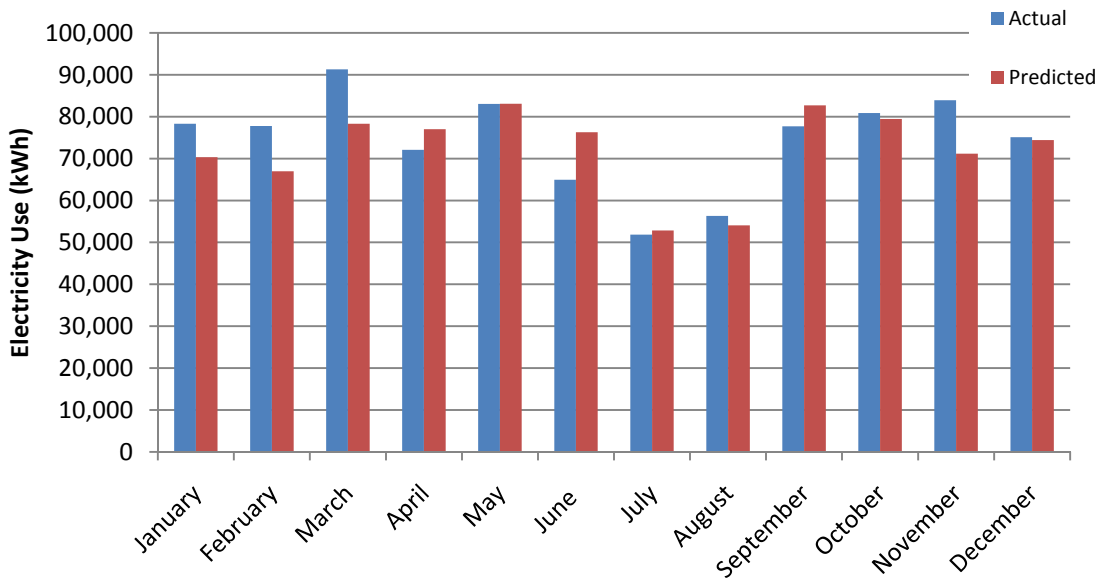


Figure 4.2-17 presents an end-usage breakdown to help the Board visualize where CDM anticipates the electricity is ultimately being used. It should be noted that these are only estimated usages based on information gathered during CDM's field audit.

Figure 4.2-17: North 13th Street School Electricity Usage Breakdown

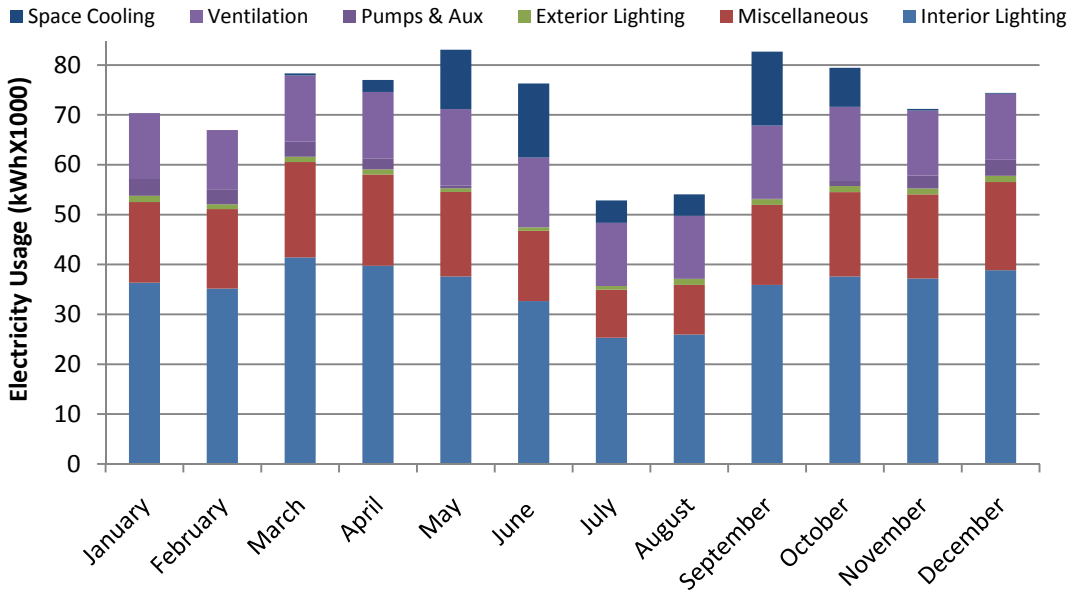
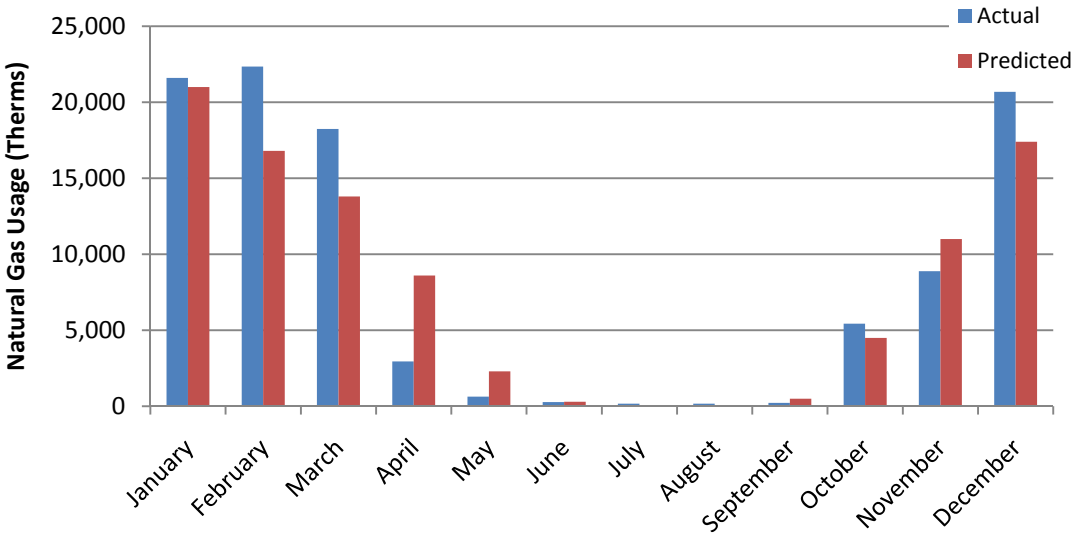


Figure 4.2-18 below compares actual natural gas usage to model-predicted natural gas use.

Figure 4.2-18: North 13th Street School Natural Gas Usage



All major equipment noted during CDM's on site audit is listed in Table 4.2-15 below, along with estimated current ages and ASHRAE-expected service lives. It should be noted that only equipment that was observed at the time of the audit is included.

Table 4.2-15 North 13th Street School HVAC Equipment Service Lives							
Description [Tag ID]	Unit Location	Service Location	Manufacturer	Model	Estimated Efficiency	Estimated Age (Years)	ASHRAE Expected Life (Years)
ACCU	Roof	3rd Floor IDF	Fujitsu	AOU24RMLI	EER 9-10	<20	20
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	1794 Series	75%	3	35
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	1794 Series	75%	3	35
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	788 Series	75%	3	35
Boiler, Cast Iron	Boiler Room	Entire Building	Weil McLain	788 Series	75%	3	35

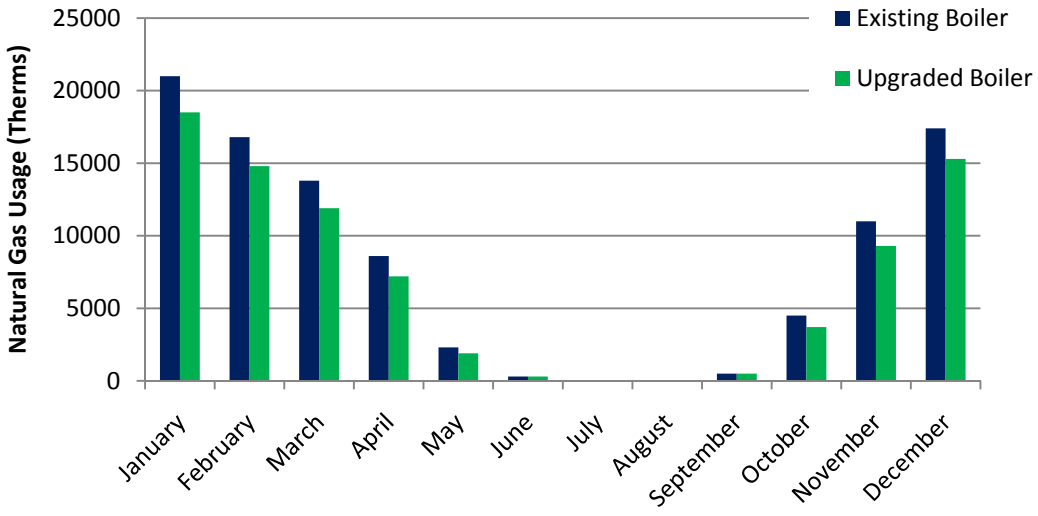
The North 13th Street School is heated by steam. Unlike hot water systems, steam systems cannot capitalize on the extra efficiency offered by condensing boilers. Therefore, CDM has analyzed savings from a switch to a hot water system for the entire school.

Currently, the heating system utilizes two Weil McLain cast iron steam boilers, each with a net output capacity of approximately 3,610 MBH; and two Weil McLain cast iron hot water boilers, each with a net output capacity of approximately 1,419 MBH. CDM estimates these boilers to be 75% efficient.

CDM recommends replacing these boilers with a system of high-efficiency, condensing boilers. Based on the building model, and accounting for a 25% safety factor, CDM has calculated a building peak heating load of 6,800 MBH.

Figure 4.2-19 compares current gas usage with predicted gas usage resulting from a switch to a system of high-efficiency, condensing boilers. Condensing boilers are modeled with a full-load efficiency of ~90% and return water temperature of 120°F. Additionally, for purposes of modeling, it has been assumed that the entire school system is currently steam-heated, as CDM has not accurately determined which portion of the school is currently utilizing hot water heat.

Figure 4.2-19: North 13th Street School – Hot Water System with Condensing Boilers - Natural Gas Usage



Fiscal savings from such an upgrade are then identified in Table 4.2-16 below. Lifetime savings calculations for all ECRM's may be found in Appendix I. It's important to note that these are estimates based on building models, and further investigation is warranted before pursuing boiler replacements.

Due to the improved automation and control within modern condensing boilers, their operation and maintenance costs tend to be less than those of typical cast iron boilers. CDM estimates a cast iron boiler system will typically cost around $3,500 per year for regular preventative maintenance, whereas a condensing boiler system would cost around $2,000 per year. Therefore, replacing the existing boilers with a system of condensing boilers should result in an operation and maintenance cost savings of $1,500 per year.

Table 4.2-16: North 13th Street School Hot Water System with Condensing Boilers Payback	
Predicted Annual Savings (Therms)	12,700
Total Annual Savings	$12,192
Initial Capital Cost of Upgrade	$4,091,072
Incentives**	$8,000
Cost of Upgrade	$4,083,072
Annual Maintenance Cost Savings (AMCS)	$1,500
Simple Payback	**298.8**
Lifetime Energy Savings (24 years)*	$370,903
Annual Return on Investment (AROI)	(3.83%)
Internal Rate of Return (IRR)	(23.0%)
Net Present Value (NPV)	($3,764,035)

*Assumes 2% yearly inflation on natural gas costs
**Incentives, per New Jersey Clean Energy Program, are $1.00 per MBH

It can be seen that a switch to a hot water heating system likely wouldn't be cost beneficial. However, the importance of regular steam system and trap inspection and maintenance should be stressed. Regular maintenance on steam systems will help to ensure that energy is not being wasted through leaks or open traps in the system.

A domestic water heater inventory may be seen as Table 4.2-17 below.

Table 4.2-17 13th Street School Domestic Water Heaters

Location	Make	Storage Capacity (Gallons)	Model Number	Type	Heating Capacity	Observed Condition
Boiler Room	Laars	2 Tanks, 119 Gallons Each	PNCV1000NACN2 BJN	Gas	999 MBH	Good

An inventory of compressors for pneumatic HVAC control systems may be seen as Table 4.2-18 below.

Table 4.2-18 13th Street School HVAC Control Compressors

Location	Make	Tank Capacity (Gallons)	Model Number	Motor Horsepower [Quantity X HP]	Observed Condition
Boiler Room	Speedaire	80	Unknown	2 X 5	Good

4.3 Alternative Energy Sources

4.3.1 Photovoltaic Solar Energy System Overview

Photovoltaic (PV) cells convert energy in sunlight directly into electrical energy through the use of silicon semi conductors, diodes and collection grids. Several PV cells are then linked together in a single frame of module to become a solar panel. PV cells are able to convert the energy from the sun into electricity. The angle of inclination of the PV cells, the amount of sunlight available, the orientation of the panels, the amount of physical space available and the efficiency of the individual panels are all factors that affect the amount of electricity that is generated.

Based on the estimated cumulative total available roof area, calculations determine that the installation of five systems with a total rating of approximately 818.8 kW (dc) will be appropriate for the five Essex County Vocational School Buildings listed below.

As part of this energy audit, a preliminary engineering feasibility study of the sites outlined above to support solar generation facilities was completed consisting of the following tasks:

- Site Visit by our engineers.
- Satellite Image Analysis and Conceptual design and layout of the photovoltaic system.
- Design and construction cost estimates.
- Determine a preliminary design for the size and energy production of the solar system.

The total unobstructed available area of each section of the roof with southern exposure was evaluated. It is important to note the following:

- The structural integrity of the roofs was not confirmed during our site visit. The municipal buildings may require some degree of roofing work prior to the implementation of a solar system.
- In the case of the flat areas, the PV system sizing and kWh production was calculated assuming the installation of a crystalline module facing south direction (180 Degree Azimuth) and tilted approximately 20 degrees to allow better rain water shedding and snow melting. Please note that the kWh production as well as system size may differ significantly based on final panel tilt selected during the RFP and design phase.
- Blended electric rates were used based on actual utility bills and were applied for the facility.

The following is a preliminary study on the feasibility of installing PV solar systems at the five buildings to generate a portion of each facility's electricity requirements. Each system is designed to offset the electric purchased from the local utility and not as a backup or emergency source of power.

In order to determine the best location for the installation of the PV solar system, a satellite image analysis and site walkthrough of the buildings was performed on February 8-9th. As per the Scope of Work, only the building roofs were considered for PV installation.

Also, as part of our assessment we investigated possible locations for electrical equipment that need to be installed such as combiner boxes, disconnect switches and DC to AC inverters. Consideration was also given to locations of interconnection between the solar system and building's electrical grid.

4.3.1.1 Board Office Building

The roof of the Board Office Building is a flat roof with several obstructions. The roof surface has such obstructions as rooftop HVAC units, and electrical and gas piping. There is a minimal amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major

defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 80.4 kW (dc).

Electrical Service

The electrical service size consists of an 800 A, 120/208V, 3-phase service. The interconnection point for the PV system will require a modification or replacement of the existing service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.2 West Caldwell School

The roof of the West Caldwell School is a flat roof with many obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is no amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 163.8 kW (dc).

Electrical Service

The electrical service size consists of a 2000 A, 120/208V, 3-phase service. The interconnection point for the PV system will require a modification or replacement of the existing service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.3 Newark Technical School

The roof of the Newark Technical School is a flat roof with several obstructions and a pitched roof over the gym building. The flat surface has obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping, while the gym roof is completely free of obstructions. There is no amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and

the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 265.2 kW (dc).

Electrical Service

The electrical service size consists of a 2000 A, 480V, 3-phase service. The interconnection point for the PV system will require a modification or replacement of the existing service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.4 Bloomfield Technical School

The roof of the Bloomfield Technical School is a flat roof with several obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping. There is no amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 139.6 kW (dc).

Electrical Service

The electrical service size consists of a 1600 A, 208/480V, 3-phase service. The interconnection point for the PV system will require a modification or replacement of the existing service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.5 North 13th Street School

The roof of the North 13th Street School is a flat roof with a many obstructions such as exhaust fans, rooftop HVAC units, and electrical and gas piping and has a maintenance shed building located on it. There is no amount of shading on the roof from adjacent foliage that would need to be addressed during the design phase of the project. The structural integrity of the roof was not confirmed although a visual inspection revealed no leaks or major defects. The structural integrity of the roof and

the existence of a warranty shall be confirmed prior to the implementation of a PV system.

The Project Team conducted both a facility walkthrough and a satellite image analysis and based on the estimated total available area we calculated the installation of a solar system, rated at approximately 170 kW (dc).

Electrical Service

The electrical service size consists of a 2000 A, 480V, 3-phase service. The interconnection point for the PV system will require a modification or replacement of the existing service entrance equipment wherein the PV system feeder connections will have to be made after the main circuit breaker, and protective relaying will also have to be implemented. Any connection points would have to meet NEC and local utility requirements. Further investigation and verification of existing electrical equipment would be required prior to implementation of a PV system.

4.3.1.6 Basis for Design and Calculations

The proposed Photovoltaic (PV) Power systems outlined above for each school are comprised of the PV arrays, inverter(s), combiner boxes, disconnect switches, and all of the necessary wiring and interconnection equipment. The solar panels will be mounted onto the roof. The array outputs will feed power into the DC to AC inverters. AC outputs will then be connected at each building's electrical service as outlined above. Pending further engineering analysis of the roofs, it is yet to be determined if the solar arrays will be installed using a self-ballasting system, or roof penetration system, or a combination of both.

Fixed Tilt System

The most common roof mounted system is referred to as a ("fixed tilt") system typically mounted to a metal rack that can be fixed at a specific angle. There are also ("tracking systems") or movable along one or two axes to follow the position of the sun during the day. For a roof-mounted PV system, tracking systems are very rarely installed and are usually used for ground-mounted systems only, as they require more complex racks and higher maintenance costs. For the "fixed" system, the tilt is determined based on the following factors: geographical location, total targeted kWh production, seasonal electricity requirements and weather conditions such as wind. Ideally, the module tilt for Central to Eastern New Jersey should be 25-35 degrees with an azimuth as close as possible to 180 (south); however, our experience has shown that PV systems are typically installed at a tilt of 20 degrees or lower in order to avoid any issues with wind and to maximize total system size

The type of PV panels and equipment used to mount the system shall be determined based on the wind conditions and structural integrity of the roof determined during the design phase of the project. In general, penetration/tie-down systems, non-penetrating ballasted type systems, or a combination of the two should be considered.

Calculation of PV System Yield

An industry accepted software package PV Watts was used to calculate projected annual electrical production of the crystalline silicon PV system in its first year, as summarized in Table 4.3-1. The system was designed to provide maximum kWh production based on available roof space.

Table 4.3-1 Summary of Solar (PV) Systems

Site	Est. Area (ft2)	kWh	Annual Energy Savings	Est. Annual SREC	Lifetime Energy Savings (25 Years)*	Annual Return On Investment (AROI)	Net Present Value (NPV)	Internal Rate of Return (IRR)
Board Office	8,039	98,526	$16,049.9	$66,505	$585,168	4.0%	-$5,740	2.9%
West Caldwell School	16,377	200,716	$32,576.2	$135,483	$1,187,704	4.5%	$115,196	3.7%
Newark Technical School	26,515	324,968	$54,594.6	$219,353	$1,990,479	4.8%	$306,259	4.1%
Bloomfield Technical School	13,955	171,033	$29,793.9	$115,447	$1,086,264	4.6%	$126,230	3.8%
13th Street School	16,996	208,303	$31,995.3	$140,605	$1,166,525	4.5%	$82,835	3.5%

*3% yearly inflation on electricity costs

Total Costs

It should be noted that construction costs are only estimates based on historic data compiled from similar installations, and engineering opinion. Additional engineering and analysis is required to confirm the condition of the roofs, structural integrity of the roofs, the system type, sizing, costs and savings. Budget costs assume existing roofs are structurally sound, do not need to be replaced, and can accommodate a solar system. For illustration purposes, a draft financial analysis pro forma is attached outlining all project costs and revenues.

Table 4.3-2 Engineers Opinion of Probable Cost

Engineers Opinion of Probable Cost	$9,836,727

As stated above the estimated installation costs are based on significant experience with the pricing of solar installations in New Jersey, and are intended to provide the Board with a realistic budget cost. A typical solar installation can vary in cost from $7.00 - $10.00 per watt depending on size, complexity of the system, labor rates, etc. Approximately 60-70% of that number is material costs while the balance is labor, engineering, etc. Like any installation, certain conditions can affect a price upward or downward. For purposes of this analysis the estimated installation cost does not include any roofing or structural work which may be required to maintain warranties or for additional structural support. We have included a budget of $9/watt for the solar system installation with an additional estimated budget of $100,000 for potential electric service work.

Refer to Section 7 for discussion on Solar Renewable Energy Certificates and other financing options for solar projects. The financial model in Appendix E provides an annual forecast illustration of project revenues and costs for 25 years.

4.3.2 Geothermal Energy

Geothermal systems utilize the constant temperature of the earth throughout the year (at depths from 5 ft. to 1,000 ft. the earth temperature remains at 53 deg. F) as the primary source of energy for the heating/cooling and domestic hot water production. Additionally, since the earth is maintained at a constant temperature from heat absorbed from the sun this energy is considered a "renewable resource," and therefore is not as reliant on existing supplies of fossil fuels

Even though this application requires significantly higher up-front costs, it has several advantages over conventional HVAC systems such as substantially lower operating and maintenance costs. The life span of the system is longer than conventional heating and cooling systems. Most loop fields are warranted for 25 to 50 years and are expected to last at least 50 to 100 years. However it is important to note that geothermal systems are more difficult to install in existing facilities and require higher capital cost due to having to complete significant infrastructure changes. Therefore, installation of a geothermal system is not recommended at any of the Essex County Vocational Schools at this point.

4.3.3 Wind Power Generation

On-site wind power generation typically utilizes a form of turbine, which is rotated with the flow of wind across it, this rotational force powers a generator, producing DC electricity. The DC electricity is then converted into AC electricity, which can be used for commercial power, or can be fed back into the power grid, reducing the overall electric demand. The size of the turbine is proportional to the amount of wind and concurrently the amount of energy it can produce. An ideal location for a wind turbine is 20 feet above any surrounding object within a 250 foot radius. In general this relates to a property size of one acre or more.

CDM has determined that it is feasible for Essex County to install a wind turbine energy system on the Board Office, West Caldwell School, and Bloomfield Technical School grounds. A wind turbine energy system would not be viable for the rest of the

schools as the available ground space required for a wind turbine is limited. Because the Schools do not have a large area for installation of a larger wind turbine at any of the locations surveyed for the audit, a 10kW wind turbine was chosen. For the purpose of this feasibility analysis, CDM is recommending payback for a one 10K wind turbine. Depending on area available, and funding, the Board may choose to install more than 1 wind turbine on the premises.

Utilizing NASA's online wind mapping tool, it was determined that the local average wind speeds for Essex County ranged from 8.4mph to 12.1mph, or 3.8m/s to 5.4m/s at 30 meters above the ground. In general, around 9mph of average wind speed, as determined over the course of a year, is necessary to "fuel" the turbine. These values fall within the range of feasibility for installation of a new wind turbine system.

For the purposes of this feasibility analysis, CDM chose a 10kW Bergey wind turbine. This turbine size is used most often for small commercial applications. Power Curve data was determined through the use of the product specification sheets on vendor websites and vendor provided tools. Actual turbine size, height, location, and manufacturer should be determined upon design of a wind turbine system.

The estimated wind speed data, associated wind probability distribution function (weibull value), turbulence losses, and other relevant data were then incorporated into Bergey's Wind Cad program to estimate the annual output for the wind turbine. Refer to Appendix J for Wind Cad Modeling.

In order to determine simple payback analysis of the proposed wind turbine, CDM used the vendor pricing information located on the Bergey Wind Turbine website (www.bergey.com), for more information on wind turbine cost estimation refer to Appendix H. By installing the proposed wind turbine, the Schools will offset between $858.3 and $2,428.5 per year in utility costs based on the minimum and maximum average local wind speeds. In addition, Renewable Energy Credits (REC's) are obtainable for renewable power and incentives are available through the Renewable Energy Incentive Program (REIP); refer to Section 7 for a more in depth explanation.

This simple payback calculation takes into account the incentive provided for wind turbines through the REIP program. For the first 16,000 kWh of production, the incentive is $3.20/kWh. For production between 16,000 kWh – 750,000 kWh the REIP program incentive is $0.50/kWh. CDM used this incentive as an upfront deduction from the Engineer's Opinion of Probable Cost. In addition, in order to benefit from the REIP incentive, the Board must purchase a wind turbine on the approved NJ Clean Energy list. CDM chose the Bergey wind turbine for this analysis as it is approved by the NJ Clean Energy program and is the appropriate size for smaller commercial installations and the limited area available on the site. Refer to the NJ Clean Energy website for more information.

Table 4.3-1 includes a simple payback analysis for the installation of a wind turbine energy system at the Schools. Refer to Appendix K for a more detailed wind turbine financing spreadsheet, including utility cost avoidance and REC's.

Table 4.3-1: Simple Payback Analysis for Wind Turbine Energy System			
Parameter	**Wind Turbine (Minimum Average Site Wind Speed – 8.4 mph)**	**Wind Turbine (Maximum Average Site Wind Speed – 12.1 mph)**	**Wind Turbine (Average Site Wind Speed – 10.5 mph)**
Engineer's Opinion of Probable Cost	$68,489.69	$68,489.69	$68,489.69
Renewable Energy Incentive Program**	-$17,395.00	-$50,890.00	-$33,082.00
Total Cost	$51,094.69	$17,599.69	$35,407.69
1st Year Production	5,436 kWh	15,380 kWh	10,338 kWh
Annual Estimated Electric Savings	$858.30	$2,428.50	$1,632.4
Annual Estimated REC Revenue	$136.00	$385.00	$258.00
Project Simple Payback	**51.4 Years**	**6.3 Years**	**18.7 Years**
Annual Return On Investment (AROI)	-2.1%	12.0%	1.3%
Lifetime Energy Savings (15 years)**	$31,292.99	$88,541.32	$59,516.10
Internal Rate of Return (IRR)	-3.0%	17.6%	4.4%
Net Present Value (NPV)	-$29,218	$44,297	$6,197

*Refer to Appendix J for Wind Cad Modeling

**REIP incentive is calculated for only the first year and is applied as a deduction.

Based on the simple payback model, summarized in Table 4.3-1, it would benefit the Board to further investigate the installation of a wind energy system for the Board Office, West Caldwell School, and Bloomfield Technical School grounds. This is primarily based on the initial upfront capital investment required for a wind turbine energy system installation and the 18.7 year average wind speed payback period. Other options such as Power Purchase Agreements are potentially available as well to help finance the project. This technology is constantly changing and will most likely continue to lower in price.

It should be noted that CDM used only REC values, utility cost avoidance factors, and the REIP incentive in determining simple payback periods. As stated above, other incentives and financial programs such as Power Purchase Agreements are available to help finance this installation. For example, if a Power Purchase Agreement is completed, the private company financing the project would benefit from the 30% tax credit. Other incentives such as CREB's and first year usage incentives could be available to the Schools in lowering the payback period. Refer to *www.dsireusa.org* for an extensive listing of possible incentives for the New Jersey area.

It should also be noted that the wind turbine represented above is for feasibility purposes only. If the Board decides to install a wind turbine, different mounting heights, turbine sizes, and manufacturers should be considered. In addition, permits may be required for installation according to local zoning laws. The FAA must also be

notified in order to give clearance for the tower, and for installation of aviation safety lights if necessary.

4.4 Additional Measure

As discussed in Section 2, it may be possible to reduce the plug load of the buildings even further with the implementation of smart strips, NightWatchman software, and energy star appliances. Smart Strips save energy by electronically unplugging all of the devices that are plugged into the "Automatically Switched outlets" when the device plugged into the control outlet is turned off. It is important to note that CDM is not suggesting that computers be plugged into the automatically switched off outlets, as there would be potential for the computers to be shut off mid-operation. There are a vast amount of computer peripherals that are typically left on after a computer is shut off, including monitors, scanners, printers and DSL/Cable modems. These peripherals can be plugged into the automatic outlets.

As an example, a computer room contains 30 computers and 4 printers. A standard Smart Strip has one 'control' outlet, six (6) outlets that are automatically switched off when the control device is and three (3) outlets that are always hot. An example of how the Board can implement the use of Smart Strips within this classroom is to plug a computer into the control outlet, five (5) monitors and a personal printer (8 W in standby mode) into the automatic outlets and three (3) computers into the always hot outlets. An LCD monitor can use up to 34W; in standby mode the monitor utilizes 1 – 2W. A CRT monitor typically utilizes around 75W. The following table 4.4-1 summarizes the payback of a Smart Strip, assuming 5 LCD monitors and 1 printer are automatically powered down that would otherwise been left on 8 hours/day and in standby mode 16 hours/day, 5 days/week for 9 months. In an average computer classroom, this example and energy savings can be recognized three or four times.

Table 4.4-1: Simple Payback

Smart Strip Classroom Application Example	
Predicted Annual Savings – 5 LCD monitors, 1 printer (kWH)	611
Total Annual Savings	$103
Initial Capital Cost	$40
Simple Payback (months)	**3.5**
Lifetime Energy Savings (15 years)	**$1,915**
Net Present Value (NPV)	**$1,189**

The following Table 4.4-2 summarizes other applications for the Smart Strip that may be applicable throughout the building:

Table 4.4-2 Applications for Smart Strips

Control Outlet	Switched Outlets
Computer	Monitors, printers, scanners, lamps
TV	VCR, DVD player, cable box
Lamp	Stereo, space heater

The Night Watchman software package reduces power consumption to achieve energy savings through the scheduled shutdown of workstations/ laptops across the network. The cost for the software is $18/per computer, which is a 1 time license fee. No special training is necessary for the software installation, so the facilities IT personnel can do the installation themselves. Clients who use the software see an average annual energy savings for a desktop machine of $36 dollars/year, and savings for a laptop of $25/year (depending on utility pricing, etc.). The implementation of the software does not require any modification to the facilities existing network, and does not require an additional network server to be installed.

Section 5
Evaluation of Energy Purchasing and Procurement Strategies

5.1 Energy Deregulation

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law, the deregulation of the market, allowed all consumers to shop for their electric supplier. The intent was to create a competitive market for electrical energy supply. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party supplier. Energy deregulation in New Jersey increased the energy buyers' options by separating the function of electricity distribution from that of electricity supply.

To sell electric generation service in New Jersey, electric power suppliers must be licensed by the New Jersey Board of Public Utilities (NJ BPU). They must also be registered with the local public utility (PSE&G or JCP&L) to sell electric service in that utility's service areas. The following third party electric suppliers are licensed with the NJ BPU:

- Amerada Hess Corp
- BOC Energy Services
- Con Edison Solutions, Inc.
- Constellation New Energy, Inc.
- Direct Energy, LLC.
- First Energy Solutions Corp.
- Glacial Energy
- Integrys Energy Service
- Liberty Power
- Pepco Energy Services, Inc.
- PP&L Energy Plus, LLC.
- Reliant Energy Solutions East, LLC.
- Sempra Energy Solutions
- South Jersey Energy
- Strategic Energy LLC
- Suez Energy Resources NA, Inc
- UGI Energy Services

Natural gas service is also deregulated in New Jersey. Similarly with electric power suppliers, natural gas suppliers must be licensed by the NJ BPU. The following natural gas suppliers are licensed with the NJ BPU:

- Core Energy
- Dominion Retail, Inc.
- GASMARK
- Gateway Energy Services Corp.
- Great Eastern Energy
- Hess Corporation
- Hudson Energy Services LLC
- Infinite Energy
- Metro Media Energy
- MXenergy
- NATGASCO
- Pepco Energy Services
- PPL EnergyPlus, LLC
- South Jersey Energy Company
- Sprague Energy
- Systrum Energy
- U.S. Gas & Electric Inc.
- Woodruff Energy

5.1.1 Alternate Third Party Electrical Energy Supplier

In evaluating the potential for an alternative third party supplier, CDM had contacted and requested a proposal for electrical service from Glacial Energy. The objective of which was to get an overall idea of whether or not switching electric energy suppliers is an avenue that should be pursued further to obtain electrical energy cost savings.

Glacial Energy was unable to provide a quote, as the 'POD Id #'s' assigned to the PSE&G accounts are required. These Id #'s were assigned in mid-2009 and CDM did not receive copies of these 2009 utility bills. However, it should be noted that quotes obtained for similar studies have indicated an 11 – 12% savings from switching to an alternate third party energy supplier.

5.2 Demand Response Program

Demand Response is a program through which a business can make money on reducing their electricity use when wholesale electricity prices are high or when heavy demand causes instability on the electric grid, which can result in voltage fluctuations or grid failure. Demand Response is an energy management program that compensates the participant for reducing their energy consumption at critical times. Demand Response is a highly efficient and cost effective means of reducing the potential for electrical grid failure and price volatility and is one of the best solutions to the Mid-Atlantic region's current energy challenges.

The program provides at least 2 hours advance notice before curtailment is required. There is typically 1 event a year that lasts about 3 hours in the summer months, when demand for electricity is at its highest.

Participation in Demand Response is generally done through companies known as Curtailment Service Providers, or CSPs, who are members of PJM Interconnection. There is no cost to enroll in the program and participation is voluntary, for instance, you can choose when you want to participate. In most cases, there is no penalty for declining to reduce your electricity use when you're asked to do so. The event is managed remotely by notifying your staff of the curtailment request and then enacting curtailment through your Building Management System. CSPs will share in a percentage of your savings, which may differ among various CSPs, since there may be costs associated with the hardware and /or software required for participation, so it is recommended that a number of CSPs be contacted to review their offers.

Section 6
Ranking of Energy Conservation and Retrofit Measures (ECRM)

6.1 ECRMs

The main objective of this energy audit is to identify potential Energy Conservation and Retrofit Measures and to determine whether or not the identified ECRM's are economically feasible to warrant the cost for planning and implementation of each measure. Economic feasibility of each identified measure was evaluated through a simple payback analysis. The simple payback analysis consists of establishing the Engineer's Opinion of Probable Construction Cost estimates; O&M cost savings estimates, projected annual energy savings estimates and the potential value of New Jersey Clean Energy Rebates or Renewable Energy Credits, if applicable. The simple payback period is then determined as the amount of time (years) until the energy savings associated with each measure amounts to the capital investment cost.

As discussed in Section 3, aggregate unit costs for electrical energy delivery and usage and natural gas delivery and usage, which accounts for all demand and tariff charges at each complex, was determined and utilized in the simple payback analyses.

In general, ECRMs having a payback period of 20 years or less have been recommended and only those recommended ECRMs within Section 4 of the report have been ranked for possible implementation. The most attractive rankings are those with the lowest simple payback period.

Ranking of ECRMs has been broken down into the following categories:

- Lighting Systems
- HVAC Systems
- Solar
- Wind

6.1.1 Lighting Systems

Table 6.1-1 includes the recommended ECRMs to provide energy savings for all building lighting systems, which include the installation of energy-efficient luminaires and occupancy sensors. A detailed discussion on building lighting systems is presented in Section 4.1.

Table 6.1-1 Ranking of Energy Savings Measures Summary – Lighting System Retrofits					
Building & Measure	**Engineer's Opinion of Probable Cost**	**Incentives**	**Total Cost**	**Annual Fiscal Savings**	**Simple Payback (Years)**
North 13th Street School	$63,797.69	$4,900	$58,897.69	$17,092.59	**3.4**
Board Office	$18,498.47	$1,586	$16,912.47	$4,576.63	**3.7**
Bloomfield Technical School	$46,978.94	$3,600	$43,378.94	$10,880.25	**4.0**
Newark Technical School	$98,406.94	$9,696	$88,710.94	$17,899.59	**5.0**
West Caldwell School	$42,291.25	$2,765	$39,526.25	$7,611.8	**5.2**

6.1.2 HVAC Systems

Table 6.1-2 includes the recommended ECRM to provide energy savings for building HVAC systems, which provide a simple payback of less than 20 years. A detailed discussion on building HVAC systems is presented in Section 4.2.

Table 6.1-2 Ranking of Energy Savings Measures Summary – HVAC System Upgrade					
Building Measure	**Retrofit Cost**	**Incentives**	**Total Cost**	**Annual Fiscal Savings**	**Simple Payback (Years)**
Newark Technical School DDC BMS	$159,855	$0	$159,844	$35,626	**4.5**
West Caldwell School DDC BMS	$69,425	$0	$69,425	$8,850	**7.8**
Newark Technical School Boiler Upgrade	$326,376	$10,000	$316,376	$38,572	**8.2**
Board Office Boiler Upgrade	$67,353	$2,000	$65,353	$6,835	**9.6**

6.1.3 Solar Energy

Implementation of new solar energy systems have been evaluated to determine the economic feasibility for furnishing and installing such systems at the five Essex County Technical Schools Board of Education buildings. Based on the simple payback modeling performed, it would benefit the Board to further investigate installing the solar energy systems. This is primarily based on the initial upfront capital investment required for a solar energy system installation and the average 11.1 year payback period.

Two major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions and Solar Renewable Energy Credit (SREC) rates, with the largest impact to the payback model being the SREC credit pricing. For

the payback model, conservative estimates of the SREC's market value over a 15 year period were assumed, as discussed in Section 4.3.

Table 6.1-3 includes a simple payback analysis for the installation of five solar energy systems for the Essex County Technical Schools Board of Education. Refer to Appendix E for a more detailed solar financing spreadsheet.

Table 6.1-4 Ranking of Energy Savings Measures Summary – Alternative Energy Systems

Building & Measure	Engineer's Opinion of Probable Cost	Annual REC Credit	Annual Fiscal Savings	Simple Payback (Years)
Newark Technical School – PV Solar System	$3,107,938	$219,353	$54,594.6	**11.4**
Bloomfield Technical School – PV Solar System	$1,694,938	$115,447	$29,793.9	**11.7**
West Caldwell School – PV Solar System	$1,967,413	$135,483	$32,576.2	**11.7**
North 13th Street School – PV Solar System	$2,037,050	$140,605	$31,995.3	**11.8**
Board Office – PV Solar System	$1,029,388	$66,505	$16,049.9	**12.5**

6.1.4 Wind Power Generation

Implementation of a new on-site wind energy system has been evaluated to determine the economic feasibility for furnishing and installing such systems for the Essex County Technical Schools Board of Education. Based on the simple payback modeling performed, it would benefit the Board to further investigate installing the on-site wind energy systems at the Board Office, West Caldwell School, and Bloomfield Technical School grounds. This is primarily based on the initial upfront capital investment required for a wind energy system installation and an acceptable payback period.

Three major factors influencing the project financial evaluation is the variance of the prevailing energy market conditions, Renewable Energy Certificate (REC) rates and the Renewable Energy Incentive Program, with the largest impact to the simple payback model being the REIP incentive.

Table 6.1-4, includes a summary of the wind energy ECRM for the Essex County Technical Schools Board of Education.

Table 6.1-4: Ranking of Energy Savings Measures Summary – Wind Turbine Energy System			
Parameter	**Wind Turbine (Minimum Average Site Wind Speed – 8.4 mph)**	**Wind Turbine (Maximum Average Site Wind Speed – 12.1 mph)**	**Wind Turbine (Average Site Wind Speed – 10.5 mph)**
Engineer's Opinion of Probable Cost	$68,489.69	$68,489.69	$68,489.69
Renewable Energy Incentive Program	-$17,395.00	-$50,890.00	-$33,082.00
Total Cost	$51,094.69	$17,599.69	$35,407.69
1st Year Production	5,436 kWh	15,380 kWh	10,338 kWh
Annual Estimated Electric Savings	$858.30	$2,428.50	$1,632.4
Annual Estimated REC Revenue	$136.00	$385.00	$258.00
Project Simple Payback	**51.4 Years**	**6.3 Years**	**18.7 Years**

Section 7
Grants, Incentives and Funding Sources

7.1 Renewable Energy

7.1.1 Renewable Energy Certificates (NJ BPU)

As part of New Jersey's Renewable Portfolio Standards (RPS), electric suppliers are required to have an annually-increasing percentage of their retail sales generated by renewable energy. Electric suppliers fulfill this obligation by purchasing renewable energy certificates (RECs) from the owners of solar generating systems. One REC is created for every 1,000 kWh (1 MWh) of renewable electricity generated. Although solar systems generate electricity and SRECs in tandem, the two are independent commodities and sold separately. The RPS, and creation of RECs, is intended to provide additional revenue flow and financial support for renewable energy projects in New Jersey. Class I RECs, which include electricity generation from wind, wave, tidal, geothermal and sustainable biomass typically trade at around $25/MWh. RECs generated from solar electricity, or SRECs, trade at $550/MWh due to supplemental funding from NJ BPU. The supplemental funding will decrease over time to $350/MWh.

7.1.2 Clean Energy Solutions Capital Investment Loan/Grant (NJ EDA)

NJ EDA in cooperation with NJ DEP is offering interest-free loans and grants for energy efficiency, combined heat and power (CHP) and renewable energy projects with total project capital equipment costs of at least $1 million. The interest-free loans are available for up to $5 million, a portion of which may be issued as a grant. The most recent round was closed as of October 2009, but new CESCI program updates will be posted at www.njeda.com. For additional information, contact CESCI@njeda.com or call 866-534-7789.

7.1.3 Renewable Energy Incentive Program (NJ BPU)

The Renewable Energy Incentive Program (REIP) provides rebates for installing solar, wind, and sustainable biomass systems in Smart Growth regions. Rebates of $1.00 per watt are available for solar electricity projects up to 50 kW in capacity. Wind systems can receive rebates up to $3.20 per expected kWh produced. Sustainable biomass rebates start at $4.00 per watt installed with a maximum incentive amount of 30 percent of project costs. REIP will give out $53.25 million in rebates from 2009 - 2012. Project owners must complete the Pay for Performance Program, Direct Install or Local Municipal audit, or the rebate will be reduced by $0.10 per watt. For more information on REIP, please see www.njcleanenergy.com.

7.1.4 Grid Connected Renewables Program (NJ BPU)

The New Jersey Grid Connected Renewables Program offers competitive incentives for wind and sustainable biomass electricity generation projects larger than 1 Megawatt (MW). Applications for the most recent round of funding, which totaled $6

million, were due January 8, 2010. Requests for Proposals (RFPs) for the next round will be posted at www.njcleanenergy.com and www.state.nj.us/bpu. A total of roughly $16 million is available for incentives under this program during 2010. Most of the incentives offered under this program will take the form of a payment for energy production ($/MWh) once the project is operating. Incentives range up to $58.49/MWh for publicly-owned wastewater biogas projects. Up to 10% of the incentive may be requested in the form of a lump grant to cover up-front costs such as financing fees, interconnection fees, project design, permitting, and construction costs.

7.1.5 Utility Financing Programs

All four Electric Distribution Companies (EDCs) in New Jersey have developed long term contracting or financing programs for the development of solar energy systems. In all of the programs, Solar Renewable Energy Credits (SRECs) generated by the solar energy systems will be sold at auction to energy suppliers who are required to purchase a certain quantity of SRECs to meet their Renewable Portfolio Standard requirements.

7.1.6 Renewable Energy Manufacturing Incentive (NJ BPU)

New Jersey's Renewable Energy Manufacturing Incentive (REMI) program provides rebates to purchase and install solar panels, inverters, and racking systems manufactured in New Jersey. Rebates for panels start at $0.25 per watt and rebates for racking systems and inverters start at $0.15 per watt for solar projects up to 500 kW in capacity. To be eligible for REMI, applicants must apply to either the Renewable Energy Incentive Program (REIP) or the SREC Registration Program (SRP).

7.1.7 PSE&G Solar Loan Program

Public Service Electric and Gas (PSE&G) of New Jersey will offer $143 million in loans to their customers for solar electric systems in 2009-2010. Their Solar Loan program will provide 15-year loans at an interest rate of 11.3092% to cover 40-60% of the cost of solar systems 500 kW in capacity or less. PSE&G customers may repay the loan through cash payments or by signing over their Solar Renewable Energy Certificates (SRECs) to PSE&G. Loan applications are scheduled to be accepted on a quarterly basis. For more information, call 973-430-8460.

7.1.8 Clean Renewable Energy Bonds (IRS)

CREBs are 0% interest bonds typically issued for up to approximately $3.0 million administered by the Internal Revenue Service (IRS). Last year, $2.2 billion in CREBs was allocated to municipal entities to fund 610 renewable energy projects, including anaerobic digestion. IRS has been allocating funding for CREBs annually since 2005. Last year, IRS solicited applications starting in April, which were due in August. The IRS is expected to receive additional funding for CREBs and release another round of solicitations in 2010.

7.1.9 Qualified Energy Conservation Bonds (IRS)

These IRS 0% interest bonds are very similar to CREBs except they are allocated based on state and county population. New Jersey was allocated $90 million as part of the ARRA stimulus fund. QECBs are typically distributed through municipal bond banks or state economic development agencies.

7.1.10 Global Climate Change Mitigation Incentive Fund (US EDA)

The Economic Development Agency (part of the U.S. Department of Commerce) administers the GCCMIF to public works projects that reduce greenhouse gas emissions and creates new jobs. In FY 2009, $15 million was allocated to the fund, and additional funding is expected to be allocated in FY 2010. Applications are due on a rolling basis. The program does not have a maximum grant amount but does limit the grant to 50 percent of the project cost.

7.1.11 Private Tax-Exempt Financing

Similar to traditional municipal bond financing, there are many private financial service companies that offer a myriad of options for tax-exempt financing of municipal projects. The providers of these services suggest that this capital can be offered at competitive rates in an expedited timeframe and with fewer complications when compared to traditional municipal financing methods. Though these factors would need to be compared on a case-by-case basis, the one distinct advantage to private financing on the current project would likely be the flexibility to structure payments to meet budget needs with consideration given to the terms and conditions of existing loan and/or bond agreements. For example, this mechanism could be used to limit the initial debt payments when the current bond debt is the greatest and the operations savings of the project has yet to be fully realized. It should also be noted that, in many cases, the construction and long term financing can be rolled into a single private financing agreement. Also, in some instances, equipment manufacturers have the ability to offer competitive financing terms (e.g. Siemens Financial Services Corporation), though financing from these sources is generally contingent upon a substantial portion of the project cost (~20% to 30%) being for their respective equipment.

7.1.12 Performance Based Contracts (ESCOs)

A second financing alternative for a project of this nature would be to enter into a Performance Based Contract with an Energy Services Company (ESCO). The premise of this type of contract is that it requires no initial municipal capital contributions in order to implement the project - instead relying on future operations cost savings and/or energy production, to fund the annual payments. Prior to entering into an agreement for the funding of the project, an ECSO would perform an energy audit and/or conceptual studies to confirm future energy cost savings or energy production inherent with the projects implementation and operation. The contract would then be formulated based on some measurable parameter(s) (energy production, etc) which

would be verified by measurement throughout the contract duration. The savings in energy costs or energy production would then be used to pay back the capital investment of the project over the contract time period (typically on the order of 10-years or less). The ESCO would guarantee the agreed upon energy savings or energy production. If the project does not meet energy savings or production commitments, the ESCO pays the owner the equivalent difference.

With this funding alternative, the ownership and operation of the facility would be maintained by the original owner. A performance contract may also include ESCO operation and maintenance of the energy-related facilities if that were deemed appropriate. Significant ESCO's with experience in this area include Siemens Building Technologies, Chevron and Johnson Controls. CDM has functioned in several roles on performance based contracts including being the owner's representative and, on different contracts, providing design-build services (as a subcontractor to the ECSO). CDM can provide additional experience-based information upon request.

7.1.13 Power Purchase Agreements (SPCs)

More commonly referred to as a Build-Own-Transfer (BOT) agreement in the Water/Wastewater industry, a Power Purchase Agreement (PPA) also delivers a project with no initial capital contribution by the original owner. In this model, a Special Purpose Company (SPC) created by a developer, would own the energy production facilities. Within the framework of a PPA, a SPC will typically lease property from the owners for construction and operation of the new facilities. The funding and construction of the new facilities would be performed by the SPC who would then own and operate the facilities for the duration of the contract (typically 20 to 30 years). Throughout that period of time, the original owner would purchase power from the SPC at a pre-negotiated rate which would take into account the initial capital cost, operation and maintenance of the constructed facility, ancillary benefits of the project and investor returns on investment. For renewable energy, financial incentives may enable this financing approach to compete favorably with utility power tariffs. Incentives include state and local tax credits, renewable energy credits, and Federal energy production tax credits or energy investment tax credits. It is expected that a number of experienced companies and developers may be interested in a PPA for New Jersey municipal renewable energy projects.

7.2 Energy Efficiency

7.2.1 Introduction

New Jersey's Clean Energy Program (NJ CEP) promotes increased energy efficiency and the use of clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass. The results for New Jersey are a stronger economy, less pollution, lower costs, and reduced demand for electricity. NJCEP offers financial incentives, programs, and services for residential, commercial, and municipal customers.

NJCEP reduces the need to generate electricity and burn natural gas which eliminates the pollution that would have been caused by such electric generation or natural gas usage. The benefits of these programs continue for the life of the measures installed, which on average is about 15 years. Thus, the public receives substantial environmental and public health benefits from programs that also lower energy bills and benefit the economy.

7.2.2 New Jersey Smart Start Buildings Program (NJ BPU)

The New Jersey Smart Start Buildings Program offers rebate incentives for several qualifying equipment such as high efficient premium motors and lighting, and lighting controls.

Incentive information and incentive calculation worksheets are provided for the various new equipment installation identified in this report and are included in Appendix G.

7.2.3 Pay for Performance Program (NJ BPU)

Another program offered through the New Jersey Smart Start Program, is the Pay for Performance Program. Commercial, industrial and institutional buildings are eligible for participation if not already receiving Energy Efficiency and Conservation Block Grants.

Incentives are available for buildings that are able to present an Energy Reduction Plans that reduce the building's current energy consumption by 15% or more, in addition to incentives for installing the recommended measures and incentives for presenting the energy savings in a post-construction benchmarking report. No more than 50% of the total energy savings may be derived from lighting retrofits. In addition, the total energy savings of 15% may not come from the implementation of one energy savings measure. The incentive structure is provided in Appendix G.

The ERP presented herein for the Newark Technical High School results in a thermal energy savings of 15% or more. The following table summarizes the current annual energy use at Newark Tech and the energy savings presented herein from the implementation of the Indoor & Outdoor lighting retrofits and the HVAC ECRMs.

Table 7.2-1: Pay for Performance ERP

	Current Annual Electrical Energy Use (kWh)	Current Annual Fuel Use (therms)	Annual Energy Savings from Vending Misers, HVAC & Lighting ECRMs
Newark Technical High School	2,642,164	105,804	246,758 kWh 43,110 therms

Implementation of the recommended HVAC retrofits would potentially warrant participation in the Pay for Performance program.

The following table summarizes the potential incentives available through participation in the Pay for Performance Program.

Table 7.2-2: Pay for Performance Incentive Summary	
	Newark Technical High School
Incentive #1: *Energy Reduction Plan*	$18,534
Incentive #2: *Installation of Recommended ECRMs*	$62,409 ($1.45 per projected therm saved)
Incentive #3: *Post-Construction Benchmarking Report*	$45,265 ($1.05 per projected therm saved)
Total Incentives	**$126,208**

7.2.4 Direct Install (NJ BPU)

Owners of existing small to mid-size commercial and industrial facilities with a peak electric demand that did not exceed 200 kW in any of the preceding 12 months are eligible to participate in Direct Install. The buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies.

This program will cover up to 80% of the retro-fitting costs associated with the use of new energy efficient equipment. Lighting, HVAC, refrigeration, motors, natural gas systems, and variable frequency drives are covered under the Direct Install program.

The building covered under this audit that are potentially eligible for participation in the Direct Install Program, based on the requirement to have not exceeded a peak demand of 200 kW in the preceding 12 months, is the Board of Education Office building. The Direct Install Program is designed to fast-track project implementation so energy savings can be realized sooner rather than later. The steps for participation are to contact the contractor assigned and trained to provide Direct Install services in your County and schedule an Energy Assessment with this contractor. The contractor will assist in completing the Program Application and Participation Agreement.

The Energy Assessment with the participating contractor will work to determine which conservation measures qualify and the resulting project cost. Following this assessment, a scope of work will be finalized and installation will be arranged. Following completion of the installation a 'project completion form' must be submitted to the program representative assigned to the project.

The contractor for Essex County is:

Lime Energy
Direct Install Program Administrator
Phone: 866-401-2686
Email: njdiadministrator@lime-energy.com

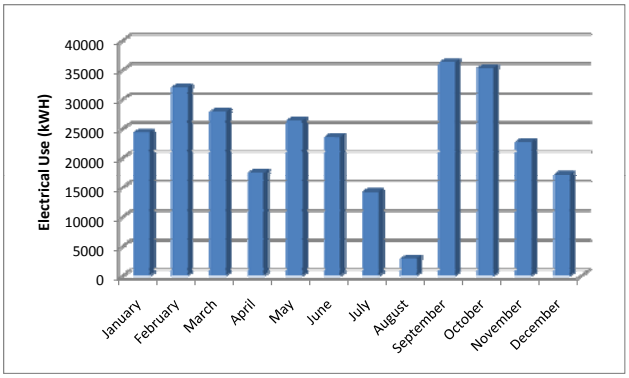
Any additional information on the Direct Install Program can be obtained by calling 866-NJSMART or by e-mail to DirectInstall@trcsolutions.com

APPENDIX A

UTILITY BILL INFORMATION

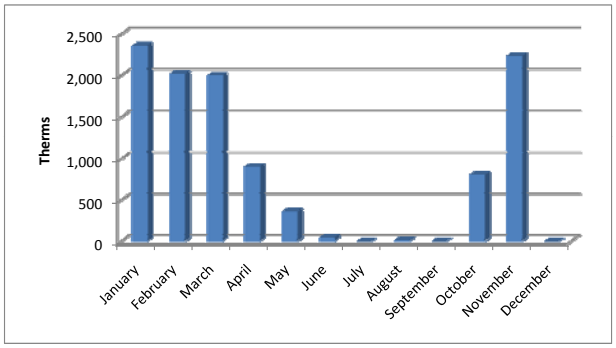
Electric Bills - Essex County Board Office						
Account# 65-378-147-07, Meter #728012082						
Comments	Month	Year	Charges	Total kWh	Cost Per KWH	Demand (kW)
	January	2008	$5,127.48	18,960	$0.27	
	February	2008	$8,407.04	48,560	$0.17	
	March	2008	$7,146.33	36,000	$0.20	
	April	2008	$4,687.84	18,080	$0.26	
	May	2008	$6,822.30	32,240	$0.21	
	June	2008	$6,465.54	23,440	$0.28	
	July	2008	$5,714.87	14,400	$0.40	
	August	2008	$4,312.92	3,040	$1.42	
	September	2008	$6,284.20	23,760	$0.26	
	October	2008	$7,252.05	34,720	$0.21	
	November	2008	$5,850.44	22,720	$0.26	
	December	2008	$2,509.77	17,120	$0.15	
	January	2009	$4,340.99	29,680	$0.15	
	February	2009	$2,394.14	15,520	$0.15	
	March	2009	$2,847.64	19,760	$0.14	
	April	2009	$2,570.94	16,880	$0.15	
	May	2009	$3,607.40	20,480	$0.18	
	June	2009	$4,539.04	23,680	$0.19	
	July	2009	$3,256.21	14,160	$0.23	
	August	2009	$1,609.51	2,880	$0.56	
	September	2009	$7,342.89	48,800	$0.15	
	October	2009	$4,934.61	35,920	$0.14	
	November	2009	$5,038.52	30,960	$0.16	

Month	Use (KWH)
January	24320
February	32040
March	27880
April	17480
May	26360
June	23560
July	14280
August	2960
September	36280
October	35320
November	22720
December	17120
Total	**280320**



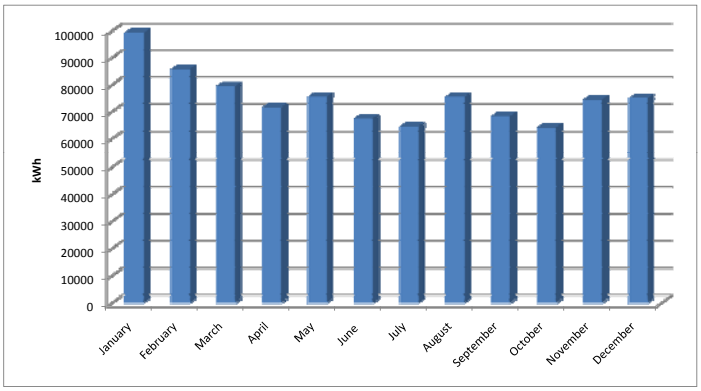
Natural Gas Bills - Essex County Board Office					
Account #12-038-101-05, Meter #2916026					
Comments	Month	Year	Use (Therms)	Total Charge	Cost/Therm
	January	2009	2,359	$3,662.90	$1.55
	February	2009	2,019	$3,193.21	$1.58
	March	2009	1,996	$2,684.38	$1.34
	April	2009	905	$1,277.25	$1.41
	May	2009	360	$566.12	$1.57
	June	2009	44	$151.11	$3.43
	July	2009	0	$93.72	
	August	2009	10	$107.36	$10.74
	September	2009	0	$93.72	
	October	2009	803	$1,567.62	$1.95
	November	2009	2,236	$2,445.56	$1.09
	December	2009	0	$1,940.08	

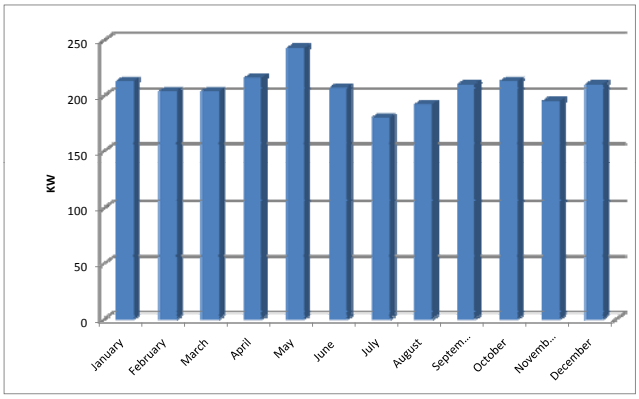
Month	Therm Usage
January	2,359
February	2,019
March	1,996
April	905
May	360
June	44
July	0
August	10
September	0
October	803
November	2,236
December	0



Electric Bills - Essex County - West Caldwell							
Account #12 429 160 16							
Service From	To	Month	Year	PSE&G Electric Charges Meter #: 778013015	KWh	PSE & G Cost Per KWh	Distribution Demand
17-Oct	16-Nov	October	2007	$7,827.96	59400	$0.13	
15-Nov	16-Dec	November	2007	$9,560.80	76800	$0.12	
17-Dec	16-Jan	December	2007	$9,759.51	78600	$0.12	
17-Jan	15-Feb	January	2008	$9,456.36	73800	$0.13	
Feb 16	March 20	February	2008	$10,645.25	85,800	$0.12	204
March 21	Apr 18	March	2008	$8,660.04	68,400	$0.13	210
Apr 19	May 19	April	2008	$8,588.99	67,200	$0.13	198
May 20	June 17	May	2008	$13,585.67	75,000	$0.18	282
June 18	July 17	June	2008	$12,607.65	66,000	$0.19	198
July 18	Aug 15	July	2008	$12,885.99	67,200	$0.19	186
Aug 16	Sept 15	August	2008	$14,611.66	76,200	$0.19	
Sept 16	Oct 16	September	2008	$10,619.35	67,200	$0.16	
Oct 17	Nov 14	October	2008	$9,670.02	65,400	$0.15	222
Nov 15	Dec 16	November	2008	$10,569.95	76,200	$0.14	204
Dec 17	Jan 10	December	2008				
Jan 10	Feb 9	January	2009	$18,939.97	132,000	$0.14	204
		February	2009				
7-Mar	9-Apr	March	2009	$12,680.79	90,600	$0.14	198
10-Apr	30-Apr	April	2009	$10,919.14	76,200	$0.14	234
13-May	12-Jun	May	2009	$13,271.43	76,200	$0.17	204
13-Jun	15-Jul	June	2009	$13,393.49	69,000	$0.19	216
16-Jul	13-Aug	July	2009	$11,996.69	61,800	$0.19	174
14-Aug	15-Sep	August	2009	$13,806.96	75,000	$0.18	192
16-Sep	15-Oct	September	2009	$11,238.09	69,600	$0.16	210
16-Oct	12-Nov	October	2009	$9,705.55	63,000	$0.15	204
13-Nov	15-Dec	November	2009	$10,736.33	72,600	$0.15	186
16-Dec	15-Jan	December	2009	$11,177.87	75,000	$0.15	210
16-Jan	16-Feb	January	2010	$13,204.06	92,400	$0.14	222

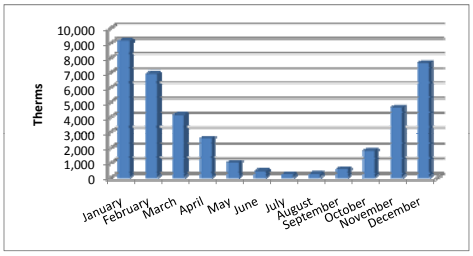
Month	KWh	Demand (KW)
January	99400	213
February	85800	204
March	79500	204
April	71700	216
May	75600	243
June	67500	207
July	64500	180
August	75600	192
September	68400	210
October	64200	213
November	74400	195
December	75000	210





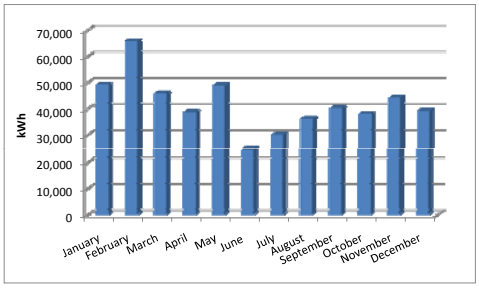
Natural Gas Bills						
Essex County Gas Account # 12 429 160 16 : West Caldwell						
Service Dates	Year	PSE&G Meter #: 2413342	Total Charge	Cost/Therm	Month	Adjusted Monthly Usage
Dec 15 - Jan 14	2008	10,297	$10,297.46	$1.12	December	
Jan 15 - Feb 16	2008	12,404	$12,403.98	$1.16	January	9,937
Feb 16 - Mar 20	2008	12,738	$12,737.87	$1.45	February	9,739
Mar 21 - Apr 18	2008	4,378	$4,377.68	$1.35	March	6,030
Apr 19 - May 19	2008	2,047	$2,046.86	$1.54	April	2,293
May 20 - June 17	2008	1,073	$1,072.51	$1.73	May	976
June 18 - July 17	2008	480	$479.85	$2.09	June	424
July 18 - Aug 15	2008	486	$485.98	$1.88	July	244
Aug 16 - Sept 17	2008	481	$481.28	$1.57	August	283
Sept 18- Oct 16	2008	947	$947.27	$1.29	September	520
Oct 17 - Nov 14	2008	4,414	$4,414.22	$1.58	October	1,760
Nov 15 - Dec 16	2008	9,604	$9,604.40	$1.29	November	5,122
Dec 17 - Jan 10	2009	9,968	$9,967.84	$1.24	December	7,731
Jan 11 - Feb 9	2009	9,257	$9,256.60	$1.15	January	8,020
10-Feb 6-Mar	2009				February	4,016
7-Mar 9-Apr	2009	3,430	$3,430.49	$0.77	March	2,241
10-Apr 12-May	2009	1,166	$1,166.14	$0.75	April	3,017
13-May 12-Jun	2009	482	$482.43	$0.85	May	1,061
13-Jun 15-Jul	2009	294	$294.10	$1.05	June	425
16-Jul 13-Aug	2009	254	$254.40	$1.13	July	253
14-Aug 15-Sep	2009	285	$285.15	$0.97	August	260
16-Sep 15-Oct	2009	765	$764.59	$0.77	September	644
16-Oct 12-Nov	2009	3,515	$3,515.08	$1.27	October	1,880
13-Nov 15-Dec	2009	6,012	$6,011.82	$1.10	November	4,113
16-Dec 15-Jan	2010	10,473	$10,473.44	$1.09	December	7,540
16-Jan 16-Feb	2010	10,502	$10,501.89	$1.14	January	9,413

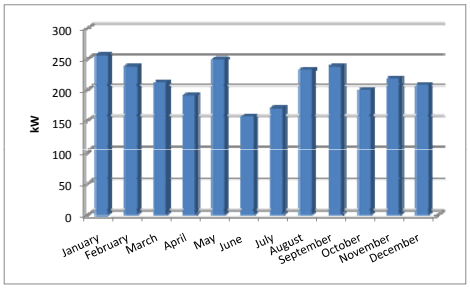
Month	Average Therm Usage
January	9,123
February	6,878
March	4,135
April	2,655
May	1,018
June	425
July	249
August	271
September	582
October	1,820
November	4,618
December	7,636



Electric Bills - Essex County - Bloomfield Tech								
Account #12 416 012 08, Meter #778011511								
Service From	**To**	**Comments**	**Month**	**Year**	**PSE&G Electric Charges**	**KWh**	**PSE & G Cost Per KWh**	**Measured Demand (kW)**
Feb 16	March 18		February	2008	$7,326.93	57,600	$0.13	238
March 19	April 16		March	2008	$6,043.36	46,600	$0.13	214
April 17	May 15		April	2008	$5,283.34	39,000	$0.14	198
May 16	June 16		May	2008	$7,825.71	43,600	$0.18	196
June 17	July 16		June	2008	$7,006.47	33,200	$0.21	186
July 17	Aug 14		July	2008	$6,001.25	29,400	$0.20	128
Aug 15	Sept 15		August	2008	$7,610.72	34,600	$0.22	
Sept 16	Oct 15		September	2008	$6,734.53	40,200		
Oct 16	Nov 13		October	2008	$5,735.12	37,000	$0.16	182
Nov 14	Dec 15		November	2008	$6,025.74	40,600	$0.15	
Dec 16	Jan 9		December	2009		27,600		170
Jan 10	Feb 6	No reading	January	2009				
7-Feb	March 6	Feb and March usage	February	2009	$11,912.85	74,000	$0.16	
7-Mar	8-Apr		March	2009	$6,862.91	45,200	$0.15	208
9-Apr	30-Apr		April	2009	$6,026.38	38,400	$0.16	183
12-May	11-Jun		May	2009	$9,388.02	54,200	$0.17	303
12-Jun	14-Jul		June	2009	$4,186.30	16,200	$0.26	127
15-Jul	12-Aug		July	2009	$6,155.70	30,600	$0.20	212
13-Aug	14-Sep		August	2009	$7,685.54	37,800	$0.20	233
15-Sep	13-Oct		September	2009	$6,901.56	40,200	$0.17	238
14-Oct	11-Nov		October	2009	$6,276.91	39,200	$0.16	216
12-Nov	14-Dec		November	2009	$7,207.62	47,600	$0.15	218
15-Dec	14-Jan		December	2009	$7,634.70	50,800	$0.15	246
15-Jan	12-Feb		January	2010	$7,419.62	49,200	$0.15	256

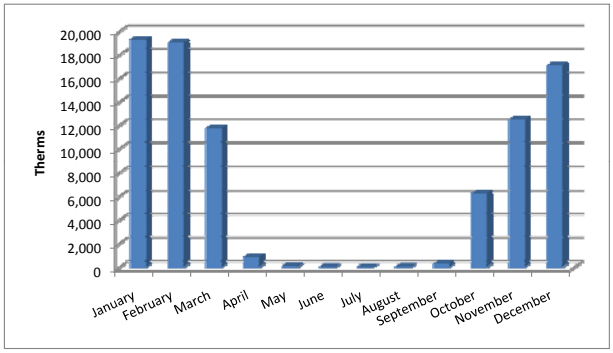
Month	KWh	Demand (KW)
January	49200	256
February	65800	238
March	45900	211
April	38700	191
May	48900	250
June	24700	157
July	30000	170
August	36200	233
September	40200	238
October	38100	199
November	44100	218
December	39200	208





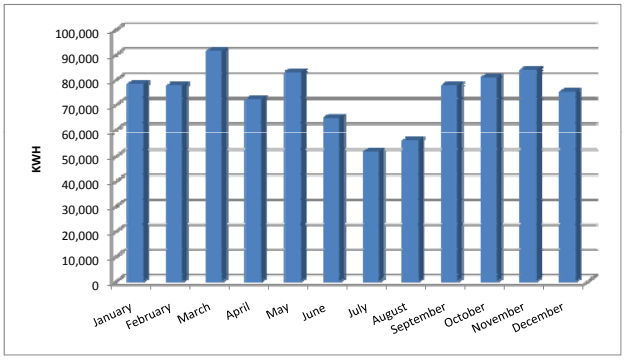
Natural Gas Bills - Essex County - Bloomfield Tech				
Account # 12 377 101 11, Meter #: 2348950				
Date	Year	Gas Usage (Therms)	Total Charge	Cost/Therm
Jan 15 - Feb 15	2008	21628.97	28834.09	$1.33
Feb 16 - Mar 18	2008	19547.55	$28,341.17	$1.45
Mar 19 - Apr 16	2008	10638.61	$14,008.04	$1.32
Apr 17 - May 15	2008	392.07	$662.18	$1.69
May 16 - Jun 16	2008	92.31	$237.62	$2.57
June 17 - Jul 16	2008	53.00	$181.28	$3.42
Jul 17 - Aug 14	2008	38.53	$151.11	$3.92
Aug 15 - Sept	2008	61.20	$170.02	$2.78
Sept - Oct 15	2008	57.05	$159.11	$2.79
Oct 16 - Nov 13	2008	8077.39	$11,968.24	$1.48
Nov 14 - Dec 15	2008	16300.78	$21,044.08	$1.29
Dec 16 - Jan 9	2009	14922.22	$18,946.10	$1.27
Jan 10 - Feb 6	2009	1616.52	$3,934.99	$2.43
Feb 6 - March 7	2009	35522.64	$34,134.72	$0.96
March 7 - April 8	2009	12869.74	$9,656.84	$0.75
April 9 - May 11	2009	1380.53	$1,051.07	$0.76
May 12 - June 12	2009	105.69	$165.89	$1.57
June 13 - July 14	2009	54.97	$132.90	$2.42
July 15 - Aug 12	2009	54.97	$132.96	$2.42
Aug 13 - Sept 14	2009	63.39	$135.19	$2.13
Sept 15 - Oct 13	2009	559.10	$467.64	$0.84
Oct 14 - Nov 11	2009	4477.00	$6,173.63	$1.38
Nov 12 - Dec 14	2009	8741.21	$10,143.09	$1.16
Dec 15 - Dec 31	2009	19334.95	$20,022.62	$1.04
Jan 15 - Feb 12	2010	17763.20	$20,475.90	$1.15

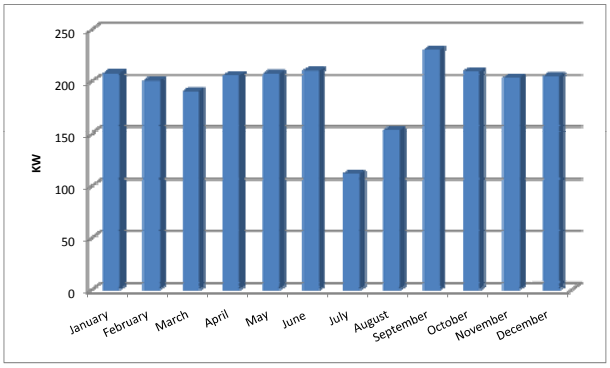
Month	Average Therm Usage
January	19,321
February	19,059
March	11,754
April	886
May	99
June	54
July	47
August	62
September	308
October	6,277
November	12,521
December	17,129



Electric Bills - Essex County - North 13th Street								
Account #11 047 081 08, Meter #: 778015827								
Service From	To	Comments	Month	Year	PSE&G Electric Charges	KWH	PSE & G Cost Per KWH	Distribution Demand (kW)
Feb 7	Mar 6		February	2008	$9,536.97	76,960	$0.12	190
Mar 7	Apr 9		March	2008	$10,097.10	84,960	$0.12	186
Apr 10	May 5		April	2008	$8,161.03	66,560	$0.12	189
May 6	June 5		May	2008	$11,895.63	80,480	$0.15	211
June 6	Jul 7		June	2008	$12,030.42	66,240	$0.18	202
Jul 8	Aug 4		July	2008	$8,896.83	48,960	$0.18	110
Aug 5	Sept 3		August	2008	$9,774.48	48,000	$0.20	176
Sept 4	Oct 2		September	2008	$12,241.85	77,920	$0.16	
Oct 3	Nov 4		October	2008	$11,107.59	82,560	$0.13	205
Nov 5	Dec 3		November	2008	$10,477.24	78,720	$0.13	194
Dec 4	Dec 30		December	2008	$9,237.01	68,000	$0.14	200
Dec 31	Jan 27		January	2009	$10,234.38	74,400	$0.14	202
Jan 28	Feb		February	2009	$10,798.42	75,520	$0.14	
24-Feb	30-Mar		March	2009	$13,074.38	97600	$0.13	195
31-Mar	29-Apr		April	2009	$10,825.58	77600	$0.14	222
30-Apr	30-May		May	2009	$13,161.01	85600	$0.15	203
2-Jun	30-Jun		June	2009	$12,217.27	63680	$0.19	219
1-Jul	31-Jul		July	2009	$10,069.34	54720	$0.18	113
1-Aug	31-Aug		August	2009	$11,304.52	64640	$0.17	129
1-Sep	1-Oct		September	2009	$12,504.44	77500	$0.16	230
2-Oct	30-Oct		October	2009	$11,267.05	79200	$0.14	214
31-Oct	3-Dec		November	2009	$12,252.11	89120	$0.14	213
4-Dec	31-Dec		December	2009	$11,480.31	82240	$0.14	210
5-Jan	2-Feb		January	2010	$11,694.62	82240	$0.14	213
3-Feb	4-Mar		February	2010	$11,497.01	80800	$0.14	210

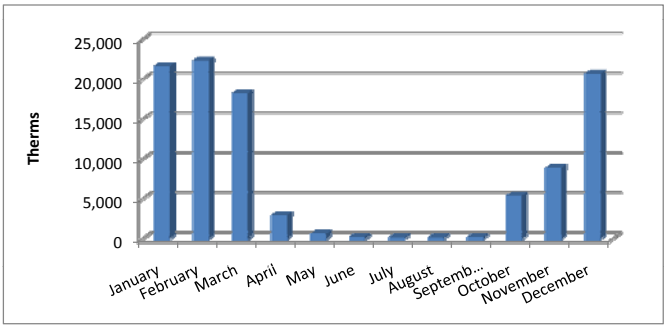
Month	KWh	Demand (KW)
January	78,320	207
February	77,760	200
March	91,280	190
April	72,080	205
May	83,040	207
June	64,960	210
July	51,840	112
August	56,320	153
September	77,710	230
October	80,880	209
November	83,920	203
December	75,120	205





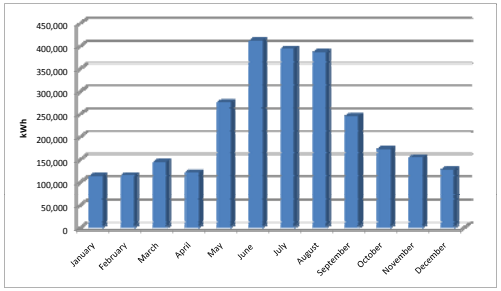
Natural Gas Bills - Essex County - North 13th Street Account # 11 006 014 14, Meter #2415436				
Date	Year	PSE&G Charges	Gas Usage (therms)	Cost/Therm
Feb 7 - Mar 6	2008	$29,610.80	20839	$1.42
Mar 7 - Apr 9	2008	$18,324.09	14163	$1.29
Apr 10 - May 5	2008	$1,229.07	815	$1.51
May 6 - Jun 5	2008	$656.19	363	$1.81
Jun 6 - Jul 7	2008	$472.19	231	$2.04
Jul 8 - Aug 4	2008	$352.46	154	$2.28
Aug 5 - Sept 3	2008	$379.82	221	$1.72
Sept 4 - Oct 1	2008	$415.14	264	$1.57
Oct 2 - Oct 31	2008	$12,375.48	7812	$1.58
Nov 1 - Dec 3	2008	$13,528.20	9499	$1.42
Dec 4 - Dec 30	2008	$20,325.59	15334	$1.33
Dec 31 - Jan 27	2009	$25,619.32	21155	$1.21
Feb 24 - March 30	2009	$17,178.69	22312	$0.77
Marh 31 - April 29	2009	$3,626.54	5077	$0.71
April 30 - June 1	2009	$705.55	901	$0.78
June 2 - June 30	2009	$314.36	319	$0.99
July 1 - 31st	2009	$223.68	176	$1.27
August 1-31st	2009	$168.55	110	$1.53
Sept 1 - Oct 1	2009	$211.21	188	$1.12
Oct 2 - Oct 31	2009	$5,216.87	3045	$1.71
Oct 31 - Dec 3	2009	$9,940.85	8277	$1.20
Dec 4 - 31	2009	$26,711.42	26037	$1.03
Jan 1 -Feb 2	2010	$25,878.00	22053	$1.17
Feb 3 - March 4	2010	$26,203.71	23848	$1.10

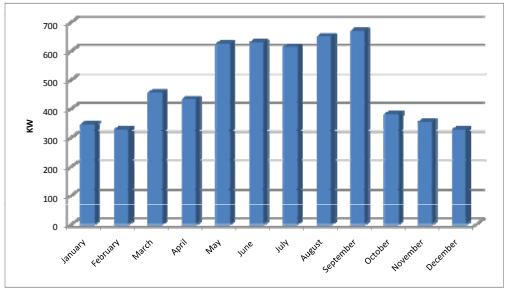
Month	Average Therm Usage
January	21,604
February	22,344
March	18,237
April	2,946
May	632
June	275
July	165
August	166
September	226
October	5,429
November	8,888
December	20,686



Electric Bills - Essex County - Newark Tech																		
Account #11 337 963 11																		
Account #4206752605										Account # 4200570203								
Service From	To	Comments	Month	Year	Gym (Meter # 778017617) Charges	On Peak (kWh)	Off Peak (kWh)	Total kWh	Measured Demand (kW)	PSE&G Electric Charges Meter #: 778015734	On Peak (kWh)	Off Peak (kWh)	KWH	PSE & G Cost Per KWH	Measured Demand (kW)	Month	Total Monthly Usage
March 15	April 15		March	2008	$2,893.86	11280	7520	18800	92	$16,349.06	70,972	53,153	124,125	$0.13	380.7	March	142,925
Apr 16	May 14		April	2008				0		$16,099.86	77,546	42,062	119,608	$0.13	380.5	April	119,608
May 15	June 13	consumption from summary sheet, demand not provided	May	2008	$9,192.85	32000	14000	46000	226.4	$37,596.10			228,757	$0.17		May	274,757
June 14	Jul 15		June	2008	$6,476.89	18000	8240	26240	144.8	$58,745.58	161,600	222,996	384,596	$0.16	618.7	June	410,836
Jul 16	Aug 13		July	2008	$9,587.78	27760	15600	43360	205.6	$56,239.62	154,848	194,534	349,382	$0.17	611.5	July	392,742
Aug 14	Sept 12		August	2008	$10,062.19	30800	17360	48160	187.2	$55,929.60	152,686	184,736	337,422	$0.17	685.3	August	385,582
Sept 13	Oct 13	consumption from summary sheet, demand not provided	September	2008	$5,088.84	19520	10640	30160	129.6	$31,771.62			214,337	$0.15		September	244,497
Oct 14	Nov 11		October	2008	$5,878.82	22560	17280	39840	97.6	$20,769.12	83,571	48,900	132,471	$0.15	376.6	October	172,311
Nov 12	Dec 12		November	2008	$3,461.50	11040	9920	20960	66.4	$20,297.93	80,192	51,874	132,066	$0.16	377.7	November	153,026
Dec 13	Jan 8		December	2008	$4,740.51	14480	13440	27920	90.4	$16,350.69	51,854	46,820	98,674	$0.17	349.6	December	126,594
Jan 9	Feb 5		January	2009						$18,414.96	65,246	46,713	111,959	$0.16	350.9	January	111,959
Feb 6		consumption from summary sheet, demand not provided	February	2009						$18,558.26			107,327	$0.17		February	107,327
3/5/2009	4/7/2009		March	2009						$21,902.35			135404	$0.16	528	March	135,404
4/8/2009	5/8/2009		April	2009						$20,210.73			12244	$1.65	481	April	12,244
5/9/2009	6/10/2009		May	2009						$32,448.03			169294	$0.19	622	May	169,294
6/11/2009	7/13/2009		June	2009						$53,397.20			32936	$1.62	635	June	32,936
7/14/2009	8/11/2009		July	2009						$54,933.01			334631	$0.16	613	July	334,631
8/12/2009	9/11/2009		August	2009						$51,847.38			314333	$0.16	612	August	314,333
9/12/2009	10/12/2009		September	2009						$32,026.29			201852	$0.16	668	September	201,852
10/13/2009	11/10/2009		October	2009						$19,743.55			120779	$0.16	382	October	120,779
11/11/2009	12/11/2009		November	2009						$18,137.87			106751	$0.17	328	November	106,751
12/12/2009	1/13/2010		December	2009						$17,209.36			99843	$0.17	301	December	99,843
1/14/2010	2/11/2010		January	2010						$19,124.94			114330	$0.17	338	January	110,708
2/12/10	3/15/10		February	2010				26720	67.2				120219.00		326.50		
3/18/10	4/15/10		March	2010				17760	61.6				167604.00		444.10		
4/15/10	5/13/10		April	2010									114310.00		554.00		

Month	KWH	Demand (KW)
January	111,959	344
February	113,773	327
March	142,925	454
April	119,608	431
May	274,757	622
June	410,836	627
July	392,742	612
August	385,582	649
September	244,497	668
October	172,311	379
November	153,026	353
December	126,594	326



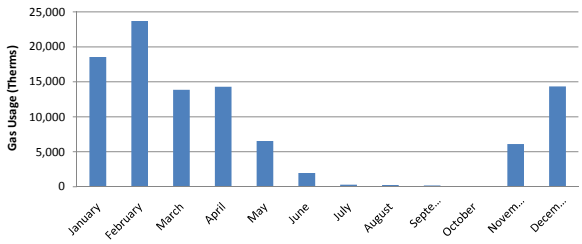


Natural Gas Bills								
Essex County Gas Account # 11 337 963 11 : Newark Tech								
Date	Year	PSE&G Meter #: 3274909	Gas Usage (therms)	Total Therms	Total Charge	Cost/Therm	Month	Adjusted Monthly Usage
Mar 15 - Apr 15	2008	$562.42	364.14	364.14	$562.42	$1.54		
Apr 16 - May 14	2008	$608.08	364.14	364.14	$608.08	$1.67	April	364
May 15 - June 13	2008						May	
June 14 - Jul 15	2008	$326.40	169.03	169.03	$326.40	$1.93	June	
Jul 16 - Aug 13	2008	$282.25	155.92	155.92	$282.25	$1.81	July	162
Aug 14 - Sept 12	2008	$287.18	188.54	188.54	$287.18	$1.52	August	172
Sept 13 - Oct 14	2008						September	
Oct 15 - Nov 12	2008	$389.21	289.58	289.58	$389.21	$1.34	October	
Nov 13 - Dec 12	2008	$478.89	364.84	364.84	$478.89	$1.31	November	327
Dec 13 - Jan 8	2009	$313.81	238.12	238.12	$313.81	$1.32	December	301
Jan 9 - Feb 5	2009	$476.63	383.66	383.66	$476.63	$1.24	January	311
Feb 5 - March 4	2009						February	
Mar 5 - Apr 7	2009	$496.23	505.97	505.97	$496.23	$0.98	March	
April 8 - May 8	2009	$298.47	321.05	321.05	$298.47	$0.93	April	414
May 9 - June 10	2009	$298.71	328.03	328.03	$298.71	$0.91	May	325
June 11 - July 13	2009	$238.19	251.21	251.21	$238.19	$0.95	June	290
July 14 - Aug 11	2009	$173.03	178.24	178.24	$173.03	$0.97	July	215
August 12 - Sept 11	2009	$35.13	29.21	29.21	$35.13	$1.20	August	104
Sept 12 - Oct 12	2009	$10.12	0.00	0.00	$10.12		September	15
Oct 13 - Nov 10	2009	$10.12	0.00	0.00	$10.12		October	0
Nov 11 - Dec 11	2009	$10.12	0.00	0.00	$10.12		November	0
Dec 12 - Jan 13	2010	$10.12	0.00	0.00	$10.12		December	0
Jan 14 - Feb 12	2010	$10.20	0.00	0.00	$10.20			0

Month	Average Therm Usage
January	18,557
February	23,697
March	13,857
April	14,306
May	6,550
June	1,961
July	298
August	256
September	173
October	0
November	6,106
December	14,349

Essex County Gas Account # 11 330 414 18 : Newark Tech								
Date	Year	PSE&G Meter #: 2209085	Gas Usage (therms)	Total Therms	Total Charge	Cost/Therm	Month	Adjusted Monthly Usage
Feb 14 - Mar 14	2008	$20,058.79	13912.79	13912.79	$20,058.79	$1.44		
Mar 15 - Apr 3	2008	$9,298.44	7221.04	7221.04	$9,298.44	$1.29	April	10,567
Apr 4 - May 14	2008	$3,006.53	2035.94	2035.94	$3,006.53	$1.48	May	4,628
May 15 - Jun 13	2008	$91.89	0.00	0.00	$91.89		June	1,018
Jun 14 - Jul 15	2008	$91.89	0.00	0.00	$91.89		July	0
Jul 16 - Aug 13	2008	$91.89	0.00	0.00	$91.89		August	0
Aug 14 - Sept 12	2008	$91.89	0.00	0.00	$91.89		Sept	0
Sept 13 - Oct 14	2008						Oct	
Oct 15 - Nov 12	2008	$8,871.90	6035.42	6035.42	$8,871.90	$1.47	Nov	
Nov 13 - Dec 12	2008	$18,149.04	14498.74	14498.74	$18,149.04	$1.25	Dec	10,267
Dec 13 - Jan 8	2009	$22,173.76	17466.24	17466.24	$22,173.76	$1.27	Jan	15,982
Jan 9 - Feb 5	2009	$22,969.46	19497.05	19497.05	$22,969.46	$1.18	Feb	18,482
Feb 5 - March 4	2009	$15,827.38	14795.43	14795.43	$15,827.38	$1.07	Mar	17,146
Mar 5 - Apr 7	2009	$9,742.50	12,941.51	12941.51	$9,742.50	$0.75	Apr	13,868
April 8 - May 8	2009	$1,954.35	2,702.97	2702.97	$1,954.35	$0.72	May	7,822
May 9 - June 10	2009	$93.72	0.00	0.00	$93.72		Jun	1,351
June 11 - July 13	2009	$93.00	0.00	0.00	$93.00		Jul	0
July 14 - Aug 11	2009	$93.72	0.00	0.00	$93.72		Aug	0
August 12 - Sept 11	2009	$93.72	0.00	0.00	$93.72		Sep	0
Sept 12 - Oct 12	2009	$93.72	0.00	0.00	$93.72		Oct	0
Oct 13 - Nov 10	2009	$9,370.05	8253.62	8253.62	$9,370.05	$1.14	Nov	4,127
Nov 11 - Dec 11	2009	$9,682.96	8099.83	8099.83	$9,682.96	$1.20	Dec	8,177
Dec 12 - Jan 13	2010	$17,901.84	16140.88	16140.88	$17,901.84	$1.11	Jan	12,120
Jan 14 - Feb 12	2010	$18,968.19	16668.18	16668.18	$18,968.19	$1.14	Feb	16,405

Essex County Gas Account # 11 388 005 03: Newark Tech Gym								
Date	Year	PSE&G Meter #: 3342072	Gas Usage (therms)	Total Therms	Total Charge	Cost/Therm	Month	Adjusted Monthly Usage
Mar 18 - Apr 16	2008	$2,331.70	1699.33	1699.33	$2,331.70	1.372131438	April	1,699
Apr 17 - May 15	2008			0.00	$0.00		May	
May 16 - Jun 16	2008	$859.61	486.31	486.31	$859.61	1.767624633	June	486
Jun 17 - Jul 16	2008	$275.96	109.14	109.14	$275.96	2.528611353	July	109
Jul 17 - Aug 14	2008	$273.53	118.18	118.18	$273.53	2.314461471	August	118
Aug 15 - Sept 15	2008	$292.75	158.10	158.10	$292.75	1.851699579	September	158
Sept 16 - Oct 14	2008			0.00	$0.00		October	0
Oct 15 - Nov 12	2008	$2,871.84	1815.18	1815.18	$2,871.84	1.582127573	November	1,815
Nov 13 - Dec 15	2008	$6,365.74	4976.56	4976.56	$6,365.74	1.279144116	December	4,977
Dec 16 - Jan 9	2009	$5,277.49	4194.57	4194.57	$5,277.49	1.258173374	January	4,195
Jan 10 - Feb 6	2008	$7,387.49	6254.36	6254.36	$7,387.49	1.181174979	February	6,254



APPENDIX B

STATEMENT OF ENERGY PERFORMANCE

PORTFOLIO MANAGER REFERENCE SHEET

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Board of Ed Office - Essex County Tech Schools

Building ID: 2250029
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 09, 2010

Facility
Board of Ed Office - Essex County Tech Schools
900 Bloomfield Ave
Verona, NJ 07044

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

Year Built: 1970
Gross Floor Area (ft²): 15,000

Energy Performance Rating[2] (1-100) 17

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	941,166
Natural Gas (kBtu)[4]	1,172,808
Total Energy (kBtu)	2,113,974

Energy Intensity[5]

Site (kBtu/ft²/yr)	141
Source (kBtu/ft²/yr)	291

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	206

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	96
National Average Source EUI	199
% Difference from National Average Source EUI	46%
Building Type	Office

Stamp of Certifying Professional

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

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

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

Certifying Professional
Matthew Goss
15 British American Blvd
Latham, NY 12110

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Board of Ed Office - Essex County Tech Schools	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	900 Bloomfield Ave, Verona, NJ 07044	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Board of Education Office - Essex Tech Schools (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	15,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	50 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	55	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	50	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: Acct# 6537814707 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
11/01/2009	11/30/2009	30,960.00
10/01/2009	10/31/2009	35,920.00
09/01/2009	09/30/2009	48,800.00
08/01/2009	08/31/2009	2,880.00
07/01/2009	07/31/2009	14,160.00
06/01/2009	06/30/2009	23,680.00
05/01/2009	05/31/2009	20,480.00
04/01/2009	04/30/2009	16,880.00
03/01/2009	03/31/2009	19,760.00
02/01/2009	02/28/2009	15,520.00
01/01/2009	01/31/2009	29,680.00
12/01/2008	12/31/2008	17,120.00
Acct# 6537814707 Consumption (kWh (thousand Watt-hours))		**275,840.00**
Acct# 6537814707 Consumption (kBtu (thousand Btu))		**941,166.08**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**941,166.08**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Acct# 1203810105 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
11/01/2009	11/30/2009	2,236.00
10/01/2009	10/31/2009	803.00
09/01/2009	09/30/2009	0.00
08/01/2009	08/31/2009	10.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	44.00
05/01/2009	05/31/2009	360.00
04/01/2009	04/30/2009	905.00
03/01/2009	03/31/2009	1,996.00
02/01/2009	02/28/2009	2,019.00

01/01/2009	01/31/2009	2,359.00
Acct# 1203810105 Consumption (therms)		**10,732.00**
Acct# 1203810105 Consumption (kBtu (thousand Btu))		**1,073,200.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**1,073,200.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Board of Ed Office - Essex County Tech Schools
900 Bloomfield Ave
Verona, NJ 07044

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

General Information

Board of Ed Office - Essex County Tech Schools	
Gross Floor Area Excluding Parking: (ft^2)	15,000
Year Built	1970
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Board of Education Office - Essex Tech Schools	
Space Type	Office
Gross Floor Area(ft^2)	15,000
Weekly operating hours	50
Workers on Main Shift	55
Number of PCs	50
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 11/30/2009)	**Baseline** (Ending Date 11/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	17	17	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	141	141	71	N/A	96
Source (kBtu/ft^2)	291	291	147	N/A	199
Energy Cost					
$/year	$ 60,834.61	$ 60,834.61	$ 30,730.26	N/A	$ 41,547.80
$/$ft^2$/year	$ 4.06	$ 4.06	$ 2.05	N/A	$ 2.77
Greenhouse Gas Emissions					
$MtCO_2e$/year	206	206	104	N/A	141
$kgCO_2e/ft^2$/year	14	14	7	N/A	10

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

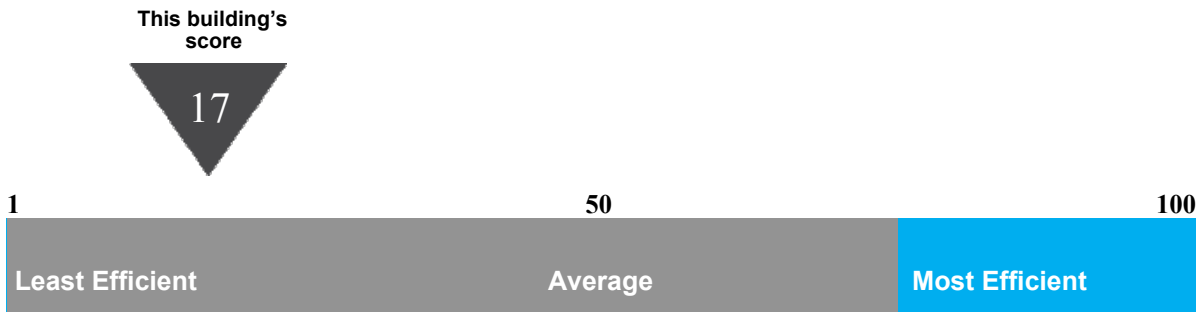
Statement of Energy Performance

2009

Board of Ed Office - Essex County Tech Schools
900 Bloomfield Ave
Verona, NJ 07044

Portfolio Manager Building ID: 2250029

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 291 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending November 2009

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 04/09/2010

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
West Caldwell Tech School - Essex County Tech Schools

Building ID: 2250033
For 12-month Period Ending: November 30, 2008[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 09, 2010

Facility
West Caldwell Tech School - Essex County Tech Schools
620 Passaic Ave
West Caldwell, NJ 07066

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

Year Built: 1963
Gross Floor Area (ft²): 80,493

Energy Performance Rating[2] (1-100) 53

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	2,940,378
Natural Gas (kBtu)[4]	5,656,152
Total Energy (kBtu)	8,596,530

Energy Intensity[5]

Site (kBtu/ft²/yr)	107
Source (kBtu/ft²/yr)	196

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	749

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	110
National Average Source EUI	202
% Difference from National Average Source EUI	-3%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

Certifying Professional
Matthew Goss
15 British American Blvd
Latham, NY 12110

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	West Caldwell Tech School - Essex County Tech Schools	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	620 Passaic Ave, West Caldwell, NJ 07066	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
West Caldwell Technical School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	80,493 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	500	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	Yes	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: Acct # 1242916016 - Electric (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
10/17/2008	11/16/2008	65,400.00
09/17/2008	10/16/2008	67,200.00
08/17/2008	09/16/2008	76,200.00
07/17/2008	08/16/2008	67,200.00
06/17/2008	07/16/2008	66,000.00
05/17/2008	06/16/2008	75,000.00
04/17/2008	05/16/2008	67,200.00
03/17/2008	04/16/2008	68,400.00
02/17/2008	03/16/2008	85,800.00
01/17/2008	02/16/2008	73,800.00
12/17/2007	01/16/2008	78,600.00
Acct # 1242916016 - Electric Consumption (kWh (thousand Watt-hours))		**790,800.00**
Acct # 1242916016 - Electric Consumption (kBtu (thousand Btu))		**2,698,209.60**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,698,209.60**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Acct# 1242916016 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
10/16/2008	11/15/2008	4,414.00
09/16/2008	10/15/2008	947.00
08/16/2008	09/15/2008	481.00
07/16/2008	08/15/2008	486.00
06/16/2008	07/15/2008	480.00
05/16/2008	06/15/2008	1,073.00
04/16/2008	05/15/2008	2,047.00
03/16/2008	04/15/2008	4,378.00
02/16/2008	03/15/2008	12,738.00
01/15/2008	02/14/2008	12,404.00
12/15/2007	01/14/2008	10,297.00

Acct# 1242916016 Consumption (therms)	**49,745.00**
Acct# 1242916016 Consumption (kBtu (thousand Btu))	**4,974,500.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**4,974,500.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
West Caldwell Tech School - Essex County Tech Schools
620 Passaic Ave
West Caldwell, NJ 07066

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

General Information

West Caldwell Tech School - Essex County Tech Schools	
Gross Floor Area Excluding Parking: (ft^2)	80,493
Year Built	1963
For 12-month Evaluation Period Ending Date:	November 30, 2008

Facility Space Use Summary

West Caldwell Technical School	
Space Type	K-12 School
Gross Floor Area(ft^2)	80,493
Open Weekends?	Yes
Number of PCs	500
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	100
Months[o]	12
High School?	Yes
School District[o]	Essex County Vocational and Technical Schools

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 11/30/2008)	**Baseline** (Ending Date 11/30/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	53	53	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	107	107	86	N/A	110
Source (kBtu/ft^2)	196	196	158	N/A	202
Energy Cost					
$/year	$ 180,570.29	$ 180,570.29	$ 146,062.43	N/A	$ 186,792.19
$/$ft^2$/year	$ 2.24	$ 2.24	$ 1.81	N/A	$ 2.32
Greenhouse Gas Emissions					
$MtCO_2e$/year	749	749	606	N/A	775
$kgCO_2e/ft^2$/year	9	9	7	N/A	9

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

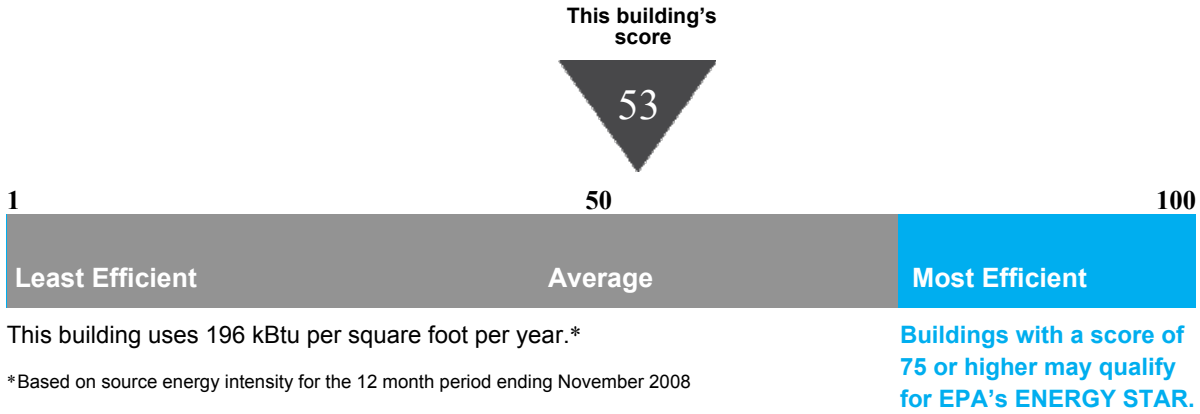
Statement of Energy Performance

2008

West Caldwell Tech School - Essex County Tech Schools
620 Passaic Ave
West Caldwell, NJ 07066

Portfolio Manager Building ID: 2250033

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 196 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending November 2008

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 04/09/2010

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Bloomfield Tech HIgh School - Essex County Tech Schools

Building ID: 2250040
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 09, 2010

Facility
Bloomfield Tech HIgh School - Essex County Tech Schools
209 Franklin St
Bloomfield, NJ 07003

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

Year Built: 1931
Gross Floor Area (ft²): 93,831

Energy Performance Rating[2] (1-100) 54

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,782,654
Natural Gas (kBtu)[4]	9,942,433
Total Energy (kBtu)	11,725,087

Energy Intensity[5]

Site (kBtu/ft²/yr)	125
Source (kBtu/ft²/yr)	174

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	800

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	130
National Average Source EUI	181
% Difference from National Average Source EUI	-4%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

Certifying Professional
Matthew Goss
15 British American Blvd
Latham, NY 12110

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Bloomfield Tech HIgh School - Essex County Tech Schools	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	209 Franklin St, Bloomfield, NJ 07003	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Bloomfield Technical High School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	93,831 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	500	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	20 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	Yes	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: Acct# 1241601208 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/07/2009	01/06/2010	50,800.00
11/07/2009	12/06/2009	47,600.00
10/07/2009	11/06/2009	39,200.00
09/07/2009	10/06/2009	40,200.00
08/07/2009	09/06/2009	37,800.00
07/07/2009	08/06/2009	30,600.00
06/07/2009	07/06/2009	16,200.00
05/07/2009	06/06/2009	54,200.00
04/07/2009	05/06/2009	38,400.00
03/07/2009	04/06/2009	45,200.00
02/07/2009	03/06/2009	74,000.00
Acct# 1241601208 Consumption (kWh (thousand Watt-hours))		**474,200.00**
Acct# 1241601208 Consumption (kBtu (thousand Btu))		**1,617,970.40**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,617,970.40**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Acct# 1237710111 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/06/2009	01/05/2010	19,334.95
11/06/2009	12/05/2009	8,741.21
10/06/2009	11/05/2009	4,477.00
09/06/2009	10/05/2009	559.10
08/06/2009	09/05/2009	63.39
07/06/2009	08/05/2009	54.97
06/06/2009	07/05/2009	54.97
05/06/2009	06/05/2009	105.69
04/06/2009	05/05/2009	1,380.53
03/06/2009	04/05/2009	12,869.74
02/06/2009	03/05/2009	35,522.64

Acct# 1237710111 Consumption (therms)	**83,164.19**
Acct# 1237710111 Consumption (kBtu (thousand Btu))	**8,316,419.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**8,316,419.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Bloomfield Tech HIgh School - Essex County Tech Schools
209 Franklin St
Bloomfield, NJ 07003

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

General Information

Bloomfield Tech HIgh School - Essex County Tech Schools	
Gross Floor Area Excluding Parking: (ft^2)	93,831
Year Built	1931
For 12-month Evaluation Period Ending Date:	January 31, 2010

Facility Space Use Summary

Bloomfield Technical High School	
Space Type	K-12 School
Gross Floor Area(ft^2)	93,831
Open Weekends?	Yes
Number of PCs	500
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	Yes
Percent Cooled	20
Percent Heated	100
Months[o]	12
High School?	Yes
School District[o]	Essex County Vocational and Technical Schools

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 01/31/2010)	**Baseline** (Ending Date 01/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	54	54	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	125	125	102	N/A	130
Source (kBtu/ft^2)	174	174	142	N/A	181
Energy Cost					
$/year	$ 185,611.94	$ 185,611.94	$ 150,794.85	N/A	$ 192,830.84
$/$ft^2$/year	$ 1.98	$ 1.98	$ 1.61	N/A	$ 2.06
Greenhouse Gas Emissions					
$MtCO_2e$/year	800	800	650	N/A	831
$kgCO_2e/ft^2$/year	9	9	7	N/A	9

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

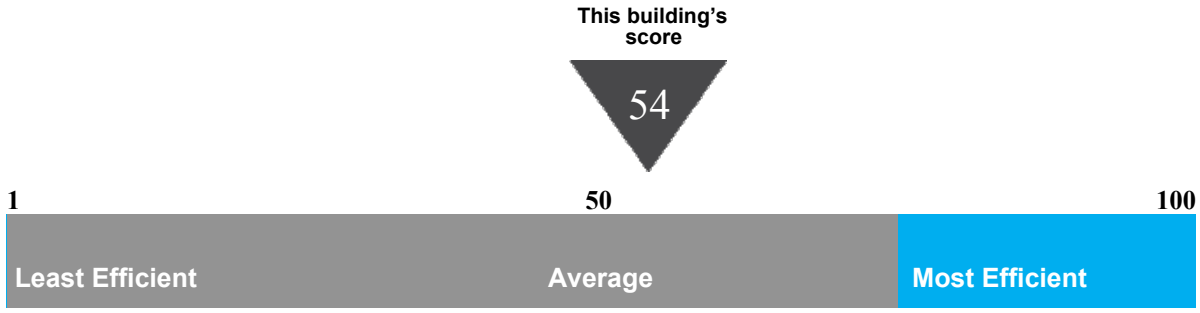
Statement of Energy Performance

2010

Bloomfield Tech HIgh School - Essex County Tech Schools
209 Franklin St
Bloomfield, NJ 07003

Portfolio Manager Building ID: 2250040

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 174 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2010

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 04/09/2010

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
North 13th Street Technical School - Essex County Tech Schools

Building ID: 2250042
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 09, 2010

Facility
North 13th Street Technical School - Essex County Tech Schools
300 North 13th Street
Newark, NJ 07107

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

Year Built: 1925
Gross Floor Area (ft²): 194,772

Energy Performance Rating[2] (1-100) 87

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	3,186,249
Natural Gas (kBtu)[4]	10,101,485
Total Energy (kBtu)	13,287,734

Energy Intensity[5]

Site (kBtu/ft²/yr)	68
Source (kBtu/ft²/yr)	109

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,023

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	105
National Average Source EUI	167
% Difference from National Average Source EUI	-35%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

Certifying Professional
Matthew Goss
15 British American Blvd
Latham, NY 12110

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	North 13th Street Technical School - Essex County Tech Schools	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	300 North 13th Street, Newark, NJ 07107	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
North 13th Street Technical School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	194,772 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	500	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	20 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	Yes	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: Acct# 1104708108 (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/24/2009	01/23/2010	82,240.00
11/24/2009	12/23/2009	82,240.00
10/24/2009	11/23/2009	89,120.00
09/24/2009	10/23/2009	79,200.00
08/24/2009	09/23/2009	77,500.00
07/24/2009	08/23/2009	64,640.00
06/24/2009	07/23/2009	54,720.00
05/24/2009	06/23/2009	63,680.00
04/24/2009	05/23/2009	85,600.00
03/24/2009	04/23/2009	77,600.00
02/24/2009	03/23/2009	97,600.00
Acct# 1104708108 Consumption (kWh (thousand Watt-hours))		**854,140.00**
Acct# 1104708108 Consumption (kBtu (thousand Btu))		**2,914,325.68**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,914,325.68**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Acct# 1100601414 (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/24/2009	01/23/2010	22,052.78
11/24/2009	12/23/2009	26,037.06
10/24/2009	11/23/2009	8,277.48
09/24/2009	10/23/2009	3,044.72
08/24/2009	09/23/2009	187.77
07/24/2009	08/23/2009	110.03
06/24/2009	07/23/2009	176.04
05/24/2009	06/23/2009	319.07
04/24/2009	05/23/2009	901.33
03/24/2009	04/23/2009	5,077.06
02/24/2009	03/23/2009	22,311.77

Acct# 1100601414 Consumption (therms)	**88,495.11**
Acct# 1100601414 Consumption (kBtu (thousand Btu))	**8,849,511.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**8,849,511.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
North 13th Street Technical School - Essex County Tech Schools
300 North 13th Street
Newark, NJ 07107

Facility Owner
Essex County Vocational & Technical Schools
900 Bloomfield Ave
Verona, NJ 07044

Primary Contact for this Facility
Lori Tanner
900 Bloomfield Ave
Verona, NJ 07044

General Information

North 13th Street Technical School - Essex County Tech Schools	
Gross Floor Area Excluding Parking: (ft^2)	194,772
Year Built	1925
For 12-month Evaluation Period Ending Date:	January 31, 2010

Facility Space Use Summary

North 13th Street Technical School	
Space Type	K-12 School
Gross Floor Area(ft^2)	194,772
Open Weekends?	Yes
Number of PCs	500
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	20
Percent Heated	100
Months[o]	12
High School?	Yes
School District[o]	Essex County Vocational and Technical Schools

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 01/31/2010)	**Baseline** (Ending Date 01/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	87	87	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	68	68	82	N/A	105
Source (kBtu/ft^2)	109	109	131	N/A	167
Energy Cost					
$/year	$ 229,755.57	$ 229,755.57	$ 275,726.89	N/A	$ 352,581.51
$/$ft^2$/year	$ 1.18	$ 1.18	$ 1.42	N/A	$ 1.81
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,023	1,023	1,228	N/A	1,570
$kgCO_2e/ft^2$/year	5	5	6	N/A	8

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

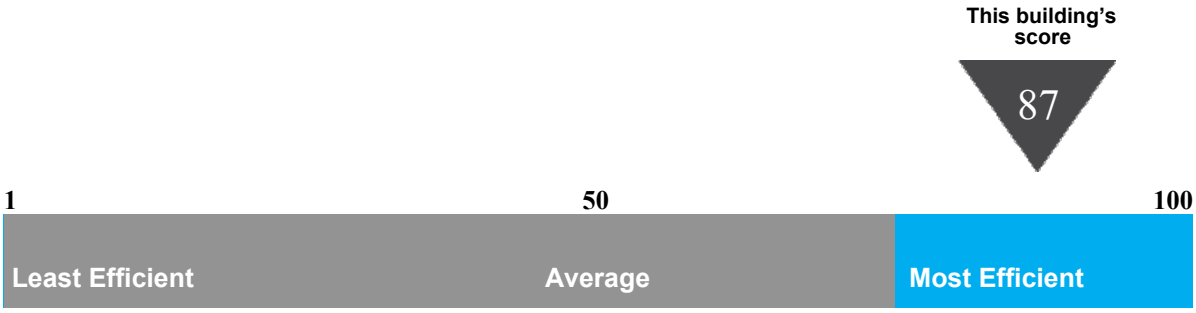
Statement of Energy Performance

2010

North 13th Street Technical School - Essex County Tech Schools
300 North 13th Street
Newark, NJ 07107

Portfolio Manager Building ID: 2250042

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 109 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2010

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

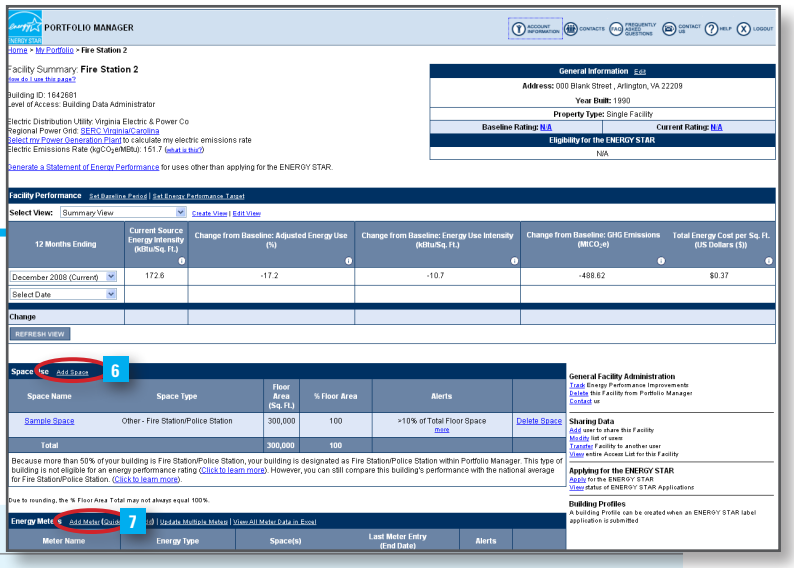
Date of certification

EPA United States Environmental Protection Agency

Date Generated: 04/09/2010

PORTFOLIO MANAGER QUICK REFERENCE GUIDE

Portfolio Manager is an interactive energy management tool that allows you to track and assess energy and water consumption across your entire portfolio of buildings in a secure online environment. Use this Quick Reference Guide to identify opportunities for energy efficiency improvements, track your progress over time, and verify results.

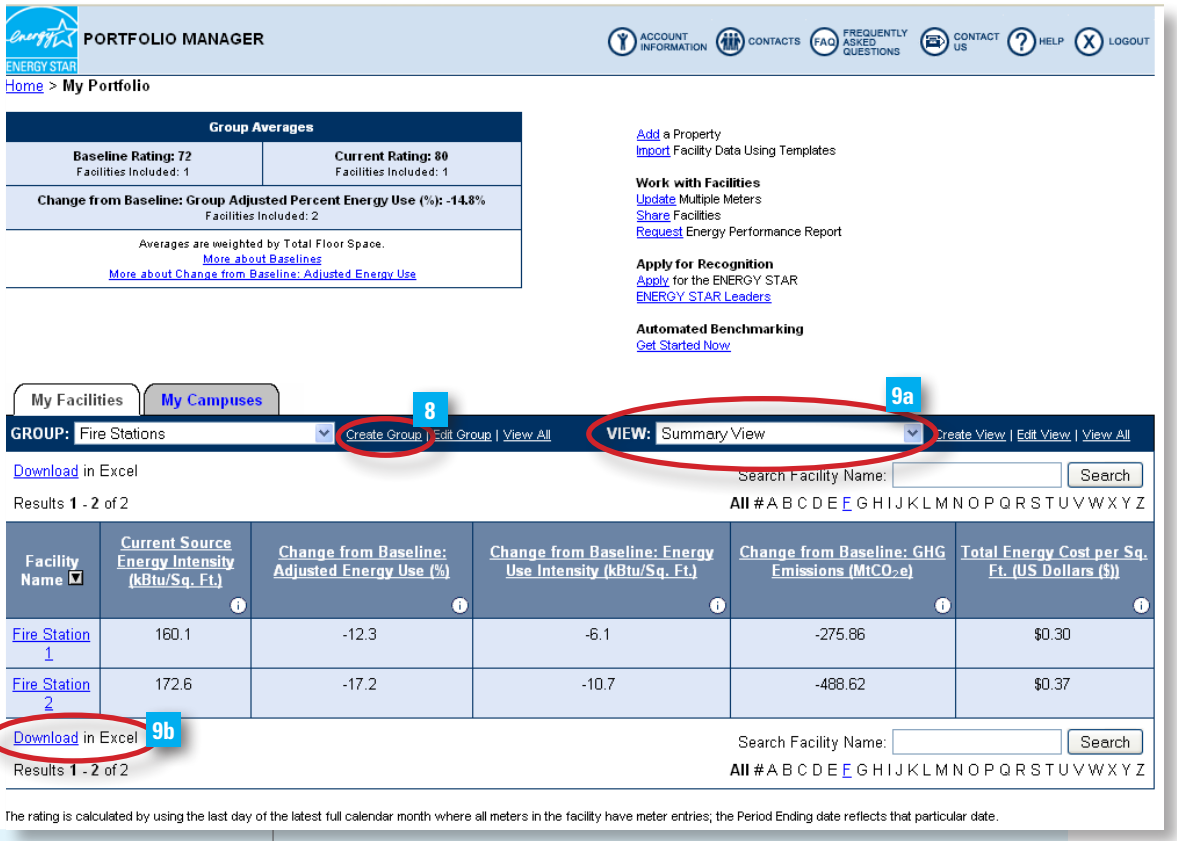


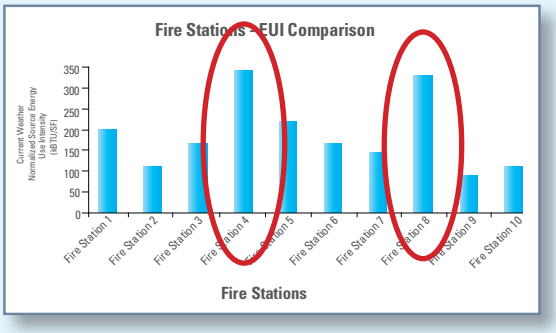
IDENTIFY ENERGY EFFICIENCY PROJECTS

Use Portfolio Manager to identify under-performing buildings to target for energy efficiency improvements and establish baselines for setting and measuring progress for energy efficiency improvement projects over time.

STEP	ACTIVITY	ACTION
1	Access Portfolio Manager. (step not shown)	Visit **www.energystar.gov/benchmark**. Scroll down to the **Login** section on the right-hand side in the middle of the page.
2	Access your account: (step not shown) • Create a new account. • Login to an existing account.	• Click **REGISTER,** and follow instructions. • Enter user name and password, and click **LOGIN**.
3	Review system updates and enter account. (step not shown)	Click **ACCESS MY PORTFOLIO**, located below **Welcome to Portfolio Manager**.
4	Add a new facility. (step not shown)	Click **ADD** a Property, located in the upper right portion of the screen.
5	Select property type and enter general facility information. (step not shown)	Select the option that most closely resembles your facility and click **CONTINUE**. Enter general data and click **SAVE**. For more information on facility space types, see: www.energystar.gov/index.cfm?c=eligibility.bus_portfoliomanager_space_types.
6	Enter space use data.	From the **Facility Summary** page, shown above, go to the **Space Use** section, located half way down the page, and click **ADD SPACE**. • Enter a facility name. In the **Select a Space Type** menu, select the appropriate space type(s) for your building. If your space is not listed, select **Other**. Click **CONTINUE**. • Enter building characteristics. Click **SAVE**. Information required for each space type is listed here: www.energystar.gov/index.cfm?c=eligibility.bus_portfoliomanager_space_types. • Repeat steps above to add all major spaces in your facility. Use bulk import service to minimize manual data entry of large sets of facility data (10 or more facilities or campuses are required). • Go back to **My Portfolio** by clicking on the link in the upper left portion of the page. • Click **IMPORT** Facility Data Using Templates, located below **Add a Property**.
7	Enter energy use data.	From the **Facility Summary** page, go to the **Energy Meters** section, located below the **Space Use** section, and click **ADD METER**. • Enter meter name, type, and units. Click **SAVE**. • Enter number of months and start date. Click **CONTINUE**. • Enter energy use and cost for each month. Click **SAVE**. • Repeat for all energy meters and fuel types.

www.energystar.gov/benchmark



STEP	ACTIVITY	ACTION
8	Create custom groups.	Organize facilities into groups (e.g., Fire Stations, Northwest Region). Groups are completely customizable, and each facility may belong to multiple groups. • From the **My Portfolio** page, click **CREATE GROUP**, located directly to the right of the **Group** drop-down menu. • Follow instructions to select buildings and name your group. • Once they have been saved, custom groups will be available in the **Group** drop-down menu.
9	View and interpret results.	Option 1: Go to **My Portfolio** and view all buildings to compare performance metrics. Option 2: Export data to Microsoft® Excel. • On the **My Portfolio** page, select the view, from the **View** drop-down menu that will display the data you wish to export. The **My Portfolio** page will update to display the selected view. (9a) • Select the **DOWNLOAD IN EXCEL** link. A File Download dialog window will open. Follow the steps provided by Excel. (9b) • Use Excel functionality to view building energy performance graphically . The example below shows a comparison of Energy Use Intensity for a portfolio of fire stations, identifying under-performing buildings to target for energy eficiency improvements. 

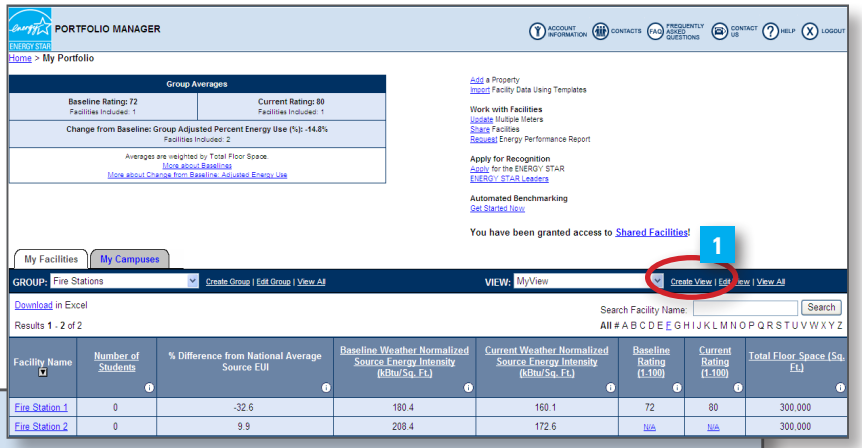
www.energystar.gov/benchmark

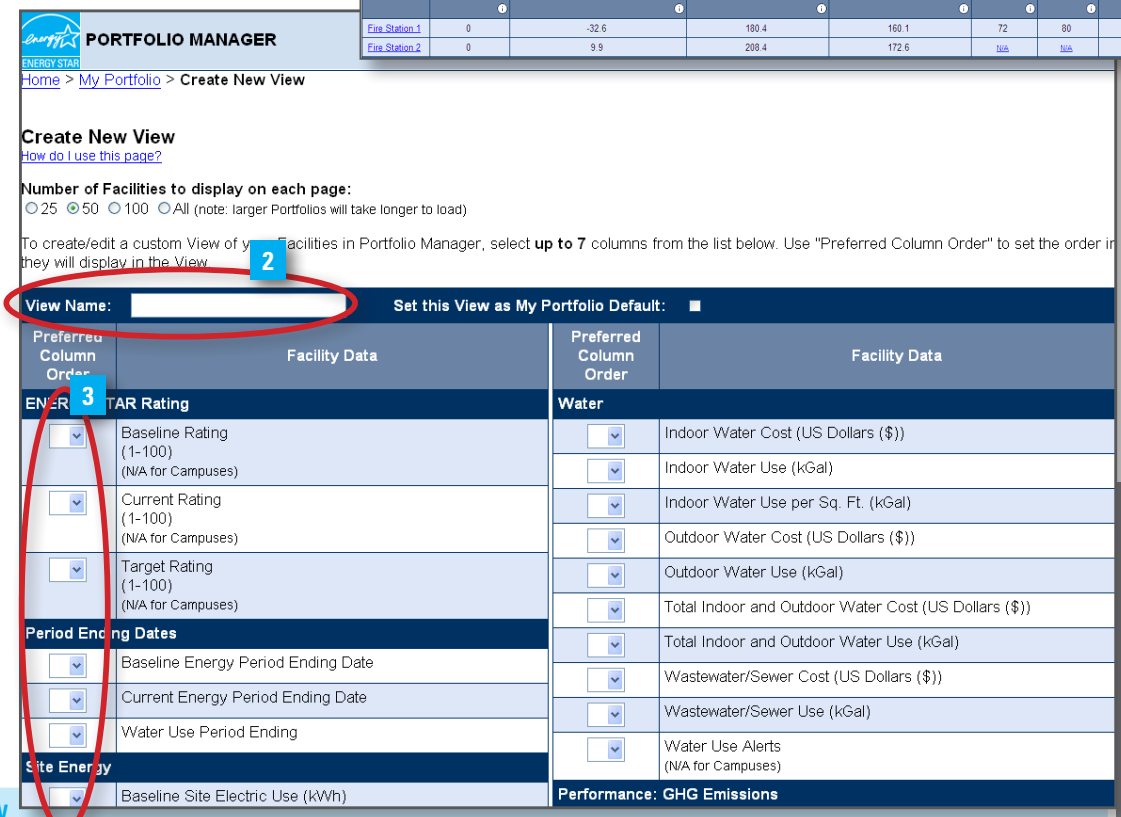
TRACK PROGRESS OVER TIME

Portfolio Manager comes pre-populated with nine standard summary views of facility data, which are displayed on the My Portfolio summary page. These standard views include:

- Summary: Energy Use
- Performance: Green House Gas Emissions
- Performance: Financial
- Performance: Water Use

Additionally, users can create and save custom downloadable views by choosing from more than 70 different metrics. The default view set by the user will display automatically after logging into Portfolio Manager, and data from all views can be exported to Microsoft® Excel.





CREATE A CUSTOM VIEW

STEP	ACTION
1	From the **My Portfolio** page or the **Facility Summary** page, select the **Create View** link, located directly to the right of the **View** drop-down menu.
2	Enter a name for the view. To set as the default view, select the box labeled **Set this View as My Portfolio Default**, located directly to the right of **View Name**. You may include up to 7 (seven) columns in each view.
3	Choose each metric to be included in the view by selecting an order number from the **Preferred Column Order** drop-down menu to the left of the **Facility Data** column.
4	Click **SAVE** at the bottom of the page. You will be returned to the **My Portfolio** page, and your custom view will be available in the **View** drop-down menu. (step not shown)

www.energystar.gov/benchmark

VERIFY AND DOCUMENT RESULTS

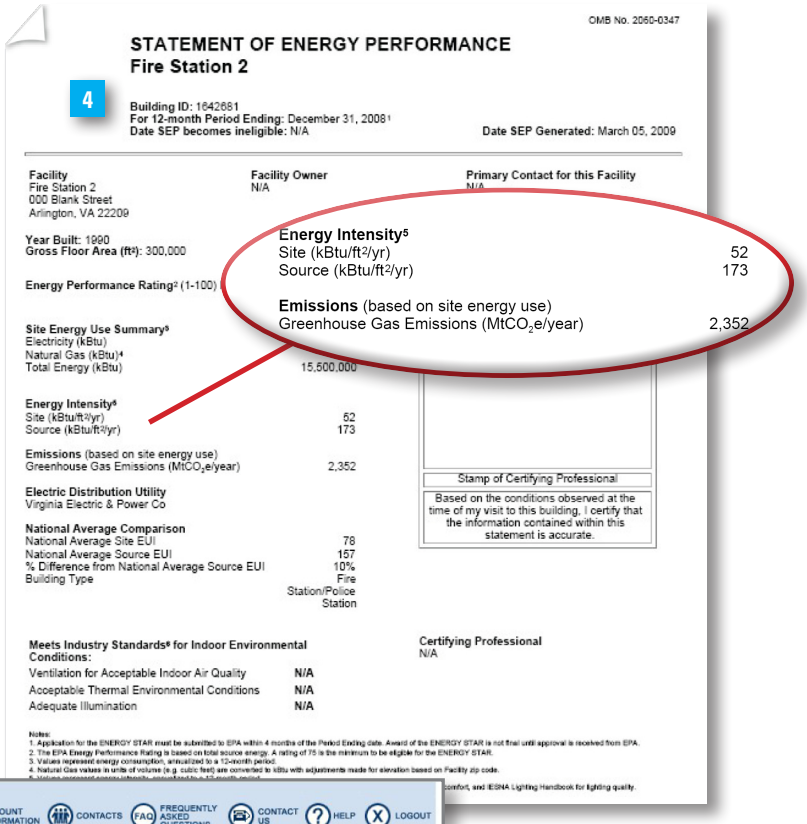
Use Portfolio Manager to quickly and accurately document reductions in energy use, greenhouse gas emissions, water use, and energy costs for an individual building or an entire portfolio. This valuable information can be used to provide a level of transparency and accountability to help demonstrate strategic use of funding.

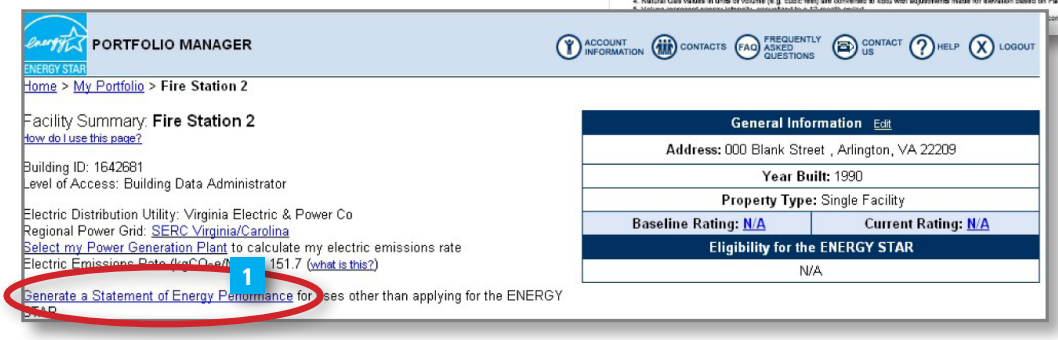
Generate a Statement of Energy Performance that includes valuable information about your building's performance, including:

- Normalized energy use intensity
- National average comparisons
- Greenhouse gas emissions
- Energy performance rating (if available)

In addition, you can also request an Energy Performance Report to see the change in performance over time for selected buildings or an entire portfolio. Available comparative metrics in this report include:

- Normalized energy use intensity
- Total electric use
- Total natural gas use
- Energy performance rating (if available)





GENERATE A STATEMENT OF ENERGY PERFORMANCE AND AN ENERGY PERFORMANCE REPORT

STEP	ACTION
1	From your selected building's **Facility Summary** page, click **GENERATE A STATEMENT OF ENERGY PERFORMANCE**.
2	On the next page, select a period ending date. (step not shown)
3	Click **GENERATE REPORT,** located in the bottom right corner of the screen. (step not shown)
4	Save the Statement of Energy Performance, accompanying Data Checklist, and Facility Summary that include information on energy use intensity and greenhouse gas emissions.
5	From the **My Portfolio** page, click **REQUEST ENERGY PERFORMANCE REPORT**, located under **Work with Facilities**, which shows reductions in key performance indicators over a user-specified time period. Specify the type of report, the facilities to be included, and the requested report columns. The report will be e-mailed to a user-specified address within one business day. (step not shown)

www.energystar.gov/benchmark

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Newark Technical High School - Essex County Tech Schools

Building ID: 2250047
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: June 24, 2010

Facility
Newark Technical High School - Essex County Tech Schools
91 West Market St.
Newark, NJ 07103

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1972
Gross Floor Area (ft²): 185,339

Energy Performance Rating[2] (1-100) 21

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	8,460,786
Natural Gas (kBtu)[4]	9,339,753
Total Energy (kBtu)	17,800,539

Energy Intensity[5]

Site (kBtu/ft²/yr)	96
Source (kBtu/ft²/yr)	205

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,785

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	74
National Average Source EUI	158
% Difference from National Average Source EUI	30%
Building Type	K-12 School

Stamp of Certifying Professional

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

Certifying Professional
N/A

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Name	Newark Technical High School - Essex County Tech Schools	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	91 West Market St. , Newark, NJ 07103	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Newark Technical High School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	185,339 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	500	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	Yes	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Elec & Gas Co

Fuel Type: Electricity		
Meter: Acct# 4200570203 - Meter 778015734 (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/12/2009	01/13/2010	99,843.00
11/11/2009	12/11/2009	106,751.00
10/13/2009	11/10/2009	120,779.00
09/12/2009	10/12/2009	201,852.00
08/12/2009	09/11/2009	314,333.00
07/05/2009	08/12/2009	334,631.00
06/05/2009	07/04/2009	326,936.00
05/05/2009	06/04/2009	169,294.00
04/05/2009	05/04/2009	122,464.00
03/05/2009	04/04/2009	135,404.00
02/05/2009	03/04/2009	107,327.00
Acct# 4200570203 - Meter 778015734 Consumption (kWh (thousand Watt-hours))		**2,039,614.00**
Acct# 4200570203 - Meter 778015734 Consumption (kBtu (thousand Btu))		**6,959,162.97**
Meter: Account - 4206752605 Meter - 778017617 (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/15/2009	01/14/2010	37,520.00
11/12/2009	12/14/2009	26,560.00
10/14/2009	11/11/2009	19,680.00
09/15/2009	10/13/2009	17,440.00
08/13/2009	09/14/2009	53,600.00
07/15/2009	08/12/2009	48,800.00
06/12/2009	07/14/2009	20,960.00
05/12/2009	06/11/2009	22,240.00
04/09/2009	05/11/2009	26,800.00
Account - 4206752605 Meter - 778017617 Consumption (kWh (thousand Watt-hours))		**273,600.00**
Account - 4206752605 Meter - 778017617 Consumption (kBtu (thousand Btu))		**933,523.20**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**7,892,686.17**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas		
Meter: Acct - 1133796311 Meter - 3274909 (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/05/2009	01/04/2010	0.00
11/05/2009	12/04/2009	0.00
10/05/2009	11/04/2009	0.00
09/05/2009	10/04/2009	0.00
08/05/2009	09/04/2009	29.21
07/05/2009	08/04/2009	178.24
06/05/2009	07/04/2009	251.21
05/05/2009	06/04/2009	328.03
04/05/2009	05/04/2009	321.05
03/05/2009	04/04/2009	505.97
02/15/2009	03/04/2009	0.00
Acct - 1133796311 Meter - 3274909 Consumption (therms)		**1,613.71**
Acct - 1133796311 Meter - 3274909 Consumption (kBtu (thousand Btu))		**161,371.00**
Meter: Account 1133041418, Meter 2209085 (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/12/2009	01/11/2010	16,140.88
11/12/2009	12/11/2009	8,099.83
10/12/2009	11/11/2009	8,253.62
09/12/2009	10/11/2009	0.00
08/12/2009	09/11/2009	0.00
07/05/2009	08/11/2009	0.00
06/05/2009	07/04/2009	0.00
05/05/2009	06/04/2009	0.00
04/05/2009	05/04/2009	2,702.97
03/05/2009	04/04/2009	12,941.51
02/05/2009	03/04/2009	14,795.43
Account 1133041418, Meter 2209085 Consumption (therms)		**62,934.24**
Account 1133041418, Meter 2209085 Consumption (kBtu (thousand Btu))		**6,293,424.00**
Meter: 3342072 (therms) **Space(s):** Entire Facility		
Start Date	**End Date**	**Energy Use (therms)**
12/15/2009	01/14/2010	5,925.41
11/12/2009	12/14/2009	2,405.35
10/14/2009	11/11/2009	1,112.40
09/15/2009	10/13/2009	164.26
08/13/2009	09/14/2009	281.11
07/15/2009	08/12/2009	199.15
06/12/2009	07/14/2009	117.73
05/12/2009	06/11/2009	108.82

04/09/2009	05/11/2009	1,008.93
03/18/2009	04/08/2009	0.00
02/18/2009	03/17/2009	0.00
3342072 Consumption (therms)		**11,323.16**
3342072 Consumption (kBtu (thousand Btu))		**1,132,316.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**7,587,111.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Newark Technical High School - Essex County Tech Schools
91 West Market St.
Newark, NJ 07103

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Newark Technical High School - Essex County Tech Schools	
Gross Floor Area Excluding Parking: (ft^2)	185,339
Year Built	1972
For 12-month Evaluation Period Ending Date:	January 31, 2010

Facility Space Use Summary

Newark Technical High School	
Space Type	K-12 School
Gross Floor Area(ft^2)	185,339
Open Weekends?	Yes
Number of PCs	500
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months[o]	12
High School?	Yes
School District[o]	Essex County Vocational and Technical Schools

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 01/31/2010)	**Baseline** (Ending Date 02/29/2008)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	21	100	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	96	2	58	N/A	74
Source (kBtu/ft^2)	205	2	123	N/A	158
Energy Cost					
$/year	$ 436,922.78	N/A	$ 262,271.95	N/A	$ 335,380.54
$/$ft^2$/year	$ 2.36	N/A	$ 1.42	N/A	$ 1.81
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,785	18	1,071	N/A	1,370
$kgCO_2e/ft^2$/year	10	0	6	N/A	8

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

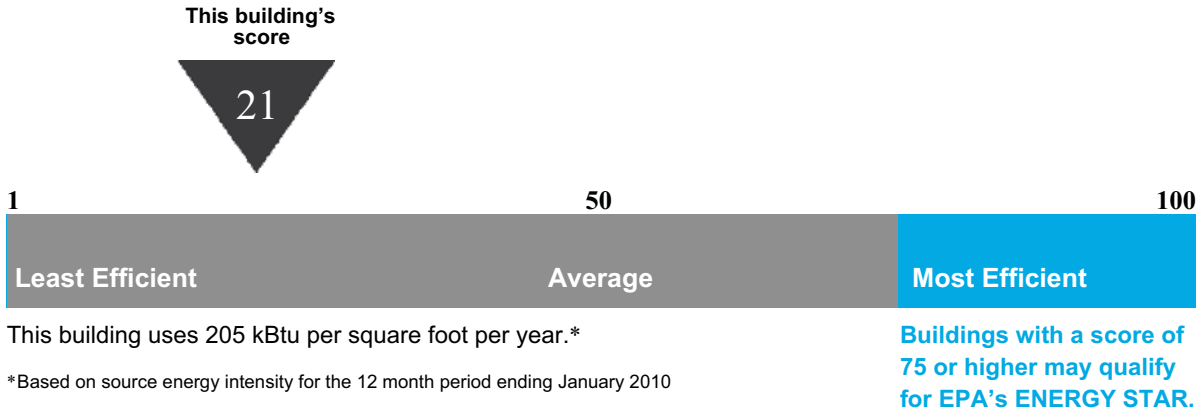
Statement of Energy Performance

2010

Newark Technical High School - Essex County Tech Schools
91 West Market St.
Newark, NJ 07103

Portfolio Manager Building ID: 2250047

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 205 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2010

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

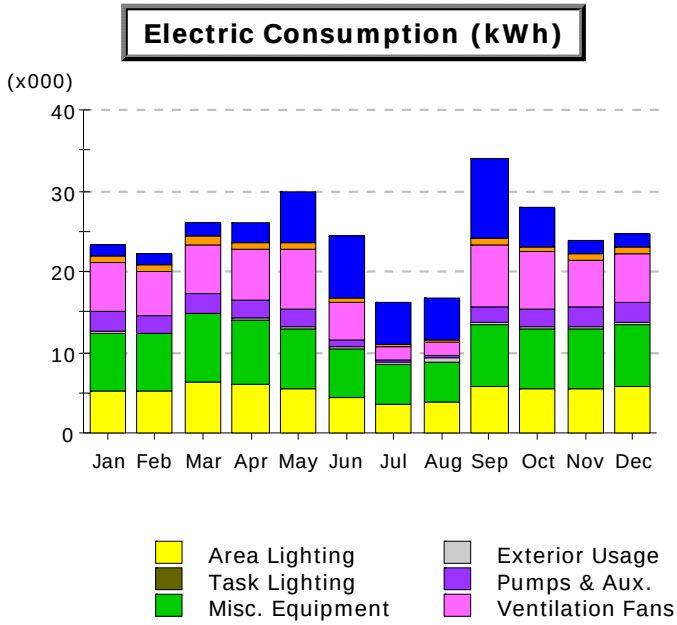
Date of certification

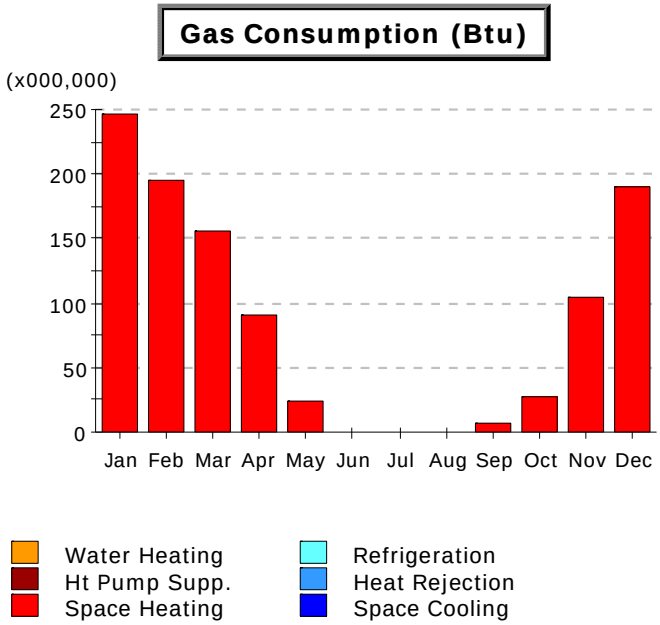
EPA United States Environmental Protection Agency

Date Generated: 08/11/2010

APPENDIX C

eQUEST MODEL RUN SUMMARIES



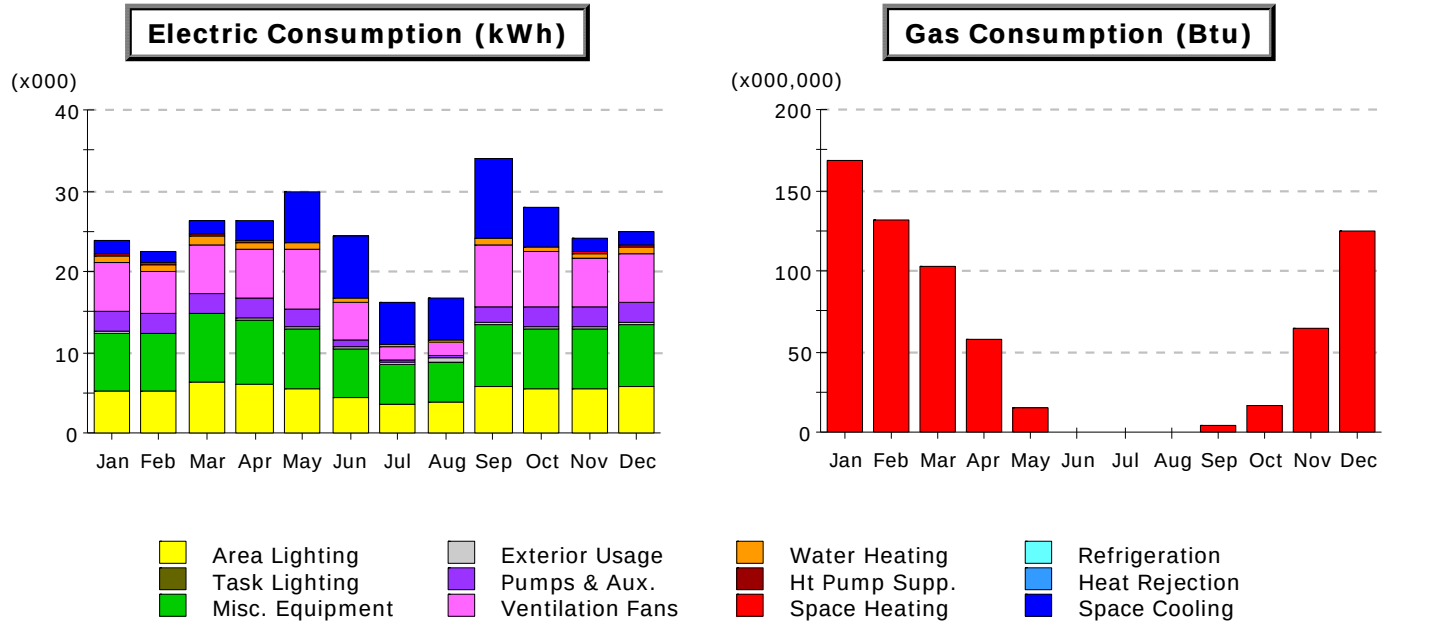


Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	1.55	1.40	1.68	2.47	6.35	7.56	5.06	5.28	9.91	4.90	1.65	1.60	49.41
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.74	0.76	0.92	0.86	0.74	0.54	0.40	0.40	0.62	0.62	0.67	0.76	8.03
Vent. Fans	6.04	5.40	6.03	6.16	7.56	4.71	1.40	1.51	7.68	6.96	5.97	6.00	65.42
Pumps & Aux.	2.42	2.19	2.41	2.28	2.17	0.91	0.45	0.48	1.99	2.25	2.32	2.42	22.28
Ext. Usage	0.29	0.22	0.24	0.24	0.17	0.16	0.17	0.28	0.27	0.28	0.28	0.29	2.88
Misc. Equip.	7.04	6.93	8.29	7.93	7.35	6.01	4.97	5.16	7.62	7.35	7.31	7.66	83.62
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	5.33	5.30	6.39	6.11	5.59	4.49	3.59	3.75	5.85	5.59	5.58	5.86	63.42
Total	23.41	22.20	25.95	26.06	29.93	24.39	16.04	16.84	33.94	27.94	23.79	24.58	295.06

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	247.4	195.8	156.3	90.7	23.2	0.9	-	-	6.0	27.1	103.8	190.2	1,041.3
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	247.4	195.8	156.3	90.7	23.2	0.9	-	-	6.0	27.1	103.8	190.2	1,041.3

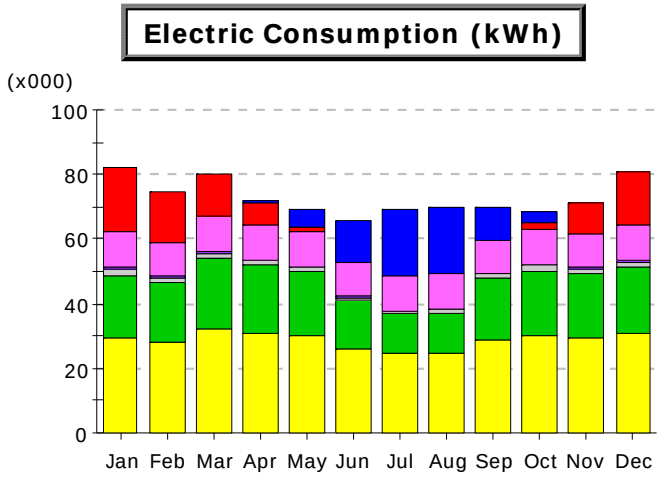


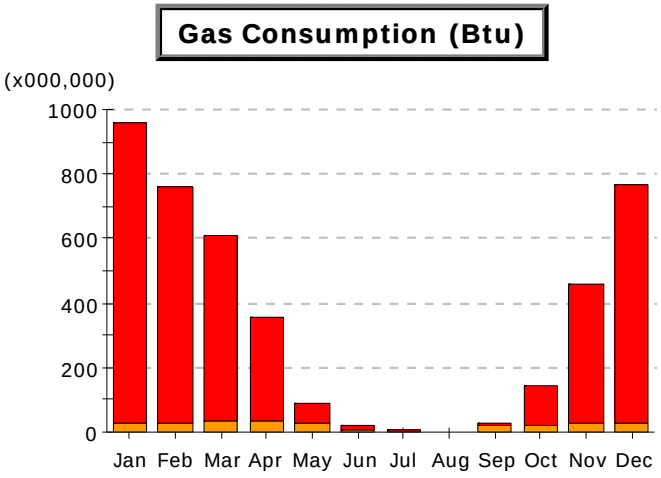
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	1.55	1.40	1.68	2.47	6.35	7.56	5.06	5.28	9.91	4.90	1.65	1.60	49.41
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.33	0.27	0.22	0.13	0.03	0.00	-	-	0.01	0.04	0.16	0.27	1.45
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.74	0.76	0.92	0.86	0.74	0.54	0.40	0.40	0.62	0.62	0.67	0.76	8.03
Vent. Fans	6.04	5.40	6.03	6.16	7.56	4.71	1.40	1.51	7.68	6.96	5.97	6.00	65.42
Pumps & Aux.	2.48	2.24	2.46	2.33	2.19	0.91	0.45	0.48	2.00	2.28	2.37	2.47	22.67
Ext. Usage	0.29	0.22	0.24	0.24	0.17	0.16	0.17	0.28	0.27	0.28	0.28	0.29	2.88
Misc. Equip.	7.04	6.93	8.29	7.93	7.35	6.01	4.97	5.16	7.62	7.35	7.31	7.66	83.62
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	5.33	5.30	6.39	6.11	5.59	4.49	3.59	3.75	5.85	5.59	5.58	5.86	63.42
Total	23.79	22.52	26.22	26.24	29.98	24.39	16.04	16.84	33.95	28.02	24.00	24.91	296.89

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	168.48	131.56	103.09	57.81	14.50	0.56	-	-	3.44	16.24	64.56	125.32	685.57
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	168.48	131.56	103.09	57.81	14.50	0.56	-	-	3.44	16.24	64.56	125.32	685.57



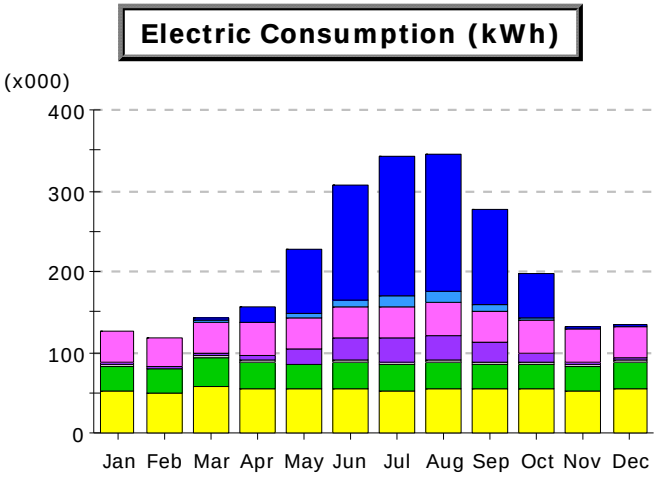


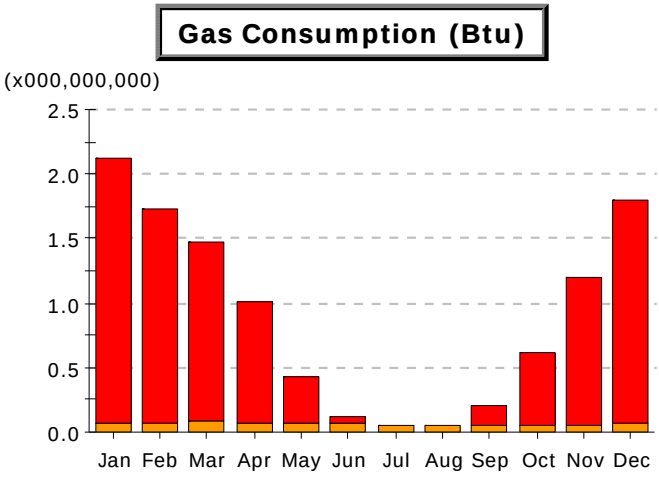
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	0.02	0.76	5.58	12.85	20.73	20.66	10.00	3.26	0.02	-	73.89
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	19.37	15.78	12.83	6.96	1.23	0.03	0.00	-	0.08	2.37	9.26	15.79	83.71
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	11.23	10.15	11.20	10.70	10.77	10.57	10.84	10.84	10.48	10.78	10.58	11.15	129.30
Pumps & Aux.	0.92	0.81	0.80	0.57	0.21	0.18	0.18	0.18	0.18	0.33	0.67	0.88	5.90
Ext. Usage	1.60	1.22	1.36	1.31	0.94	0.91	0.94	1.53	1.48	1.53	1.54	1.60	15.95
Misc. Equip.	19.53	18.60	21.65	20.78	20.07	14.89	12.33	12.46	18.72	20.05	19.73	20.58	219.38
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	29.33	27.79	32.26	31.01	30.22	26.28	24.45	24.44	28.95	30.19	29.29	30.51	344.71
Total	81.97	74.35	80.10	72.09	69.01	65.72	69.47	70.12	69.88	68.51	71.09	80.50	872.83

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	931.7	733.8	577.0	323.2	62.9	7.1	1.7	0.2	9.6	119.4	435.2	737.3	3,939.2
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	27.5	28.3	34.1	32.0	27.3	10.1	2.0	1.9	19.0	23.0	24.7	28.1	258.0
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	959.2	762.1	611.1	355.3	90.2	17.2	3.7	2.1	28.6	142.4	459.9	765.4	4,197.2



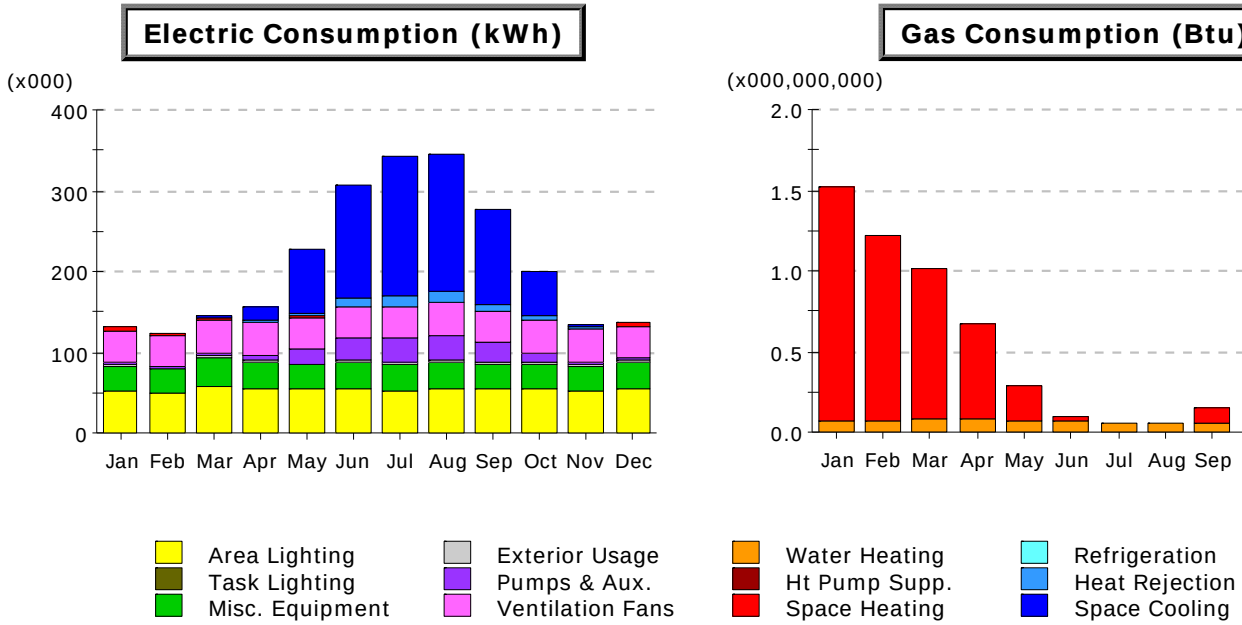


Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	4.6	18.3	78.5	140.6	172.4	170.2	118.8	54.6	4.1	1.9	764.0
Heat Reject.	-	-	0.2	0.8	4.3	9.6	14.2	13.6	7.3	3.2	0.2	0.1	53.4
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	40.1	36.3	40.2	38.9	40.1	38.9	40.2	40.2	38.9	40.1	38.8	40.1	472.7
Pumps & Aux.	2.4	2.1	3.3	5.9	17.9	27.7	30.2	30.3	24.8	12.8	3.0	2.7	163.2
Ext. Usage	3.0	2.3	2.5	2.4	1.7	1.7	1.7	2.8	2.7	2.8	2.9	3.0	29.7
Misc. Equip.	29.0	28.6	34.2	32.7	30.3	32.7	31.6	32.9	31.4	30.3	30.1	31.6	375.4
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	52.0	49.7	58.1	55.8	53.5	55.0	53.1	54.8	53.7	53.5	52.8	55.0	647.1
Total	126.4	119.0	143.0	154.8	226.3	306.3	343.4	344.8	277.6	197.4	131.9	134.4	2,505.4

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	2.06	1.66	1.40	0.93	0.36	0.05	0.00	-	0.15	0.56	1.14	1.73	10.02
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.07	0.07	0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.06	0.06	0.07	0.77
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.13	1.73	1.48	1.00	0.43	0.11	0.06	0.06	0.20	0.62	1.20	1.79	10.80

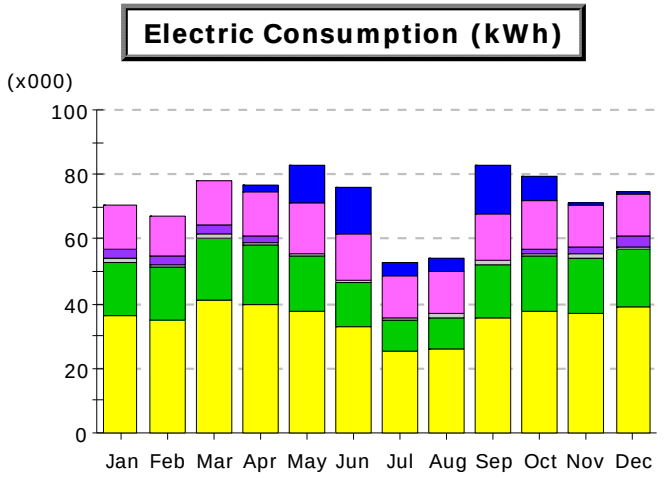


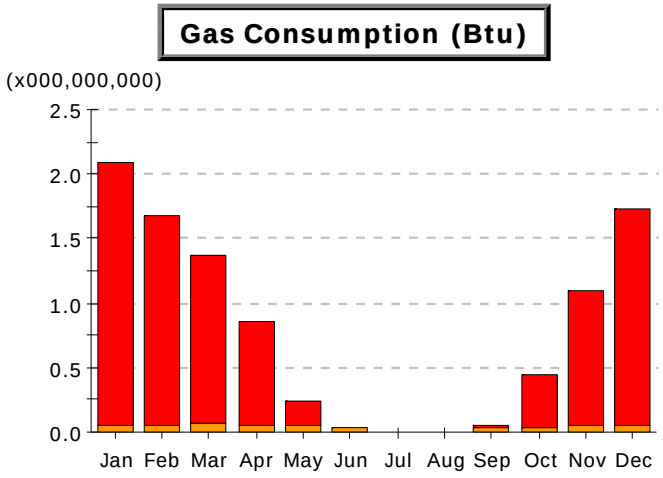
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	4.6	18.3	78.5	140.6	172.4	170.2	118.8	54.6	4.1	1.9	764.0
Heat Reject.	-	-	0.2	0.8	4.3	9.6	14.2	13.6	7.3	3.2	0.2	0.1	53.4
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	3.5	3.0	2.7	1.8	0.7	0.1	-	-	0.3	1.2	2.2	3.2	18.8
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	40.1	36.3	40.2	38.9	40.1	38.9	40.2	40.2	38.9	40.1	38.8	40.1	472.7
Pumps & Aux.	2.7	2.4	3.6	6.1	18.0	27.7	30.2	30.3	24.9	13.0	3.3	3.1	165.2
Ext. Usage	3.0	2.3	2.5	2.4	1.7	1.7	1.7	2.8	2.7	2.8	2.9	3.0	29.7
Misc. Equip.	29.0	28.6	34.2	32.7	30.3	32.7	31.6	32.9	31.4	30.3	30.1	31.6	375.4
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	52.0	49.7	58.1	55.8	53.5	55.0	53.1	54.8	53.7	53.5	52.8	55.0	647.1
Total	130.2	122.3	146.0	156.9	227.2	306.4	343.4	344.8	277.9	198.7	134.5	137.9	2,526.2

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.45	1.15	0.93	0.59	0.22	0.03	0.00	-	0.09	0.35	0.73	1.18	6.72
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.07	0.07	0.08	0.08	0.07	0.06	0.06	0.06	0.05	0.06	0.06	0.07	0.77
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.52	1.21	1.01	0.67	0.29	0.10	0.06	0.06	0.15	0.40	0.79	1.24	7.50



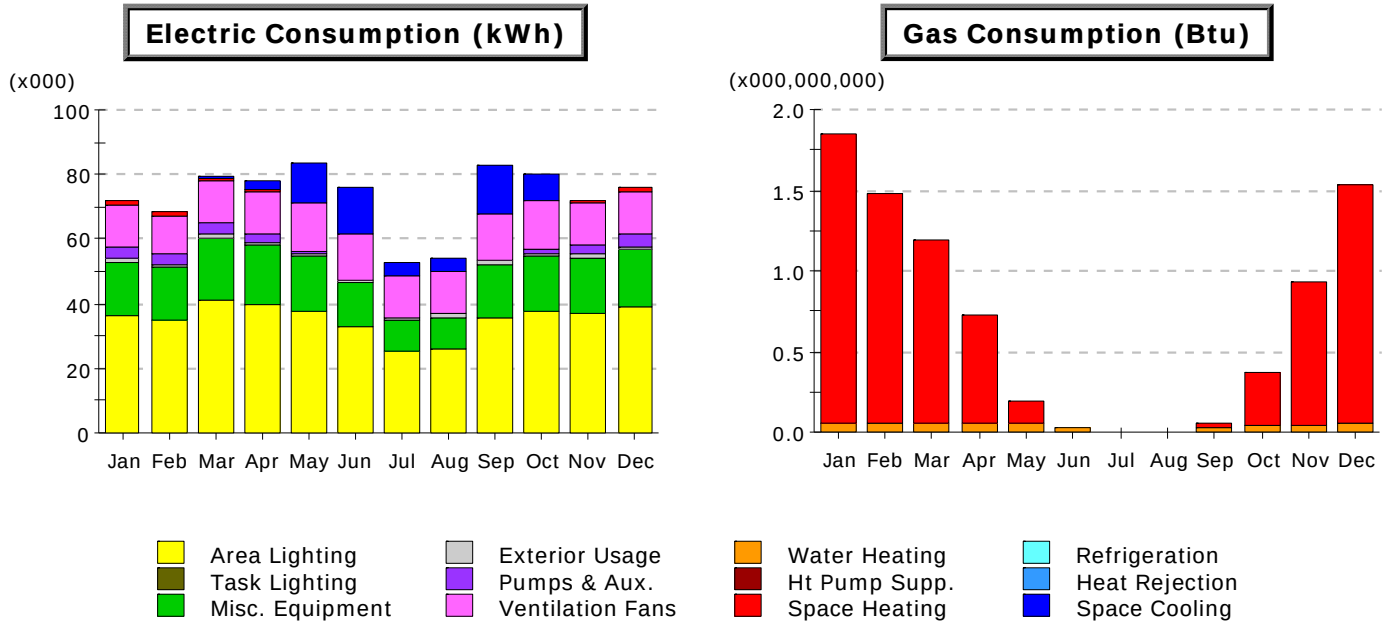


Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	0.41	2.41	11.93	14.86	4.48	4.31	14.85	7.84	0.32	0.17	61.58
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	13.19	11.88	13.29	13.32	15.35	13.97	12.69	12.64	14.67	14.69	13.01	13.24	161.93
Pumps & Aux.	3.38	3.01	3.01	2.21	0.53	0.00	-	-	0.07	1.20	2.60	3.22	19.22
Ext. Usage	1.25	0.96	1.07	1.03	0.74	0.71	0.74	1.20	1.16	1.20	1.21	1.25	12.53
Misc. Equip.	16.19	15.97	19.12	18.31	16.92	14.10	9.61	9.96	16.05	16.92	16.85	17.66	187.67
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	36.34	35.15	41.41	39.74	37.61	32.65	25.32	25.95	35.90	37.60	37.20	38.87	423.73
Total	70.35	66.98	78.30	77.01	83.08	76.30	52.83	54.07	82.70	79.46	71.19	74.41	866.67

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	2.05	1.63	1.32	0.81	0.18	0.00	-	-	0.02	0.41	1.05	1.69	9.15
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.05	0.05	0.06	0.06	0.05	0.03	0.00	0.00	0.03	0.04	0.04	0.05	0.47
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	2.10	1.68	1.38	0.86	0.23	0.03	0.00	0.00	0.05	0.45	1.10	1.74	9.62

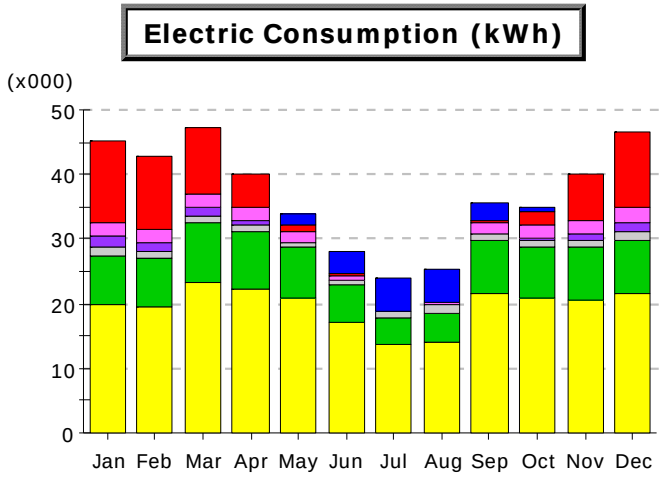


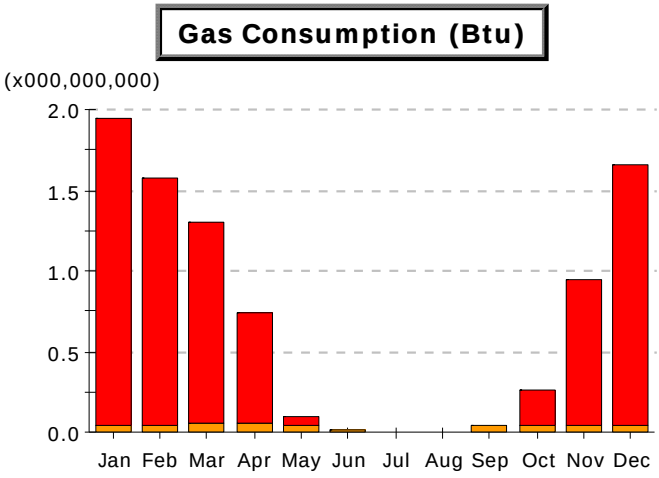
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	0.41	2.41	11.93	14.86	4.48	4.31	14.85	7.84	0.32	0.17	61.58
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.39	1.11	0.90	0.56	0.14	0.00	-	-	0.02	0.30	0.72	1.17	6.31
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	13.19	11.88	13.29	13.32	15.35	13.97	12.69	12.64	14.67	14.69	13.01	13.24	161.93
Pumps & Aux.	3.69	3.29	3.29	2.43	0.59	0.00	-	-	0.08	1.33	2.85	3.53	21.09
Ext. Usage	1.25	0.96	1.07	1.03	0.74	0.71	0.74	1.20	1.16	1.20	1.21	1.25	12.53
Misc. Equip.	16.19	15.97	19.12	18.31	16.92	14.10	9.61	9.96	16.05	16.92	16.85	17.66	187.67
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	36.34	35.15	41.41	39.74	37.61	32.65	25.32	25.95	35.90	37.60	37.20	38.87	423.73
Total	72.05	68.36	79.49	77.80	83.28	76.30	52.83	54.07	82.72	79.88	72.17	75.88	874.85

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.80	1.43	1.13	0.67	0.15	0.00	-	-	0.01	0.33	0.89	1.48	7.89
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.05	0.05	0.06	0.06	0.05	0.03	0.00	0.00	0.03	0.04	0.04	0.05	0.47
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.85	1.48	1.19	0.72	0.19	0.03	0.00	0.00	0.05	0.37	0.93	1.53	8.35



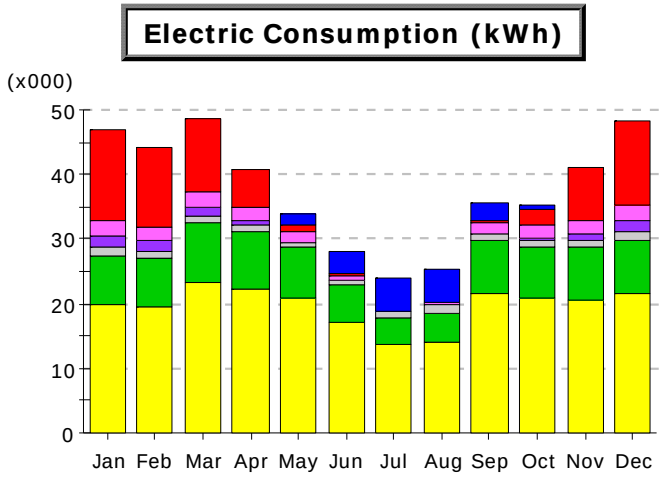


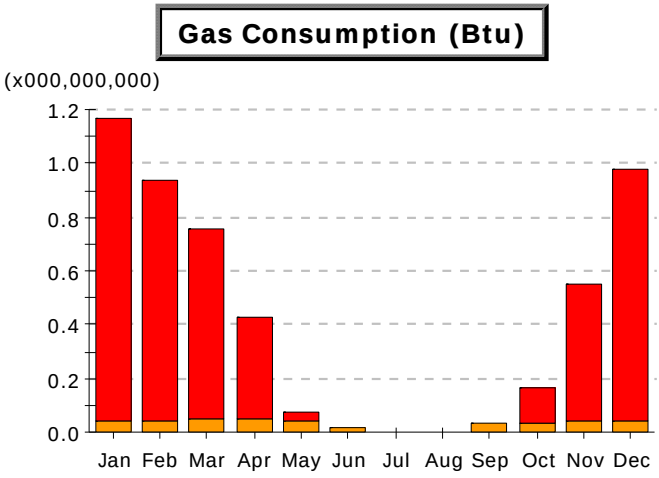
Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	0.14	1.60	3.64	5.00	5.20	2.96	0.57	-	-	19.12
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	12.46	11.33	10.19	5.12	0.97	0.04	-	-	0.14	2.30	7.14	11.73	61.42
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	2.29	2.08	2.20	1.91	1.76	0.73	0.31	0.30	1.66	1.86	2.03	2.25	19.37
Pumps & Aux.	1.60	1.39	1.32	0.82	0.07	-	-	-	-	0.29	0.99	1.48	7.97
Ext. Usage	1.25	0.96	1.06	1.02	0.73	0.71	0.73	1.19	1.15	1.19	1.21	1.25	12.44
Misc. Equip.	7.63	7.52	8.99	8.61	7.97	5.94	4.31	4.46	8.27	7.97	7.93	8.31	87.93
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	19.88	19.58	23.41	22.43	20.76	17.08	13.63	14.13	21.55	20.76	20.66	21.65	235.51
Total	45.12	42.85	47.17	40.05	33.88	28.14	23.98	25.28	35.74	34.94	39.97	46.66	443.77

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.91	1.53	1.24	0.68	0.06	-	-	-	-	0.23	0.91	1.62	8.18
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.04	0.04	0.05	0.05	0.04	0.02	0.00	0.00	0.04	0.04	0.04	0.04	0.40
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.95	1.57	1.30	0.73	0.10	0.02	0.00	0.00	0.04	0.26	0.95	1.66	8.58





Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	0.14	1.60	3.64	5.00	5.20	2.96	0.57	-	-	19.12
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	13.93	12.59	11.36	5.83	1.03	0.04	-	-	0.14	2.55	8.02	13.06	68.54
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	2.29	2.08	2.20	1.91	1.76	0.73	0.31	0.30	1.66	1.86	2.03	2.25	19.37
Pumps & Aux.	1.82	1.59	1.50	0.93	0.08	-	-	-	-	0.33	1.13	1.68	9.06
Ext. Usage	1.25	0.96	1.06	1.02	0.73	0.71	0.73	1.19	1.15	1.19	1.21	1.25	12.44
Misc. Equip.	7.63	7.52	8.99	8.61	7.97	5.94	4.31	4.46	8.27	7.97	7.93	8.31	87.93
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	19.88	19.58	23.41	22.43	20.76	17.08	13.63	14.13	21.55	20.76	20.66	21.65	235.51
Total	46.81	44.31	48.52	40.87	33.95	28.14	23.98	25.28	35.74	35.23	40.97	48.20	451.98

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.13	0.89	0.71	0.38	0.03	-	-	-	-	0.13	0.52	0.94	4.72
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.04	0.04	0.05	0.05	0.04	0.02	0.00	0.00	0.04	0.04	0.04	0.04	0.40
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.17	0.93	0.76	0.43	0.08	0.02	0.00	0.00	0.04	0.16	0.55	0.98	5.12

APPENDIX D

LIGHTING SPREADSHEETS

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Board Office - Interior	1	Ron Smith Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Ceiling Mounted Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Lori Tanner Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Ceiling Mounted Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Mary Ann Sweeney	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Automatic Wall Switch Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Copy Room 1	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Automatic Wall Switch Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Copy Room 2	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Automatic Wall Switch Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Human Resources	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Automatic Wall Switch Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Joyce Shears Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Automatic Wall Switch Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Mike Pennella Office	Incandescent Par 38 w/ 80W Lamp	8	1800	1.80	2080	3744	$609.9	Replace 80W Lamp with 23W Par CFL	8	184	0.18	2080	1456	383	268	Ceiling Mounted Occupancy Sensor	1	1.62	3476	$566.26	$0.0	$20.0	$20.0	$103.0	$73.5	$20.0	$20.0	$40.0	$233.5	$263.0	$496.5
Board Office - Interior	1	Mike Pennella Office	150W Incandescent Fixture	3	450	0.45	2080	936	$152.5	Replace 150W Incandescent Fixture with 40W CFL	3	120	0.12	2080	1456	250	250	None Proposed	0	0.33	686	$111.81	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$60.0	$21.0	$81.0
Board Office - Interior	1	Mens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Automatic Wall Switch Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Utility Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	520	137	$22.4	None Proposed	0	264	0.26	520	364	137	96	Automatic Wall Switch Occupancy Sensor	1	0.00	41	$6.71	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Storage	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	520	183	$29.8	None Proposed	0	352	0.35	520	364	183	128	Automatic Wall Switch Occupancy Sensor	1	0.00	55	$8.95	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Mens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Automatic Wall Switch Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Sheila Maurice Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	5	440	0.44	2080	915	$149.1	None Proposed	0	440	0.44	2080	1456	915	641	Ceiling Mounted Occupancy Sensor	1	0.00	275	$44.73	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Nicole Blasco Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.6	None Proposed	0	176	0.18	2080	1456	366	256	Automatic Wall Switch Occupancy Sensor	1	0.00	110	$17.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Womens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Ceiling Mounted Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Womens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Ceiling Mounted Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Kitchen	Circline Fixture w/ 1-T12 Lamps	2	92	0.09	2080	191	$31.2	Replace with T8 Circline Lamps	2	70	0.07	2080	1456	146	102	Automatic Wall Switch Occupancy Sensor	1	0.02	89	$14.57	$0.0	$7.0	$20.0	$63.5	$45.0	$20.0	$7.0	$27.0	$85.0	$77.5	$162.5
Board Office - Interior	1	Henry Chamesian	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$151.8	None Proposed	0	448	0.45	2080	1456	932	652	Automatic Wall Switch Occupancy Sensor	1	0.00	280	$45.54	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Mens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	2080	549	$89.5	None Proposed	0	264	0.26	2080	1456	549	384	Ceiling Mounted Occupancy Sensor	1	0.00	165	$26.84	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Mens Bathroom Hall	2X2 Fixtures w/ 2-T8 Lamps w/ Magnetic Ballasts	3	213	0.21	2080	443	$72.2	Replace Magnetic Ballast w/ Standard Electronic Ballast	3	180	0.18	2080	1456	374	262	Automatic Wall Switch Occupancy Sensor	1	0.03	181	$29.48	$20.0	$0.0	$65.0	$63.5	$45.0	$65.0	$20.0	$85.0	$240.0	$123.5	$363.5
Board Office - Interior	1	Board Hall	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	18	1584	1.58	2080	3295	$536.7	None Proposed	0	1584	1.58	2080	1456	3295	3295	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Board Hall	2X2 Troffers w/ 3-32W T8 Lamps w/ Electronic Ballasts	12	1116	1.12	2080	2321	$378.1	None Proposed	0	1116	1.12	2080	1456	2321	2321	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Rm. 37	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	26	2288	2.29	2080	4759	$775.2	None Proposed	0	2288	2.29	2080	1456	4759	3331	Ceiling Mounted Occupancy Sensor	2	0.00	1428	$232.57	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Board Office - Interior	1	Copy Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.9	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.77	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Copy Room Hall	1x4 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	1	85.6	0.09	2080	178	$29.0	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	48.6	0.05	2080	1456	101	71	Automatic Wall Switch Occupancy Sensor	1	0.04	107	$17.48	$70.0	$10.0	$65.0	$63.5	$45.0	$65.0	$80.0	$145.0	$110.0	$143.5	$253.5
Board Office - Interior	1	Conference Room	2x4 Fixtures w/ 4-T12 Lamp Fixture w/ Magnetic Ballast	3	513.6	0.51	2080	1068	$174.0	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	3	291.9	0.29	2080	1456	607	425	Automatic Wall Switch Occupancy Sensor	1	0.22	643	$104.79	$105.0	$20.0	$65.0	$63.5	$45.0	$65.0	$125.0	$190.0	$240.0	$438.5	$678.5
Board Office - Interior	1	Blueprints Room	1x4 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	8	684.8	0.68	2080	1424	$232.0	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	8	388.8	0.39	2080	1456	809	566	Ceiling Mounted Occupancy Sensor	1	0.30	858	$139.82	$70.0	$10.0	$65.0	$103.0	$73.5	$65.0	$80.0	$145.0	$593.5	$743.0	$1,336.5
Board Office - Interior	1	Permit Office	2X2 Troffers w/ 3-32W T8 Lamps w/ Electronic Ballasts	8	744	0.74	2080	1548	$252.1	None Proposed	0	744	0.74	2080	1456	1548	1083	Ceiling Mounted Occupancy Sensor	1	0.00	464	$75.63	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Permit Office	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	1	56	0.06	2080	116	$19.0	None Proposed	0	56	0.06	2080	1456	116	116	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Utility Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	1	88	0.09	520	46	$7.5	None Proposed	0	88	0.09	520	364	46	46	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Comptroller	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$119.3	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$35.78	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Kitchen	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	1	88	0.09	2080	183	$29.8	None Proposed	0	88	0.09	2080	1456	183	128	Automatic Wall Switch Occupancy Sensor	1	0.00	55	$8.95	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Program Accountability Supervisior	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$119.3	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$35.78	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Conference Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$119.3	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$35.78	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Conference Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	9	792	0.79	2080	1647	$268.4	None Proposed	0	792	0.79	2080	1456	1647	1153	Automatic Wall Switch Occupancy Sensor	1	0.00	494	$80.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Utility Hall	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	14	1232	1.23	2080	2563	$417.4	None Proposed	0	1232	1.23	2080	1456	2563	2563	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Engineering	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	8	704	0.70	2080	1464	$238.5	None Proposed	0	704	0.70	2080	1456	1464	1025	Ceiling Mounted Occupancy Sensor	1	0.00	439	$71.56	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Business Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	26	2288	2.29	2080	4759	$775.2	None Proposed	0	2288	2.29	2080	1456	4759	3331	Ceiling Mounted Occupancy Sensor	2	0.00	1428	$232.57	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Board Office - Interior	1	Business Office	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	4	224	0.22	2080	466	$75.9	None Proposed	0	224	0.22	2080	1456	466	466	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Vault	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$17.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.15	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Supply Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	3	264	0.26	520	137	$22.4	None Proposed	0	264	0.26	520	364	137	96	Automatic Wall Switch Occupancy Sensor	1	0.00	41	$6.71	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Board Office - Interior	1	Supply Room	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	1	56	0.06	520	29	$4.7	None Proposed	0	56	0.06	520	364	29	29	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Board Office - Interior	1	Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	6	672	0.67	2080	1398	$227.7	None Proposed	0	672	0.67	2080	1456	1398	978	Ceiling Mounted Occupancy Sensor	1	0.00	419	$68.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Server Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$151.8	None Proposed	0	448	0.45	2080	1456	932	652	Ceiling Mounted Occupancy Sensor	1	0.00	280	$45.54	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Board Office - Interior	1	Janitor Closet	60W Incandescent Fixture	1	60	0.06	520	31	$5.1	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.98	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Board Office - Interior	0	Basement	Interior Fixture - 75W Incandescent Fixture	20	1500	1.50	2080	3120	$508.2	Replace 75W Incandescent Fixture with 13W CFL	20	260	0.26	2080	1456	541	541	None Proposed	0	1.24	2579	$420.15	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$400.0	$100.0	$500.0
Board Office - Interior	0	Basement	60W Incandescent Fixture	9	540	0.54	2080	1123	$183.0	Replace 60W Incandescent Fixture with 13W CFL	9	117	0.12	2080	1456	243	243	None Proposed	0	0.42	880	$143.33	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$180.0	$45.0	$225.0
Board Office - Interior	0	Basement	40W Incandescent Fixture	2	80	0.08	2080	166	$27.1	Replace 40W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	54	None Proposed	0	0.05	112	$18.30	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
Board Office - Interior	0	Plans Room	2x4 Fixtures w/ 4-T12 Lamp Fixture w/ Magnetic Ballast	4	684.8	0.68	2080	1424	$232.0	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	4	389.2	0.39	2080	1456	810	810	None Proposed	0	0.30	615	$100.16	$105.0	$20.0	$65.0	$0.0	$0.0	$65.0	$125.0	$190.0	$260.0	$500.0	$760.0
Board Office - Interior	0	Storage	1x4 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	4	342.4	0.34	520	178	$29.0	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	4	194.4	0.19	520	364	101	101	None Proposed	0	0.15	77	$12.54	$70.0	$10.0	$65.0	$0.0	$0.0	$65.0	$80.0	$145.0	$260.0	$320.0	$580.0
Board Office - Exterior	-	Wall Packs	Exterior Wall Pack (Assume 150w HPS)	4	756	0.76	4380	3311	$539.4	Replace 150W Fixture with Induction Light Fixture	4	360	0.36	4380	3066	1577	1577	None Proposed	0	0.40	1734	$282.55	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$548.0	$1,520.0	$2,068.0
Board Office - Exterior	-	Entrance	60W Incandescent Fixture	2	120	0.12	4380	526	$85.6	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	4380	3066	114	114	None Proposed	0	0.09	412	$67.07	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
West Caldwell - Interior	1	Storage	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	520	18	$3.0	None Proposed	0	35	0.04	520	364	18	18	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
West Caldwell - Interior	1	Womens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$113.4	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$34.03	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Culinary Arts Kitchen	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	39	1209	1.21	2080	2515	$408.1	None Proposed	0	1209	1.21	2080	1456	2515	2515	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Culinary Arts Kitchen Storage	2X2 Fixtures w/ 2-T8 Lamps w/ Magnetic Ballasts	2	142	0.14	2080	295	$47.9	Replace Magnetic Ballast w/ Standard Electronic Ballast	2	120	0.12	2080	1456	250	175	Automatic Wall Switch Occupancy Sensor	1	0.02	121	$19.58	$20.0	$0.0	$65.0	$63.5	$45.0	$65.0	$20.0	$85.0	$175.0	$103.5	$278.5
West Caldwell - Interior	1	Small Engine Shop	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	18	2016	2.02	2080	4193	$680.6	None Proposed	0	2016	2.02	2080	1456	4193	4193	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Industrial Maintenance	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	10	1120	1.12	2080	2330	$378.1	None Proposed	0	1120	1.12	2080	1456	2330	2330	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Office Maintenance	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	18	2016	2.02	2080	4193	$680.6	None Proposed	0	2016	2.02	2080	1456	4193	4193	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Horticulture	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	15	1680	1.68	2080	3494	$567.1	None Proposed	0	1680	1.68	2080	1456	3494	2446	Ceiling Mounted Occupancy Sensor	1	0.00	1048	$170.14	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Green Room Hall	60W Incandescent Fixture	2	120	0.12	2080	250	$40.5	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	54	None Proposed	0	0.09	196	$31.73	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
West Caldwell - Interior	1	Green Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	26	1318.2	1.32	2080	2742	$445.0	None Proposed	0	1318.2	1.32	2080	1456	2742	2742	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	311	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	9	1008	1.01	2080	2097	$340.3	None Proposed	0	1008	1.01	2080	1456	2097	1468	Ceiling Mounted Occupancy Sensor	1	0.00	629	$102.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Storage	100W Incandescent Fixture	2	200	0.20	520	104	$16.9	Replace 100W Incandescent Fixture with 25W CFL	2	50	0.05	520	364	26	26	None Proposed	0	0.15	78	$12.66	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$40.0	$14.0	$54.0
West Caldwell - Interior	1	307	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	13	1144	1.14	2080	2380	$386.2	None Proposed	0	1144	1.14	2080	1456	2380	1666	Ceiling Mounted Occupancy Sensor	1	0.00	714	$115.86	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Womens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.4	None Proposed	0	176	0.18	2080	1456	366	256	Ceiling Mounted Occupancy Sensor	1	0.00	110	$17.82	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	310	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	12	1056	1.06	2080	2196	$356.5	None Proposed	0	1056	1.06	2080	1456	2196	1538	Ceiling Mounted Occupancy Sensor	1	0.00	659	$106.95	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Mens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$59.4	None Proposed	0	176	0.18	2080	1456	366	256	Ceiling Mounted Occupancy Sensor	1	0.00	110	$17.82	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Cafeteria	Recessed Can w/ 2-26W CFL's	51	2652	2.65	2080	5516	$895.3	None Proposed	0	2652	2.65	2080	1456	5516	5516	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Cafeteria	3-26W CFL Fixture	3	234	0.23	2080	487	$79.0	None Proposed	0	234	0.23	2080	1456	487	487	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Cafeteria Kitchen	2X2 Troffers w/ 3-17W T8 Lamps w/ Electronic Ballasts	3	141	0.14	2080	293	$47.6	None Proposed	0	141	0.14	2080	1456	293	293	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Janitor Closet	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	2080	73	$11.8	None Proposed	0	35	0.04	2080	1456	73	73	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Mens Locker	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	1	25.4	0.03	2080	53	$8.6	None Proposed	0	25.4	0.03	2080	1456	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.57	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Mens Locker Bath	60W Incandescent Fixture	2	120	0.12	2080	250	$40.5	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	38	Automatic Wall Switch Occupancy Sensor	1	0.09	212	$34.37	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$85.0	$73.5	$158.5
West Caldwell - Interior	1	Womens Locker Bath	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	1	25.4	0.03	2080	53	$8.6	None Proposed	0	25.4	0.03	2080	1456	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.57	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Boiler Room	60W Incandescent Fixture	5	300	0.30	2080	624	$101.3	Replace 60W Incandescent Fixture with 13W CFL	5	65	0.07	2080	1456	135	135	None Proposed	0	0.24	489	$79.33	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$100.0	$25.0	$125.0
West Caldwell - Interior	1	Beauty Culture Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	25	2800	2.80	2080	5824	$945.2	None Proposed	0	2800	2.80	2080	1456	5824	4077	Ceiling Mounted Occupancy Sensor	2	0.00	1747	$283.57	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	Beauty Culture Locker Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	202	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	9	1008	1.01	2080	2097	$340.3	None Proposed	0	1008	1.01	2080	1456	2097	1468	Ceiling Mounted Occupancy Sensor	1	0.00	629	$102.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Career Center	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	25	1267.5	1.27	2080	2636	$427.9	None Proposed	0	1267.5	1.27	2080	1456	2636	1845	Ceiling Mounted Occupancy Sensor	2	0.00	791	$128.37	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	Carpentry Shop	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	35	3920	3.92	2080	8154	$1,323.3	None Proposed	0	3920	3.92	2080	1456	8154	5708	Ceiling Mounted Occupancy Sensor	2	0.00	2446	$397.00	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	Carpentry Shop Bath	60W Incandescent Fixture	2	120	0.12	2080	250	$40.5	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	38	Automatic Wall Switch Occupancy Sensor	1	0.09	212	$34.37	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$85.0	$73.5	$158.5
West Caldwell - Interior	1	Existing Science Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	17	1496	1.50	2080	3112	$505.0	None Proposed	0	1496	1.50	2080	1456	3112	2178	Ceiling Mounted Occupancy Sensor	1	0.00	934	$151.51	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Existing Science Room Lab	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Office Occupation Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	15	1680	1.68	2080	3494	$567.1	None Proposed	0	1680	1.68	2080	1456	3494	2446	Ceiling Mounted Occupancy Sensor	1	0.00	1048	$170.14	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	115	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	12	1056	1.06	2080	2196	$356.5	None Proposed	0	1056	1.06	2080	1456	2196	1538	Ceiling Mounted Occupancy Sensor	1	0.00	659	$106.95	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	201	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$453.7	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$136.11	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	114	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	LDTC	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Conference Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	School Psychologist	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$75.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$22.69	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Principal	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$102.7	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$30.81	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Principal's Secretary	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Foyer	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	6	186	0.19	8760	1629	$264.4	None Proposed	0	186	0.19	8760	6132	1629	1629	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Entry Hall	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	16	496	0.50	8760	4345	$705.2	None Proposed	0	496	0.50	8760	6132	4345	4345	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Athletic Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Mens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$113.4	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$34.03	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Hall	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	56	1422.4	1.42	8760	12460	$2,022.3	None Proposed	0	1422.4	1.42	8760	6132	12460	12460	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Reading Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	20	2240	2.24	2080	4659	$756.2	None Proposed	0	2240	2.24	2080	1456	4659	3261	Ceiling Mounted Occupancy Sensor	2	0.00	1398	$226.86	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	303	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	18	2016	2.02	2080	4193	$680.6	None Proposed	0	2016	2.02	2080	1456	4193	2935	Ceiling Mounted Occupancy Sensor	1	0.00	1258	$204.17	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	305	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	21	2352	2.35	2080	4892	$794.0	None Proposed	0	2352	2.35	2080	1456	4892	3425	Ceiling Mounted Occupancy Sensor	2	0.00	1468	$238.20	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	305	1x4 Fixtures w/ 1-T12 Lamp Fixture w/ Magnetic Ballast	1	42.8	0.04	2080	89	$14.4	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	24.32	0.02	2080	1456	51	51	None Proposed	0	0.02	38	$6.24	$35.0	$5.0	$65.0	$0.0	$0.0	$65.0	$40.0	$105.0	$65.0	$40.0	$105.0
West Caldwell - Interior	1	304	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$302.5	None Proposed	0	896	0.90	2080	1456	1864	1864	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	304	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	28	3136	3.14	2080	6523	$1,058.7	None Proposed	0	3136	3.14	2080	1456	6523	4566	Ceiling Mounted Occupancy Sensor	2	0.00	1957	$317.60	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
West Caldwell - Interior	1	312	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$302.5	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$90.74	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Hall	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	19	2128	2.13	8760	18641	$3,025.5	None Proposed	0	2128	2.13	8760	6132	18641	18641	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Hall	Recessed Can w/ 2-13W CFL's	5	130	0.13	8760	1139	$184.8	None Proposed	0	130	0.13	8760	6132	1139	1139	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Mens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	1	88	0.09	2080	183	$29.7	None Proposed	0	88	0.09	2080	1456	183	128	Ceiling Mounted Occupancy Sensor	1	0.00	55	$8.91	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$68.5	None Proposed	0	202.8	0.20	2080	1456	422	295	Ceiling Mounted Occupancy Sensor	1	0.00	127	$20.54	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
West Caldwell - Interior	1	Womens Bathroom	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	1	88	0.09	2080	183	$29.7	None Proposed	0	88	0.09	2080	1456	183	128	Ceiling Mounted Occupancy Sensor	1	0.00	55	$8.91	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$102.7	None Proposed	0	304.2	0.30	2080	1456	633	443	Ceiling Mounted Occupancy Sensor	1	0.00	190	$30.81	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	308	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	8	704	0.70	2080	1464	$237.7	None Proposed	0	704	0.70	2080	1456	1464	1025	Ceiling Mounted Occupancy Sensor	1	0.00	439	$71.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	308	2X2 Fixtures w/ 2-T12 Lamps w/ Magnetic Ballasts	1	85.6	0.09	2080	178	$28.9	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	50	0.05	2080	1456	104	104	None Proposed	0	0.04	74	$12.02	$55.0	$10.0	$65.0	$0.0	$0.0	$65.0	$65.0	$130.0	$65.0	$65.0	$130.0
West Caldwell - Interior	1	309	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	16	1408	1.41	2080	2929	$475.3	None Proposed	0	1408	1.41	2080	1456	2929	2050	Ceiling Mounted Occupancy Sensor	1	0.00	879	$142.60	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Maintenance Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$151.2	None Proposed	0	448	0.45	2080	1456	932	652	Automatic Wall Switch Occupancy Sensor	1	0.00	280	$45.37	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Gym Hall	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	8760	7849	$1,273.9	None Proposed	0	896	0.90	8760	6132	7849	7849	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Gym Hall	Recessed Can w/ 2-26W CFL's	1	52	0.05	8760	456	$73.9	None Proposed	0	52	0.05	8760	6132	456	456	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	118	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	15	1320	1.32	2080	2746	$445.6	None Proposed	0	1320	1.32	2080	1456	2746	1922	Ceiling Mounted Occupancy Sensor	1	0.00	824	$133.68	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Gym	Pendant Mounted 9-42W CFL Fixtures	15	5670	5.67	2080	11794	$1,914.1	Replace CFL Fixtures with 6-Lamp Fluorescent Highbay Fixtures	15	3390	3.39	2080	1456	7051	7051	None Proposed	0	2.28	4742	$769.69	$168.0	$48.0	$100.0	$0.0	$0.0	$100.0	$216.0	$316.0	$1,500.0	$3,240.0	$4,740.0
West Caldwell - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	7	354.9	0.35	2080	738	$119.8	None Proposed	0	354.9	0.35	2080	1456	738	517	Automatic Wall Switch Occupancy Sensor	1	0.00	221	$35.94	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Boys Locker Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$136.9	None Proposed	0	405.6	0.41	2080	1456	844	591	Ceiling Mounted Occupancy Sensor	1	0.00	253	$41.08	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Boys Locker Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	5	440	0.44	2080	915	$148.5	None Proposed	0	440	0.44	2080	1456	915	915	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Hall	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	3	76.2	0.08	8760	668	$108.3	None Proposed	0	76.2	0.08	8760	6132	668	668	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	8760	3553	$576.7	None Proposed	0	405.6	0.41	8760	6132	3553	3553	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	1	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Ceiling Mounted Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Electrical Room	60W Incandescent Fixture	1	60	0.06	2080	125	$20.3	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.87	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
West Caldwell - Interior	1	Teacher Lounge	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	7	354.9	0.35	2080	738	$119.8	None Proposed	0	354.9	0.35	2080	1456	738	517	Automatic Wall Switch Occupancy Sensor	1	0.00	221	$35.94	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Academic Room	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$302.5	None Proposed	0	896	0.90	2080	1456	1864	1305	Automatic Wall Switch Occupancy Sensor	1	0.00	559	$90.74	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Main Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$302.5	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$90.74	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
West Caldwell - Interior	1	Guidance Counselor	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$102.7	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$30.81	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Guidance Counselor	60W Incandescent Fixture	1	60	0.06	2080	125	$20.3	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.87	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
West Caldwell - Interior	1	Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	6	672	0.67	2080	1398	$226.9	None Proposed	0	672	0.67	2080	1456	1398	978	Automatic Wall Switch Occupancy Sensor	1	0.00	419	$68.06	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$34.2	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.27	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Vice Principal	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$102.7	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$30.81	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Medical Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	6	672	0.67	2080	1398	$226.9	None Proposed	0	672	0.67	2080	1456	1398	978	Automatic Wall Switch Occupancy Sensor	1	0.00	419	$68.06	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
West Caldwell - Interior	1	Medical Office Bath	60W Incandescent Fixture	1	60	0.06	2080	125	$20.3	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.87	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
West Caldwell - Interior	1	Medical Office Storage	60W Incandescent Fixture	2	120	0.12	2080	250	$40.5	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	54	None Proposed	0	0.09	196	$31.73	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
West Caldwell - Interior	1	Hall	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	8760	1332	$216.2	None Proposed	0	152.1	0.15	8760	6132	1332	1332	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Interior	-	Exit Signs	CFL Exit Sign	45	720	0.72	520	374	$60.8	Replace CFL Exit Sign with LED Exit Sign	45	225	0.23	520	364	117	117	None Proposed	0	0.50	257	$41.78	$0.0	$61.0	$63.0	$0.0	$0.0	$63.0	$61.0	$124.0	$2,835.0	$2,745.0	$5,580.0
West Caldwell - Exterior	-	Canopy	60W Incandescent Fixture	2	120	0.12	4380	526	$85.3	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	4380	3066	114	114	None Proposed	0	0.09	412	$66.82	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
West Caldwell - Exterior	-	Canopy	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	4380	888	$144.2	None Proposed	0	202.8	0.20	4380	3066	888	888	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Exterior	-	Wall Packs	Exterior Fixture - 300W Quartz Wall Pack	4	1200	1.20	4380	5256	$853.0	Replace 300W Quartz Fixture with Induction Area Light	4	660	0.66	4380	3066	2891	2891	None Proposed	0	0.54	2365	$383.87	$0.0	$485.0	$134.0	$0.0	$0.0	$134.0	$485.0	$619.0	$536.0	$1,940.0	$2,476.0
West Caldwell - Exterior	-	Building Mounts	26W CFL Fixture	11	286	0.29	4380	1253	$203.3	None Proposed	0	286	0.29	4380	3066	1253	1253	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
West Caldwell - Exterior	-	Parking Lights	Pole Mounted Luminare - 1 Head (Assume 400W MH)	7	3206	3.21	4380	14042	$2,279.1	Replace 400W Fixture with Induction Light Fixture	7	1505	1.51	4380	3066	6592	6592	None Proposed	0	1.70	7450	$1,209.20	$0.0	$485.0	$137.0	$0.0	$0.0	$137.0	$485.0	$622.0	$959.0	$3,395.0	$4,354.0
Newark Technical - Interior	1	Main Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$212.6	None Proposed	0	608.4	0.61	2080	1456	1265	1265	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Vice Principal	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$70.9	None Proposed	0	202.8	0.20	2080	1456	422	295	Automatic Wall Switch Occupancy Sensor	1	0.00	127	$21.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Vice Principal	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	2080	233	$39.1	None Proposed	0	112	0.11	2080	1456	233	233	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Vice Principal Bath	24" Fluorescent w/ 2 T8 Lamp	1	31	0.03	2080	64	$10.8	None Proposed	0	31	0.03	2080	1456	64	45	Automatic Wall Switch Occupancy Sensor	1	0.00	19	$3.25	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Conference Room	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	9	456.3	0.46	2080	949	$159.4	None Proposed	0	456.3	0.46	2080	1456	949	664	Automatic Wall Switch Occupancy Sensor	1	0.00	285	$47.83	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Principal	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$212.6	None Proposed	0	608.4	0.61	2080	1456	1265	886	Automatic Wall Switch Occupancy Sensor	1	0.00	380	$63.78	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Main Office Kitchen	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	1	56	0.06	2080	116	$19.6	None Proposed	0	56	0.06	2080	1456	116	116	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Main Office Kitchen Hall	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	2080	73	$12.2	None Proposed	0	35	0.04	2080	1456	73	73	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$17.7	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.31	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Autobody Shop Bath	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$17.7	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.31	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Receiving Room Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$318.9	None Proposed	0	912.6	0.91	2080	1456	1898	1898	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Receiving Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	24	1216.8	1.22	2080	2531	$425.2	None Proposed	0	1216.8	1.22	2080	1456	2531	2531	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Receiving Room Mechanical	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	316	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Mens Bathroom	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$28.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.05	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Newark Technical - Interior	1	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Automatic Wall Switch Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Copy Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$70.9	None Proposed	0	202.8	0.20	2080	1456	422	295	Automatic Wall Switch Occupancy Sensor	1	0.00	127	$21.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Security Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$106.3	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$31.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Guidance Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$318.9	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$95.67	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	1	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$5.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$4.11	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Newark Technical - Interior	1	Guidance Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$106.3	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$31.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Guidance Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$70.9	None Proposed	0	202.8	0.20	2080	1456	422	295	Automatic Wall Switch Occupancy Sensor	1	0.00	127	$21.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Guidance Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$35.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$10.63	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$177.2	None Proposed	0	507	0.51	2080	1456	1055	738	Automatic Wall Switch Occupancy Sensor	1	0.00	316	$53.15	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Receiving Room Office	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	3	168	0.17	2080	349	$58.7	None Proposed	0	168	0.17	2080	1456	349	245	Automatic Wall Switch Occupancy Sensor	1	0.00	105	$17.61	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	5	253.5	0.25	2080	527	$88.6	None Proposed	0	253.5	0.25	2080	1456	527	369	Automatic Wall Switch Occupancy Sensor	1	0.00	158	$26.57	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	1	Elevator Mech Room	60W Incandescent Fixture	1	60	0.06	2080	125	$21.0	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$16.42	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Newark Technical - Interior	1	Mens Staff Bathroom	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$28.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.05	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Newark Technical - Interior	1	Womens Staff Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$17.7	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.31	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	1	Elevator	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	2	50.8	0.05	520	26	$4.4	None Proposed	0	50.8	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Night School Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$78.3	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$23.48	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$70.9	None Proposed	0	202.8	0.20	2080	1456	422	295	Automatic Wall Switch Occupancy Sensor	1	0.00	127	$21.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Automatic Wall Switch Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Storage Closet	60W Incandescent Fixture	1	60	0.06	520	31	$5.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$4.11	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Newark Technical - Interior	1	Auto Shop	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	80	4056	4.06	2080	8436	$1,417.3	None Proposed	0	4056	4.06	2080	1456	8436	8436	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Auto Shop Bath	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Automatic Wall Switch Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	Entrance Hall	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	26	1318.2	1.32	8760	11547	$1,940.0	None Proposed	0	1318.2	1.32	8760	6132	11547	11547	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	40	2028	2.03	8760	17765	$2,984.6	None Proposed	0	2028	2.03	8760	6132	17765	17765	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Nurse	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$318.9	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$95.67	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	1	127	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	52	2636.4	2.64	2080	5484	$921.3	None Proposed	0	2636.4	2.64	2080	1456	5484	3839	Ceiling Mounted Occupancy Sensor	2	0.00	1645	$276.38	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	1	120	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	47	2382.9	2.38	2080	4956	$832.7	None Proposed	0	2382.9	2.38	2080	1456	4956	3470	Ceiling Mounted Occupancy Sensor	2	0.00	1487	$249.80	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	1	120	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$313.1	None Proposed	0	896	0.90	2080	1456	1864	1864	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Storage	40W Incandescent Fixture	2	80	0.08	520	42	$7.0	Replace 40W Incandescent Fixture with 13W CFL	2	26	0.03	520	364	14	14	None Proposed	0	0.05	28	$4.72	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
Newark Technical - Interior	-	Stairwell	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	14	709.8	0.71	8760	6218	$1,044.6	None Proposed	0	709.8	0.71	8760	6132	6218	6218	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Learning Lab	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$141.7	None Proposed	0	405.6	0.41	2080	1456	844	591	Automatic Wall Switch Occupancy Sensor	1	0.00	253	$42.52	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	1	112	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	19	963.3	0.96	2080	2004	$336.6	None Proposed	0	963.3	0.96	2080	1456	2004	1403	Ceiling Mounted Occupancy Sensor	1	0.00	601	$100.98	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	1	109	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	28	1419.6	1.42	2080	2953	$496.1	None Proposed	0	1419.6	1.42	2080	1456	2953	2067	Ceiling Mounted Occupancy Sensor	2	0.00	886	$148.82	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	-	Stairwell	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	14	709.8	0.71	8760	6218	$1,044.6	None Proposed	0	709.8	0.71	8760	6132	6218	6218	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	105	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	26	1318.2	1.32	2080	2742	$460.6	None Proposed	0	1318.2	1.32	2080	1456	2742	1919	Ceiling Mounted Occupancy Sensor	2	0.00	823	$138.19	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	1	105 Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	21	1064.7	1.06	520	554	$93.0	None Proposed	0	1064.7	1.06	520	364	554	388	Ceiling Mounted Occupancy Sensor	2	0.00	166	$27.90	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	1	101	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	80	4056	4.06	2080	8436	$1,417.3	None Proposed	0	4056	4.06	2080	1456	8436	5906	Ceiling Mounted Occupancy Sensor	2	0.00	2531	$425.20	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	1	Gym Display Case	1x4 Fixtures w/ 1-T12 Lamp Fixture w/ Magnetic Ballast	3	128.4	0.13	2080	267	$44.9	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	3	72.96	0.07	2080	1456	152	152	None Proposed	0	0.06	115	$19.37	$35.0	$5.0	$65.0	$0.0	$0.0	$65.0	$40.0	$105.0	$195.0	$120.0	$315.0
Newark Technical - Interior	1	Gym Elec. Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	5	253.5	0.25	2080	527	$88.6	None Proposed	0	253.5	0.25	2080	1456	527	527	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Gym Hall	Interior Fixture - 70W Metal Halide	13	1235	1.24	8760	10819	$1,817.5	None Proposed	0	1235	1.24	8760	6132	10819	10819	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Gym Hall Foyer	Interior Fixture - 70W Metal Halide	3	285	0.29	8760	2497	$419.4	None Proposed	0	285	0.29	8760	6132	2497	2497	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Gym Hall	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	2	62	0.06	8760	543	$91.2	None Proposed	0	62	0.06	8760	6132	543	543	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Mens Bathroom	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	4	124	0.12	2080	258	$43.3	None Proposed	0	124	0.12	2080	1456	258	258	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Womens Bathroom	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	4	124	0.12	2080	258	$43.3	None Proposed	0	124	0.12	2080	1456	258	258	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Gym	250W Metal Halide Fixtures	28	8260	8.26	2080	17181	$2,886.4	Replace Metal Halide Fixtures with 4-Lamp Fluorescent Highbay Fixtures	28	3080	3.08	2080	1456	6406	6406	None Proposed	0	5.18	10774	$1,810.10	$168.0	$32.0	$100.0	$0.0	$0.0	$100.0	$200.0	$300.0	$2,800.0	$5,600.0	$8,400.0
Newark Technical - Interior	1	Boys Locker Hall	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	2080	64	$10.8	None Proposed	0	31	0.03	2080	1456	64	64	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Boys Locker	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	2080	64	$10.8	None Proposed	0	31	0.03	2080	1456	64	64	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Boys Locker	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	2109	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Girsl Locker Hall	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	2080	64	$10.8	None Proposed	0	31	0.03	2080	1456	64	64	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Girls Locker	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	2080	64	$10.8	None Proposed	0	31	0.03	2080	1456	64	64	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Girls Locker	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	2109	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	107	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	6	528	0.53	2080	1098	$184.5	None Proposed	0	528	0.53	2080	1456	1098	1098	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	106	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	6	528	0.53	2080	1098	$184.5	None Proposed	0	528	0.53	2080	1456	1098	1098	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Stage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	34	1723.8	1.72	2080	3586	$602.4	None Proposed	0	1723.8	1.72	2080	1456	3586	3586	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	1	Mechanical Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$8.9	None Proposed	0	101.4	0.10	520	364	53	53	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	2	229	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	35	1774.5	1.77	2080	3691	$620.1	None Proposed	0	1774.5	1.77	2080	1456	3691	2584	Ceiling Mounted Occupancy Sensor	2	0.00	1107	$186.02	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	231	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	23	2576	2.58	2080	5358	$900.2	None Proposed	0	2576	2.58	2080	1456	5358	3751	Ceiling Mounted Occupancy Sensor	2	0.00	1607	$270.05	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	220	2X2 Troffers w/ 3-17W T8 Lamps w/ Electronic Ballasts	4	188	0.19	2080	391	$65.7	None Proposed	0	188	0.19	2080	1456	391	391	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	2	220	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	62	6944	6.94	2080	14444	$2,426.5	None Proposed	0	6944	6.94	2080	1456	14444	10110	Ceiling Mounted Occupancy Sensor	2	0.00	4333	$727.95	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Ceiling Mounted Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Newark Technical - Interior	2	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	57	2889.9	2.89	8760	25316	$4,253.0	None Proposed	0	2889.9	2.89	8760	6132	25316	25316	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	2	232	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	21	2352	2.35	2080	4892	$821.9	None Proposed	0	2352	2.35	2080	1456	4892	3425	Ceiling Mounted Occupancy Sensor	2	0.00	1468	$246.56	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	203 Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$106.3	None Proposed	0	304.2	0.30	2080	1456	633	443	Automatic Wall Switch Occupancy Sensor	1	0.00	190	$31.89	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	2	203	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	13	659.1	0.66	2080	1371	$230.3	None Proposed	0	659.1	0.66	2080	1456	1371	960	Ceiling Mounted Occupancy Sensor	1	0.00	411	$69.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	2	202	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	79	4005.3	4.01	2080	8331	$1,399.6	None Proposed	0	4005.3	4.01	2080	1456	8331	5832	Ceiling Mounted Occupancy Sensor	2	0.00	2499	$419.88	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	227	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	36	1825.2	1.83	2080	3796	$637.8	None Proposed	0	1825.2	1.83	2080	1456	3796	2657	Ceiling Mounted Occupancy Sensor	2	0.00	1139	$191.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	227	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	10	560	0.56	2080	1165	$195.7	None Proposed	0	560	0.56	2080	1456	1165	1165	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	2	227 Bathroom	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$28.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.05	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Newark Technical - Interior	2	227 Bathroom	60W Incandescent Fixture	2	120	0.12	2080	250	$41.9	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	54	None Proposed	0	0.09	196	$32.85	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
Newark Technical - Interior	2	223	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	2	221	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	36	1825.2	1.83	2080	3796	$637.8	None Proposed	0	1825.2	1.83	2080	1456	3796	2657	Ceiling Mounted Occupancy Sensor	2	0.00	1139	$191.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	210	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	60	3042	3.04	2080	6327	$1,063.0	None Proposed	0	3042	3.04	2080	1456	6327	4429	Ceiling Mounted Occupancy Sensor	2	0.00	1898	$318.90	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	217	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	22	1115.4	1.12	2080	2320	$389.8	None Proposed	0	1115.4	1.12	2080	1456	2320	1624	Ceiling Mounted Occupancy Sensor	2	0.00	696	$116.93	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	213	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	48	2433.6	2.43	2080	5062	$850.4	None Proposed	0	2433.6	2.43	2080	1456	5062	3543	Ceiling Mounted Occupancy Sensor	2	0.00	1519	$255.12	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	208	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	64	3244.8	3.24	2080	6749	$1,133.9	None Proposed	0	3244.8	3.24	2080	1456	6749	4724	Ceiling Mounted Occupancy Sensor	2	0.00	2025	$340.16	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	211	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	24	1216.8	1.22	2080	2531	$425.2	None Proposed	0	1216.8	1.22	2080	1456	2531	1772	Ceiling Mounted Occupancy Sensor	2	0.00	759	$127.56	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	2	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Ceiling Mounted Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	2	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	2	Library Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$70.9	None Proposed	0	202.8	0.20	2080	1456	422	295	Automatic Wall Switch Occupancy Sensor	1	0.00	127	$21.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	2	Display Case	60W Incandescent Fixture	7	420	0.42	2080	874	$146.8	Replace 60W Incandescent Fixture with 13W CFL	7	91	0.09	2080	1456	189	189	None Proposed	0	0.33	684	$114.97	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$140.0	$35.0	$175.0
Newark Technical - Interior	2	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	2	204	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	2	201	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	72	3650.4	3.65	2080	7593	$1,275.6	None Proposed	0	3650.4	3.65	2080	1456	7593	5315	Ceiling Mounted Occupancy Sensor	2	0.00	2278	$382.68	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	Kitchen	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	57	2889.9	2.89	2080	6011	$1,009.8	None Proposed	0	2889.9	2.89	2080	1456	6011	6011	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	3	Cafeteria	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	58	2940.6	2.94	2080	6116	$1,027.6	None Proposed	0	2940.6	2.94	2080	1456	6116	6116	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	3	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	58	2940.6	2.94	8760	25760	$4,327.6	None Proposed	0	2940.6	2.94	8760	6132	25760	25760	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	3	301	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	305	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	36	1825.2	1.83	2080	3796	$637.8	None Proposed	0	1825.2	1.83	2080	1456	3796	2657	Ceiling Mounted Occupancy Sensor	2	0.00	1139	$191.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	310	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	53	2687.1	2.69	2080	5589	$939.0	None Proposed	0	2687.1	2.69	2080	1456	5589	3912	Ceiling Mounted Occupancy Sensor	2	0.00	1677	$281.69	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	Storage	60W Incandescent Fixture	4	240	0.24	520	125	$21.0	Replace 60W Incandescent Fixture with 13W CFL	4	52	0.05	520	364	27	19	Automatic Wall Switch Occupancy Sensor	1	0.19	106	$17.79	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$125.0	$83.5	$208.5
Newark Technical - Interior	3	311	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$283.5	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$85.04	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	309	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	13	659.1	0.66	2080	1371	$230.3	None Proposed	0	659.1	0.66	2080	1456	1371	960	Ceiling Mounted Occupancy Sensor	1	0.00	411	$69.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	309 Bathroom	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$28.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	96	None Proposed	1	0.04	73	$12.23	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	3	317	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	323	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	327	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	326	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$283.5	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$85.04	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	325	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$177.2	None Proposed	0	507	0.51	2080	1456	1055	738	Ceiling Mounted Occupancy Sensor	1	0.00	316	$53.15	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	325 Bathroom	Strip Fluorescent - 18" Fluorescent w/ 1 T12 Lamp	1	19	0.02	2080	40	$6.6	Replace T12 Bulb With T8 Bulb, Replace Ballast w/ Standard Electronic Ballast	1	14	0.01	2080	1456	29	20	Automatic Wall Switch Occupancy Sensor	1	0.01	19	$3.21	$35.0	$5.0	$65.0	$63.5	$45.0	$65.0	$40.0	$105.0	$110.0	$103.5	$213.5
Newark Technical - Interior	3	331	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	38	1926.6	1.93	2080	4007	$673.2	None Proposed	0	1926.6	1.93	2080	1456	4007	2805	Ceiling Mounted Occupancy Sensor	2	0.00	1202	$201.97	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	328	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	32	1622.4	1.62	2080	3375	$566.9	None Proposed	0	1622.4	1.62	2080	1456	3375	2362	Ceiling Mounted Occupancy Sensor	2	0.00	1012	$170.08	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	312	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	4	224	0.22	2080	466	$78.3	None Proposed	0	224	0.22	2080	1456	466	466	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	3	312	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	15	1320	1.32	2080	2746	$461.3	None Proposed	0	1320	1.32	2080	1456	2746	1922	Ceiling Mounted Occupancy Sensor	1	0.00	824	$138.38	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	314	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	15	1320	1.32	2080	2746	$461.3	None Proposed	0	1320	1.32	2080	1456	2746	1922	Ceiling Mounted Occupancy Sensor	1	0.00	824	$138.38	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	320	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	Faculty Dining	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$156.5	None Proposed	0	448	0.45	2080	1456	932	652	Automatic Wall Switch Occupancy Sensor	1	0.00	280	$46.96	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	3	303	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	48	2433.6	2.43	2080	5062	$850.4	None Proposed	0	2433.6	2.43	2080	1456	5062	3543	Ceiling Mounted Occupancy Sensor	2	0.00	1519	$255.12	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	307	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	24	2688	2.69	2080	5591	$939.3	None Proposed	0	2688	2.69	2080	1456	5591	3914	Ceiling Mounted Occupancy Sensor	2	0.00	1677	$281.79	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	313	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	28	1419.6	1.42	2080	2953	$496.1	None Proposed	0	1419.6	1.42	2080	1456	2953	2067	Ceiling Mounted Occupancy Sensor	2	0.00	886	$148.82	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	3	319	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Ceiling Mounted Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	3	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	3	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$5.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$4.11	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Newark Technical - Interior	3	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$5.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$4.11	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Newark Technical - Interior	4	431	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	18	2016	2.02	2080	4193	$704.5	None Proposed	0	2016	2.02	2080	1456	4193	2935	Ceiling Mounted Occupancy Sensor	1	0.00	1258	$211.34	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	431 Bath	1x4 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	1	85.6	0.09	2080	178	$29.9	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	48.6	0.05	2080	1456	101	71	Automatic Wall Switch Occupancy Sensor	1	0.04	107	$18.02	$70.0	$10.0	$65.0	$63.5	$45.0	$65.0	$80.0	$145.0	$110.0	$143.5	$253.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Newark Technical - Interior	4	Storage	1x4 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	1	85.6	0.09	520	45	$7.5	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	48.6	0.05	520	364	25	25	None Proposed	0	0.04	19	$3.23	$70.0	$10.0	$65.0	$0.0	$0.0	$65.0	$80.0	$145.0	$65.0	$80.0	$145.0
Newark Technical - Interior	4	430	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$469.6	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$140.89	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	420	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	419	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	4	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Ceiling Mounted Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	Supervisior of Technology	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	13	659.1	0.66	2080	1371	$230.3	None Proposed	0	659.1	0.66	2080	1456	1371	960	Ceiling Mounted Occupancy Sensor	1	0.00	411	$69.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	Supervisior of Technology Bath	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$28.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.05	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Newark Technical - Interior	4	403	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	35	1774.5	1.77	2080	3691	$620.1	None Proposed	0	1774.5	1.77	2080	1456	3691	2584	Ceiling Mounted Occupancy Sensor	2	0.00	1107	$186.02	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	4	Boiler Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	25	1267.5	1.27	2080	2636	$442.9	None Proposed	0	1267.5	1.27	2080	1456	2636	2636	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	4	Boiler Room	150W Metal Halide Fixtures	3	570	0.57	2080	1186	$199.2	Replace Metal Halide Fixtures with 4-Lamp Fluorescent Highbay Fixtures	3	330	0.33	2080	1456	686	686	None Proposed	0	0.24	499	$83.87	$168.0	$32.0	$100.0	$0.0	$0.0	$100.0	$200.0	$300.0	$300.0	$600.0	$900.0
Newark Technical - Interior	4	425	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$177.2	None Proposed	0	507	0.51	2080	1456	1055	738	Ceiling Mounted Occupancy Sensor	1	0.00	316	$53.15	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	425 Bathroom	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	1	25.4	0.03	2080	53	$8.9	None Proposed	0	25.4	0.03	2080	1456	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.66	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Newark Technical - Interior	4	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	2080	316	$53.1	None Proposed	0	152.1	0.15	2080	1456	316	221	Ceiling Mounted Occupancy Sensor	1	0.00	95	$15.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	405	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	36	1825.2	1.83	2080	3796	$637.8	None Proposed	0	1825.2	1.83	2080	1456	3796	2657	Ceiling Mounted Occupancy Sensor	2	0.00	1139	$191.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	4	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	115	5830.5	5.83	8760	51075	$8,580.6	None Proposed	0	5830.5	5.83	8760	6132	51075	51075	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Newark Technical - Interior	4	429	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	11	1232	1.23	2080	2563	$430.5	None Proposed	0	1232	1.23	2080	1456	2563	1794	Ceiling Mounted Occupancy Sensor	1	0.00	769	$129.15	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	423	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	2	0.00	633	$106.30	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	4	417	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	415	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	413	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	411	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$354.3	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$106.30	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Newark Technical - Interior	4	407	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	25	1267.5	1.27	2080	2636	$442.9	None Proposed	0	1267.5	1.27	2080	1456	2636	1845	Ceiling Mounted Occupancy Sensor	2	0.00	791	$132.87	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	4	401	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	36	1825.2	1.83	2080	3796	$637.8	None Proposed	0	1825.2	1.83	2080	1456	3796	2657	Ceiling Mounted Occupancy Sensor	2	0.00	1139	$191.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Newark Technical - Interior	4	Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.1	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.06	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Newark Technical - Interior	-	Exit Signs	CFL Exit Sign	35	560	0.56	520	291	$48.9	Replace CFL Exit Sign with LED Exit Sign	35	175	0.18	520	364	91	91	None Proposed	0	0.39	200	$33.63	$0.0	$61.0	$63.0	$0.0	$0.0	$63.0	$61.0	$124.0	$2,205.0	$2,135.0	$4,340.0
Newark Technical - Exterior	-	Canopy	Exterior Wall Packs (Assume 70w)	10	900	0.90	4380	3942	$662.3	Replace 70W Fixture with Induction Light Fixture	10	440	0.44	4380	3066	1927	1927	None Proposed	0	0.46	2015	$338.49	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$1,370.0	$3,800.0	$5,170.0
Newark Technical - Exterior	-	Wall Packs	Exterior Wall Pack (Assume 150w HPS)	22	4158	4.16	4380	18212	$3,059.6	Replace 150W Fixture with Induction Light Fixture	22	1980	1.98	4380	3066	8672	8672	None Proposed	0	2.18	9540	$1,602.66	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$3,014.0	$8,360.0	$11,374.0
Newark Technical - Exterior	-	Canopy	Incandescent Par 38 w/ 1 75W Lamp	8	600	0.60	4380	2628	$441.5	Replace 75W Lamp with 23W Par CFL	8	184	0.18	4380	3066	806	806	None Proposed	0	0.42	1822	$306.11	$0.0	$20.0	$20.0	$0.0	$0.0	$20.0	$20.0	$40.0	$160.0	$160.0	$320.0
Newark Technical - Exterior	-	Canopy	Canopy Fixure (Assume 400W MH)	8	3664	3.66	4380	16048	$2,696.1	Replace 400W Fixture with Induction Light Fixture	8	1720	1.72	4380	3066	7534	7534	None Proposed	0	1.94	8515	$1,430.47	$0.0	$485.0	$137.0	$0.0	$0.0	$137.0	$485.0	$622.0	$1,096.0	$3,880.0	$4,976.0
Bloomfield Technical - Interior	0	Electrical Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.6	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	0	Boiler Room	1x8 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	7	896	0.90	520	466	$81.2	Replace T12 Bulbs With T8 Bulbs, Replace Ballast Standard Electronic Ballast	7	763	0.76	520	364	397	397	None Proposed	0	0.13	69	$12.05	$35.0	$15.0	$65.0	$0.0	$0.0	$65.0	$50.0	$115.0	$455.0	$350.0	$805.0
Bloomfield Technical - Interior	0	Boiler Room Hall	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	1	Cafeteria Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	520	105	$18.4	None Proposed	0	202.8	0.20	520	364	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	1	Book Room	100W Incandescent Fixture	7	700	0.70	520	364	$63.4	Replace 100W Incandescent Fixture with 25W CFL	7	175	0.18	520	364	91	91	None Proposed	0	0.53	273	$47.56	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$140.0	$49.0	$189.0
Bloomfield Technical - Interior	1	Book Room Storage	100W Incandescent Fixture	2	200	0.20	520	104	$18.1	Replace 100W Incandescent Fixture with 25W CFL	2	50	0.05	520	364	26	26	None Proposed	0	0.15	78	$13.59	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$40.0	$14.0	$54.0
Bloomfield Technical - Interior	1	Corridor	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$81.2	None Proposed	0	224	0.22	2080	1456	466	466	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	Corridor	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$29.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	96	None Proposed	0	0.04	73	$12.68	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	1	Kitchen	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	2796	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	Kitchen Bath	Interior Fixture - 75W Incandescent Fixture	7	525	0.53	2080	1092	$190.2	Replace 75W Incandescent Fixture with 13W CFL	7	91	0.09	2080	1456	189	132	Automatic Wall Switch Occupancy Sensor	1	0.43	960	$167.15	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$185.0	$98.5	$283.5
Bloomfield Technical - Interior	1	Kitchen Storage	Interior Fixture - 75W Incandescent Fixture	7	525	0.53	2080	1092	$190.2	Replace 75W Incandescent Fixture with 13W CFL	7	91	0.09	2080	1456	189	132	Automatic Wall Switch Occupancy Sensor	1	0.43	960	$167.15	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$185.0	$98.5	$283.5
Bloomfield Technical - Interior	1	Receiving	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$36.7	None Proposed	0	101.4	0.10	2080	1456	211	211	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	Receiving Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$18.4	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	1	Receiving Office Bath	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$29.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.68	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Bloomfield Technical - Interior	1	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	17	Automatic Wall Switch Occupancy Sensor	1	0.04	25	$4.42	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Bloomfield Technical - Interior	1	17 Hall	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$162.3	None Proposed	0	448	0.45	2080	1456	932	932	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	17	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	40	2028	2.03	2080	4218	$734.8	None Proposed	0	2028	2.03	2080	1456	4218	4218	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	Cafeteria	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	76	3853.2	3.85	2080	8015	$1,396.2	None Proposed	0	3853.2	3.85	2080	1456	8015	8015	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	11	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$183.7	None Proposed	0	507	0.51	2080	1456	1055	738	Ceiling Mounted Occupancy Sensor	1	0.00	316	$55.11	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	12	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$324.7	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$97.40	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	Faculty Lounge	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	9	456.3	0.46	2080	949	$165.3	None Proposed	0	456.3	0.46	2080	1456	949	664	Automatic Wall Switch Occupancy Sensor	1	0.00	285	$49.60	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	1	Mens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$36.7	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$11.02	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	1	16	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	13	659.1	0.66	2080	1371	$238.8	None Proposed	0	659.1	0.66	2080	1456	1371	960	Ceiling Mounted Occupancy Sensor	1	0.00	411	$71.64	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	18A	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	15	760.5	0.76	2080	1582	$275.6	None Proposed	0	760.5	0.76	2080	1456	1582	1107	Ceiling Mounted Occupancy Sensor	1	0.00	475	$82.67	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	18	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$293.9	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$88.18	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	19A	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	19	2128	2.13	2080	4426	$771.1	None Proposed	0	2128	2.13	2080	1456	4426	3098	Ceiling Mounted Occupancy Sensor	1	0.00	1328	$231.32	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Bloomfield Technical - Interior	1	19B	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	28	1419.6	1.42	2080	2953	$514.4	None Proposed	0	1419.6	1.42	2080	1456	2953	2067	Ceiling Mounted Occupancy Sensor	1	0.00	886	$154.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	1	15	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	4	224	0.22	2080	466	$81.2	None Proposed	0	224	0.22	2080	1456	466	466	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	1	15	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	12	1056	1.06	2080	2196	$382.6	None Proposed	0	1056	1.06	2080	1456	2196	1538	Ceiling Mounted Occupancy Sensor	1	0.00	659	$114.79	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	28	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	37	1875.9	1.88	2080	3902	$679.7	None Proposed	0	1875.9	1.88	2080	1456	3902	2731	Ceiling Mounted Occupancy Sensor	2	0.00	1171	$203.91	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Bloomfield Technical - Interior	2	27	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$330.7	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$99.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Hall	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	27	2376	2.38	8760	20814	$3,625.8	None Proposed	0	2376	2.38	8760	6132	20814	20814	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	2	Hall	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	8760	272	$47.3	None Proposed	0	31	0.03	8760	6132	272	272	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	2	Mens Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$36.7	None Proposed	0	101.4	0.10	2080	1456	211	148	Ceiling Mounted Occupancy Sensor	1	0.00	63	$11.02	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Vice Principal	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	2	62	0.06	2080	129	$22.5	None Proposed	0	62	0.06	2080	1456	129	90	Automatic Wall Switch Occupancy Sensor	1	0.00	39	$6.74	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Main Office	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$147.0	None Proposed	0	405.6	0.41	2080	1456	844	591	Ceiling Mounted Occupancy Sensor	1	0.00	253	$44.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Main Office	60W Incandescent Fixture	1	60	0.06	2080	125	$21.7	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$17.03	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
Bloomfield Technical - Interior	2	Cordinator's Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$18.4	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Principal	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$81.2	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$24.35	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	20	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	14	709.8	0.71	2080	1476	$257.2	None Proposed	0	709.8	0.71	2080	1456	1476	1033	Ceiling Mounted Occupancy Sensor	1	0.00	443	$77.16	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Conference Room	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$36.7	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$11.02	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Conference Room Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$18.4	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$18.4	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Womens Bathroom	60W Incandescent Fixture	2	120	0.12	2080	250	$43.5	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	54	None Proposed	0	0.09	196	$34.06	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
Bloomfield Technical - Interior	2	Nurse	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	5	253.5	0.25	2080	527	$91.9	None Proposed	0	253.5	0.25	2080	1456	527	369	Ceiling Mounted Occupancy Sensor	1	0.00	158	$27.56	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	25	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$220.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$66.13	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	29	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	44	2230.8	2.23	2080	4640	$808.3	None Proposed	0	2230.8	2.23	2080	1456	4640	3248	Ceiling Mounted Occupancy Sensor	2	0.00	1392	$242.49	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Bloomfield Technical - Interior	2	27	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	22	2464	2.46	2080	5125	$892.8	None Proposed	0	2464	2.46	2080	1456	5125	3588	Ceiling Mounted Occupancy Sensor	2	0.00	1538	$267.84	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
Bloomfield Technical - Interior	2	27	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	4	124	0.12	2080	258	$44.9	None Proposed	0	124	0.12	2080	1456	258	258	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	2	Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	2	Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	2	Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	2	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$18.4	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Faculty Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$127.5	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$38.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Auditorium	Circline Fixture w/ 2-T12 Lamps	3	243	0.24	2080	505	$88.0	Replace with T8 Circline Lamps	3	138	0.14	2080	1456	287	287	None Proposed	0	0.11	218	$38.05	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$60.0	$42.0	$102.0
Bloomfield Technical - Interior	2	Auditorium	Pendant Mounted Chandelier (Assume 6-200W Incandescent)	4	4800	4.80	2080	9984	$1,739.2	Replace 200W Incandescent Lamps with 55W CFL	4	1320	1.32	2080	1456	2746	2746	None Proposed	0	3.48	7238	$1,260.93	$0.0	$90.0	$20.0	$0.0	$0.0	$20.0	$90.0	$110.0	$80.0	$360.0	$440.0
Bloomfield Technical - Interior	2	Stage	60W Incandescent Fixture	60	3600	3.60	2080	7488	$1,304.4	Replace 60W Incandescent Fixture with 13W CFL	60	780	0.78	2080	1456	1622	1622	None Proposed	0	2.82	5866	$1,021.79	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$1,200.0	$300.0	$1,500.0
Bloomfield Technical - Interior	2	Stage Hall	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	6	152.4	0.15	2080	317	$55.2	None Proposed	0	152.4	0.15	2080	1456	317	317	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	2	Gym	6-Lamp Fluorescent Highbay Fixtures	8	1808	1.81	2080	3761	$655.1	None Proposed	0	1808	1.81	2080	1456	3761	3761	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	2	Girls Locker Bathroom	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	1	25.4	0.03	2080	53	$9.2	None Proposed	0	25.4	0.03	2080	1456	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.76	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Girls Locker Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$73.5	None Proposed	0	202.8	0.20	2080	1456	422	295	Ceiling Mounted Occupancy Sensor	1	0.00	127	$22.04	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Boys Locker Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$73.5	None Proposed	0	202.8	0.20	2080	1456	422	295	Ceiling Mounted Occupancy Sensor	1	0.00	127	$22.04	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	2	Vice Principal	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	2	112	0.11	2080	233	$40.6	None Proposed	0	112	0.11	2080	1456	233	163	Automatic Wall Switch Occupancy Sensor	1	0.00	70	$12.17	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	2	Guidance Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	6	528	0.53	2080	1098	$191.3	None Proposed	0	528	0.53	2080	1456	1098	769	Ceiling Mounted Occupancy Sensor	1	0.00	329	$57.39	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	31	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	32	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	14	709.8	0.71	2080	1476	$257.2	None Proposed	0	709.8	0.71	2080	1456	1476	1033	Ceiling Mounted Occupancy Sensor	1	0.00	443	$77.16	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	33	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	Auditorium Balcony	Circline Fixture w/ 2-T12 Lamps	3	243	0.24	2080	505	$88.0	Replace with T8 Circline Lamps	3	138	0.14	2080	1456	287	287	None Proposed	0	0.11	218	$38.05	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$60.0	$42.0	$102.0
Bloomfield Technical - Interior	3	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$9.2	None Proposed	0	101.4	0.10	520	364	53	53	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	3	Womens Bathroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$36.7	None Proposed	0	101.4	0.10	2080	1456	211	148	Ceiling Mounted Occupancy Sensor	1	0.00	63	$11.02	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.6	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	3	Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	3	Video/TV Production Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	19	1672	1.67	2080	3478	$605.8	None Proposed	0	1672	1.67	2080	1456	3478	3478	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	3	Video/TV Production Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$127.5	None Proposed	0	352	0.35	2080	1456	732	732	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	3	Video/TV Production Room Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$9.2	None Proposed	0	101.4	0.10	520	364	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.76	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	3	Video/TV Production Room Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	520	105	$18.4	None Proposed	0	202.8	0.20	520	364	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$5.51	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	3	39D	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39B	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	18	2016	2.02	2080	4193	$730.5	None Proposed	0	2016	2.02	2080	1456	4193	2935	Ceiling Mounted Occupancy Sensor	1	0.00	1258	$219.14	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39C	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$220.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$66.13	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	Hall	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	23	2024	2.02	8760	17730	$3,088.6	None Proposed	0	2024	2.02	8760	6132	17730	17730	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	3	31	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	30	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
Bloomfield Technical - Interior	3	38	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	20	2240	2.24	2080	4659	$811.6	None Proposed	0	2240	2.24	2080	1456	4659	3261	Ceiling Mounted Occupancy Sensor	1	0.00	1398	$243.49	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	34	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	12	1056	1.06	2080	2196	$382.6	None Proposed	0	1056	1.06	2080	1456	2196	1538	Ceiling Mounted Occupancy Sensor	1	0.00	659	$114.79	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	35	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	5	253.5	0.25	2080	527	$91.9	None Proposed	0	253.5	0.25	2080	1456	527	369	Ceiling Mounted Occupancy Sensor	1	0.00	158	$27.56	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	36	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	11	968	0.97	2080	2013	$350.7	None Proposed	0	968	0.97	2080	1456	2013	1409	Ceiling Mounted Occupancy Sensor	1	0.00	604	$105.22	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	36	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	3	93	0.09	2080	193	$33.7	None Proposed	0	93	0.09	2080	1456	193	135	Ceiling Mounted Occupancy Sensor	1	0.00	58	$10.11	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	37	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$367.4	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$110.22	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39A	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$220.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$66.13	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39A	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	3	93	0.09	2080	193	$33.7	None Proposed	0	93	0.09	2080	1456	193	135	Ceiling Mounted Occupancy Sensor	1	0.00	58	$10.11	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39F	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	7	354.9	0.35	2080	738	$128.6	None Proposed	0	354.9	0.35	2080	1456	738	517	Ceiling Mounted Occupancy Sensor	1	0.00	221	$38.58	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39F	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	3	93	0.09	2080	193	$33.7	None Proposed	0	93	0.09	2080	1456	193	135	Ceiling Mounted Occupancy Sensor	1	0.00	58	$10.11	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39E	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$147.0	None Proposed	0	405.6	0.41	2080	1456	844	591	Ceiling Mounted Occupancy Sensor	1	0.00	253	$44.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	3	39E	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	4	124	0.12	2080	258	$44.9	None Proposed	0	124	0.12	2080	1456	258	181	Ceiling Mounted Occupancy Sensor	1	0.00	77	$13.48	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	43	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	18	1584	1.58	2080	3295	$573.9	None Proposed	0	1584	1.58	2080	1456	3295	2306	Ceiling Mounted Occupancy Sensor	1	0.00	988	$172.18	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	43 Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$9.2	None Proposed	0	101.4	0.10	520	364	53	37	Automatic Wall Switch Occupancy Sensor	1	0.00	16	$2.76	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	4	43 Storage	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	4	Classroom	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$324.7	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$97.40	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	Bathroom	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$29.3	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	67	Automatic Wall Switch Occupancy Sensor	1	0.04	102	$17.68	$0.0	$14.0	$20.0	$63.5	$45.0	$20.0	$14.0	$34.0	$65.0	$77.5	$142.5
Bloomfield Technical - Interior	4	Janitor Closet	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	520	42	$7.3	Replace with T8 Circline Lamps	1	46	0.05	520	364	24	24	None Proposed	0	0.04	18	$3.17	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
Bloomfield Technical - Interior	4	Classroom	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	41	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	40	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$487.0	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$146.09	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	Classroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$324.7	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$97.40	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	Hall	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	11	1232	1.23	2080	2563	$446.4	None Proposed	0	1232	1.23	2080	1456	2563	1794	Ceiling Mounted Occupancy Sensor	1	0.00	769	$133.92	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
Bloomfield Technical - Interior	4	Storage	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	520	58	$10.1	None Proposed	0	112	0.11	520	364	58	58	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	4	Director Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$127.5	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$38.26	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
Bloomfield Technical - Interior	4	Director Office	2X2 Troffers w/ 2-17W T8 Lamps w/ Electronic Ballasts	1	31	0.03	2080	64	$11.2	None Proposed	0	31	0.03	2080	1456	64	64	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	-	Exit Signs	CFL Exit Sign	55	880	0.88	520	458	$79.7	Replace CFL Exit Sign with LED Exit Sign	55	275	0.28	520	364	143	143	None Proposed	0	0.61	315	$54.80	$0.0	$61.0	$63.0	$0.0	$0.0	$63.0	$61.0	$124.0	$3,465.0	$3,355.0	$6,820.0
Bloomfield Technical - Interior	-	Stairwells	Interior Fixture - 70W Metal Halide	26	2470	2.47	8760	21637	$3,769.2	None Proposed	0	2470	2.47	8760	6132	21637	21637	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Interior	-	Stairwells	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	9	456.3	0.46	8760	3997	$696.3	None Proposed	0	456.3	0.46	8760	6132	3997	3997	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Bloomfield Technical - Exterior	-	Building Mounts	Exterior Fixture (Assume 70w)	6	540	0.54	4380	2365	$412.0	Replace 70W Fixture with Induction Light Fixture	6	264	0.26	4380	3066	1156	1156	None Proposed	0	0.28	1209	$210.59	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$822.0	$2,280.0	$3,102.0
Bloomfield Technical - Exterior	-	Wall Packs	Exterior Wall Pack (Assume 150w HPS)	5	945	0.95	4380	4139	$721.0	Replace 150W Fixture with Induction Light Fixture	5	450	0.45	4380	3066	1971	1971	None Proposed	0	0.50	2168	$377.68	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$685.0	$1,900.0	$2,585.0
Bloomfield Technical - Exterior	-	Canopy	Canopy Fixture (Assume 70w)	1	90	0.09	4380	394	$68.7	Replace 70W Fixture with Induction Light Fixture	1	44	0.04	4380	3066	193	193	None Proposed	0	0.05	201	$35.10	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$137.0	$380.0	$517.0
Bloomfield Technical - Exterior	-	Parking Lights	Pole Mounted Luminare - 1 Head (Assume 400W MH)	5	2290	2.29	4380	10030	$1,747.3	Replace 400W Fixture with Induction Light Fixture	5	1075	1.08	4380	3066	4709	4709	None Proposed	0	1.22	5322	$927.04	$0.0	$485.0	$137.0	$0.0	$0.0	$137.0	$485.0	$622.0	$685.0	$2,425.0	$3,110.0
13th Street School - Interior	0	Boiler	1x8 Fixtures w/ 2-T12 Lamp Fixture w/ Magnetic Ballast	10	1280	1.28	2080	2662	$408.9	Replace T12 Bulbs With T8 Bulbs, Replace Ballast Standard Electronic Ballast	10	1090	1.09	2080	1456	2267	2267	None Proposed	0	0.19	395	$60.70	$35.0	$15.0	$65.0	$0.0	$0.0	$65.0	$50.0	$115.0	$650.0	$500.0	$1,150.0
13th Street School - Interior	0	Boiler	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	105	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	0	Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	2080	233	$35.8	None Proposed	0	112	0.11	2080	1456	233	163	Automatic Wall Switch Occupancy Sensor	1	0.00	70	$10.73	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	-	Elevator	Circline Fixture w/ 2-T12 Lamps	1	81	0.08	2080	168	$25.9	Replace with T8 Circline Lamps	1	46	0.05	2080	1456	96	96	None Proposed	0	0.04	73	$11.18	$0.0	$14.0	$20.0	$0.0	$0.0	$20.0	$14.0	$34.0	$20.0	$14.0	$34.0
13th Street School - Interior	-	Stairwells	Interior Fixture - 70W Metal Halide	22	2090	2.09	2080	4347	$667.7	None Proposed	0	2090	2.09	2080	1456	4347	4347	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	-	Main Stairwell	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	20	508	0.51	8760	4450	$683.5	None Proposed	0	508	0.51	8760	6132	4450	4450	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	-	Main Stairwell	Interior Fixture - 70W Metal Halide	10	950	0.95	8760	8322	$1,278.3	None Proposed	0	950	0.95	8760	6132	8322	8322	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Womens Bathroom	60W Incandescent Fixture	1	60	0.06	2080	125	$19.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	19	Automatic Wall Switch Occupancy Sensor	1	0.05	106	$16.26	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$65.0	$68.5	$133.5
13th Street School - Interior	1	Storage	26W CFL Fixture	2	52	0.05	520	27	$4.2	None Proposed	0	52	0.05	520	364	27	19	Automatic Wall Switch Occupancy Sensor	1	0.00	8	$1.25	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	119	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	116	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	8	704	0.70	2080	1464	$224.9	None Proposed	0	704	0.70	2080	1456	1464	1025	Ceiling Mounted Occupancy Sensor	1	0.00	439	$67.48	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	116	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	3	168	0.17	2080	349	$53.7	None Proposed	0	168	0.17	2080	1456	349	349	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Womens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Janitor Closet	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	520	18	$2.8	None Proposed	0	35	0.04	520	364	18	18	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Guidance Supervisior	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	10	880	0.88	2080	1830	$281.1	None Proposed	0	880	0.88	2080	1456	1830	1281	Ceiling Mounted Occupancy Sensor	1	0.00	549	$84.34	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Weight Room	1X4 Fixtures w/ 1-T8 Lamps w/ Electronic Ballasts	12	304.8	0.30	2080	634	$97.4	None Proposed	0	304.8	0.30	2080	1456	634	444	Ceiling Mounted Occupancy Sensor	1	0.00	190	$29.21	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	109	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	24	1216.8	1.22	2080	2531	$388.8	None Proposed	0	1216.8	1.22	2080	1456	2531	1772	Ceiling Mounted Occupancy Sensor	2	0.00	759	$116.63	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	1	Storage	13W CFL Fixture	1	13	0.01	520	7	$1.0	None Proposed	0	13	0.01	520	364	7	7	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Mens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Mens Bathroom	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	2080	73	$11.2	None Proposed	0	35	0.04	2080	1456	73	73	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	107	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	105	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	20	2240	2.24	2080	4659	$715.7	None Proposed	0	2240	2.24	2080	1456	4659	3261	Ceiling Mounted Occupancy Sensor	1	0.00	1398	$214.70	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	106	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
13th Street School - Interior	1	Bathroom	Circline Fixture w/ 2-T8 Lamps	1	55	0.06	2080	114	$17.6	None Proposed	0	55	0.06	2080	1456	114	80	Automatic Wall Switch Occupancy Sensor	1	0.00	34	$5.27	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	1	Storage	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	520	18	$2.8	None Proposed	0	35	0.04	520	364	18	18	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Womens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$143.1	None Proposed	0	448	0.45	2080	1456	932	652	Ceiling Mounted Occupancy Sensor	1	0.00	280	$42.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Computer Server Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$9.72	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	Private Room	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$9.72	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	103	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	5	280	0.28	2080	582	$89.5	None Proposed	0	280	0.28	2080	1456	582	582	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	103	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	12	1056	1.06	2080	2196	$337.4	None Proposed	0	1056	1.06	2080	1456	2196	1538	Ceiling Mounted Occupancy Sensor	1	0.00	659	$101.21	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	101	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	9	792	0.79	2080	1647	$253.0	None Proposed	0	792	0.79	2080	1456	1647	1153	Ceiling Mounted Occupancy Sensor	1	0.00	494	$75.91	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Kitchen Storage	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	2	176	0.18	2080	366	$56.2	None Proposed	0	176	0.18	2080	1456	366	256	Automatic Wall Switch Occupancy Sensor	1	0.00	110	$16.87	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	100	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	12	1344	1.34	2080	2796	$429.4	None Proposed	0	1344	1.34	2080	1456	2796	1957	Ceiling Mounted Occupancy Sensor	1	0.00	839	$128.82	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	Receiving Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$71.6	None Proposed	0	224	0.22	2080	1456	466	326	Automatic Wall Switch Occupancy Sensor	1	0.00	140	$21.47	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	1	Receiving	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	211	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	121	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$71.6	None Proposed	0	224	0.22	2080	1456	466	326	Ceiling Mounted Occupancy Sensor	1	0.00	140	$21.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	121	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	5	440	0.44	2080	915	$140.6	None Proposed	0	440	0.44	2080	1456	915	915	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	121 Bathroom	Interior Fixture - 75W Incandescent Fixture	1	75	0.08	2080	156	$24.0	Replace 75W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	19	Automatic Wall Switch Occupancy Sensor	1	0.06	137	$21.05	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$65.0	$68.5	$133.5
13th Street School - Interior	1	121	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	105	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	120	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	16	1408	1.41	2080	2929	$449.8	None Proposed	0	1408	1.41	2080	1456	2929	2050	Ceiling Mounted Occupancy Sensor	1	0.00	879	$134.95	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	120	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	2	112	0.11	2080	233	$35.8	None Proposed	0	112	0.11	2080	1456	233	233	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	120	Interior Fixture - 75W Incandescent Fixture	1	75	0.08	2080	156	$24.0	Replace 75W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.06	129	$19.81	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	1	120	Interior Fixture - 75W Incandescent Fixture	1	75	0.08	2080	156	$24.0	Replace 75W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.06	129	$19.81	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	1	120	25W Incandescent Fixture	1	25	0.03	2080	52	$8.0	Replace 25W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.01	25	$3.83	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	1	Cafeteria	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	60	5280	5.28	2080	10982	$1,686.9	None Proposed	0	5280	5.28	2080	1456	10982	10982	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Kitchen 1	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$162.0	None Proposed	0	507	0.51	2080	1456	1055	1055	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Kitchen 1	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	211	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Kitchen 2	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	2080	422	$64.8	None Proposed	0	202.8	0.20	2080	1456	422	422	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Kitchen 2	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	105	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	83	4208.1	4.21	8760	36863	$5,662.2	None Proposed	0	4208.1	4.21	8760	6132	36863	36863	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	117	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	8	704	0.70	2080	1464	$224.9	None Proposed	0	704	0.70	2080	1456	1464	1025	Ceiling Mounted Occupancy Sensor	1	0.00	439	$67.48	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	117	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	4	224	0.22	2080	466	$71.6	None Proposed	0	224	0.22	2080	1456	466	466	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	115	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	24	1216.8	1.22	2080	2531	$388.8	None Proposed	0	1216.8	1.22	2080	1456	2531	1772	Ceiling Mounted Occupancy Sensor	2	0.00	759	$116.63	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	1	113	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	114	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	112	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	111	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	110	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	108	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	104	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	7	784	0.78	2080	1631	$250.5	None Proposed	0	784	0.78	2080	1456	1631	1142	Ceiling Mounted Occupancy Sensor	1	0.00	489	$75.14	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	104	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	211	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Storage 1-5	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	4	202.8	0.20	520	105	$16.2	None Proposed	0	202.8	0.20	520	364	105	105	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Storage 1-5	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	520	58	$8.9	None Proposed	0	112	0.11	520	364	58	58	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Storage 1-4	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	520	79	$12.1	None Proposed	0	152.1	0.15	520	364	79	79	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Storage 1-3	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	520	79	$12.1	None Proposed	0	152.1	0.15	520	364	79	79	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	Storage 1-2	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$8.1	None Proposed	0	101.4	0.10	520	364	53	53	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	102	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	19	1672	1.67	2080	3478	$534.2	None Proposed	0	1672	1.67	2080	1456	3478	2434	Ceiling Mounted Occupancy Sensor	1	0.00	1043	$160.26	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	1	102	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	7	392	0.39	2080	815	$125.2	None Proposed	0	392	0.39	2080	1456	815	815	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	1	118	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	24	2688	2.69	2080	5591	$858.8	None Proposed	0	2688	2.69	2080	1456	5591	3914	Ceiling Mounted Occupancy Sensor	1	0.00	1677	$257.64	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Hall	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	30	2640	2.64	8760	23126	$3,552.2	None Proposed	0	2640	2.64	8760	6132	23126	23126	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	59	2991.3	2.99	8760	26204	$4,024.9	None Proposed	0	2991.3	2.99	8760	6132	26204	26204	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	222 File Room	1X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	2080	233	$35.8	None Proposed	0	112	0.11	2080	1456	233	163	Automatic Wall Switch Occupancy Sensor	1	0.00	70	$10.73	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$4.86	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Hall	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$286.3	None Proposed	0	896	0.90	2080	1456	1864	1305	Automatic Wall Switch Occupancy Sensor	1	0.00	559	$85.88	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.0	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	222 Copy Room	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$4.86	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$4.86	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$4.86	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
13th Street School - Interior	2	222 Office	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	74	Automatic Wall Switch Occupancy Sensor	1	0.00	32	$4.86	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	222 Special Ed. Supervisior	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$9.72	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	Child Study Room	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$9.72	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	Book Storage	60W Incandescent Fixture	1	60	0.06	2080	125	$19.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.02	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	Mens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Computer Server Room	60W Incandescent Fixture	1	60	0.06	2080	125	$19.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.02	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	Womens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$71.6	None Proposed	0	224	0.22	2080	1456	466	326	Ceiling Mounted Occupancy Sensor	1	0.00	140	$21.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	219	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	9	1008	1.01	2080	2097	$322.0	None Proposed	0	1008	1.01	2080	1456	2097	1468	Ceiling Mounted Occupancy Sensor	1	0.00	629	$96.61	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Auditorium	Surface Mounted Fixture (Assume 5-60W Incandescent)	3	900	0.90	2080	1872	$287.5	Replace 60W Incandescent Lamps with 13W CFL	3	195	0.20	2080	1456	406	406	None Proposed	0	0.71	1466	$225.24	$0.0	$90.0	$20.0	$0.0	$0.0	$20.0	$90.0	$110.0	$60.0	$270.0	$330.0
13th Street School - Interior	2	Auditorium	Pendant Mounted Chandelier (Assume 6-200W Incandescent)	4	4800	4.80	2080	9984	$1,533.5	Replace 200W Incandescent Lamps with 55W CFL	4	1320	1.32	2080	1456	2746	2746	None Proposed	0	3.48	7238	$1,111.82	$0.0	$90.0	$20.0	$0.0	$0.0	$20.0	$90.0	$110.0	$80.0	$360.0	$440.0
13th Street School - Interior	2	Auditorium Balcony	Circline Fixture w/ 2-T8 Lamps	2	110	0.11	2080	229	$35.1	None Proposed	0	110	0.11	2080	1456	229	229	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	Stage	Stage Lights (Assume 76-60W Incandescent)	3	13680	13.68	2080	28454	$4,370.6	Replace 60W Incandescent Lamps with 13W CFL	3	2964	2.96	2080	1456	6165	6165	None Proposed	0	10.72	22289	$3,423.63	$0.0	$380.0	$40.0	$0.0	$0.0	$40.0	$380.0	$420.0	$120.0	$1,140.0	$1,260.0
13th Street School - Interior	2	Stage Hall	100W Incandescent Fixture	1	100	0.10	2080	208	$31.9	Replace 100W Incandescent Fixture with 25W CFL	1	25	0.03	2080	1456	52	52	None Proposed	0	0.08	156	$23.96	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$20.0	$7.0	$27.0
13th Street School - Interior	2	Stage Hall	100W Incandescent Fixture	1	100	0.10	2080	208	$31.9	Replace 100W Incandescent Fixture with 25W CFL	1	25	0.03	2080	1456	52	52	None Proposed	0	0.08	156	$23.96	$0.0	$7.0	$20.0	$0.0	$0.0	$20.0	$7.0	$27.0	$20.0	$7.0	$27.0
13th Street School - Interior	2	Mens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	201	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	11	968	0.97	2080	2013	$309.3	None Proposed	0	968	0.97	2080	1456	2013	1409	Ceiling Mounted Occupancy Sensor	1	0.00	604	$92.78	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	202	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	28	1419.6	1.42	2080	2953	$453.5	None Proposed	0	1419.6	1.42	2080	1456	2953	2067	Ceiling Mounted Occupancy Sensor	1	0.00	886	$136.06	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Private Room	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	4	352	0.35	2080	732	$112.5	None Proposed	0	352	0.35	2080	1456	732	513	Automatic Wall Switch Occupancy Sensor	1	0.00	220	$33.74	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	203 Main Office	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	10	880	0.88	2080	1830	$281.1	None Proposed	0	880	0.88	2080	1456	1830	1830	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	203 Office	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	2080	233	$35.8	None Proposed	0	112	0.11	2080	1456	233	163	Automatic Wall Switch Occupancy Sensor	1	0.00	70	$10.73	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	203 Closet	60W Incandescent Fixture	1	60	0.06	2080	125	$19.2	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	2080	1456	27	27	None Proposed	0	0.05	98	$15.02	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	200	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	11	968	0.97	2080	2013	$309.3	None Proposed	0	968	0.97	2080	1456	2013	1409	Ceiling Mounted Occupancy Sensor	1	0.00	604	$92.78	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Gym	6-Lamp Fluorescent Highbay Fixtures	10	2260	2.26	2080	4701	$722.0	None Proposed	0	2260	2.26	2080	1456	4701	4701	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	Storage 2-4	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	520	53	$8.1	None Proposed	0	101.4	0.10	520	364	53	53	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	220	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	5	440	0.44	2080	915	$140.6	None Proposed	0	440	0.44	2080	1456	915	641	Ceiling Mounted Occupancy Sensor	1	0.00	275	$42.17	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	220 Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	1	112	0.11	2080	233	$35.8	None Proposed	0	112	0.11	2080	1456	233	163	Automatic Wall Switch Occupancy Sensor	1	0.00	70	$10.73	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	217	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Girls Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$143.1	None Proposed	0	448	0.45	2080	1456	932	652	Ceiling Mounted Occupancy Sensor	1	0.00	280	$42.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Storage 2-6	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	214	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	210	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	204	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$259.2	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$77.75	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Girsl Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	5	560	0.56	2080	1165	$178.9	None Proposed	0	560	0.56	2080	1456	1165	815	Ceiling Mounted Occupancy Sensor	1	0.00	349	$53.67	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Display Case	24" Fluorescent w/ 2 T12 Lamp	6	336	0.34	2080	699	$107.3	Replace T12 Bulb With T8 Bulb, Replace Ballast w/ Standard Electronic Ballast	6	186	0.19	2080	1456	387	387	None Proposed	0	0.15	312	$47.92	$55.0	$10.0	$65.0	$0.0	$0.0	$65.0	$65.0	$130.0	$390.0	$390.0	$780.0
13th Street School - Interior	2	208	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	9	456.3	0.46	2080	949	$145.8	None Proposed	0	456.3	0.46	2080	1456	949	664	Ceiling Mounted Occupancy Sensor	1	0.00	285	$43.73	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	216	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Storage 2-5	Circline Fixture w/ 2-T8 Lamps	1	55	0.06	520	29	$4.4	None Proposed	0	55	0.06	520	364	29	29	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	215	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	20	1760	1.76	2080	3661	$562.3	None Proposed	0	1760	1.76	2080	1456	3661	2563	Ceiling Mounted Occupancy Sensor	1	0.00	1098	$168.69	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	215	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	2080	105	$16.2	None Proposed	0	50.7	0.05	2080	1456	105	105	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	Storage 2-8	Interior Fixture - 75W Incandescent Fixture	1	75	0.08	520	39	$6.0	Replace 75W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.06	32	$4.95	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	Storage 2-9	Interior Fixture - 75W Incandescent Fixture	1	75	0.08	520	39	$6.0	Replace 75W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.06	32	$4.95	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	2	213	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	30	2640	2.64	2080	5491	$843.4	None Proposed	0	2640	2.64	2080	1456	5491	3844	Ceiling Mounted Occupancy Sensor	2	0.00	1647	$253.03	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	2	212	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	211	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	10	507	0.51	2080	1055	$162.0	None Proposed	0	507	0.51	2080	1456	1055	738	Ceiling Mounted Occupancy Sensor	1	0.00	316	$48.59	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	209	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$97.2	None Proposed	0	304.2	0.30	2080	1456	633	443	Ceiling Mounted Occupancy Sensor	1	0.00	190	$29.16	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	208	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	15	760.5	0.76	2080	1582	$243.0	None Proposed	0	760.5	0.76	2080	1456	1582	1107	Ceiling Mounted Occupancy Sensor	1	0.00	475	$72.89	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	208 Storage	Interior Fixture - 75W Incandescent Fixture	15	1125	1.13	520	585	$89.9	Replace 75W Incandescent Fixture with 13W CFL	15	195	0.20	520	364	101	101	None Proposed	0	0.93	484	$74.28	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$300.0	$75.0	$375.0
13th Street School - Interior	2	207	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	15	760.5	0.76	2080	1582	$243.0	None Proposed	0	760.5	0.76	2080	1456	1582	1107	Ceiling Mounted Occupancy Sensor	1	0.00	475	$72.89	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Storage 2-3	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	520	18	$2.8	None Proposed	0	35	0.04	520	364	18	18	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	206	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$259.2	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$77.75	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	204	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	8	896	0.90	2080	1864	$286.3	None Proposed	0	896	0.90	2080	1456	1864	1305	Ceiling Mounted Occupancy Sensor	1	0.00	559	$85.88	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	204	2X2 Troffers w/ 3-32W T8 Lamps w/ Electronic Ballasts	4	372	0.37	2080	774	$118.8	None Proposed	0	372	0.37	2080	1456	774	774	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	2	200	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	17	1496	1.50	2080	3112	$478.0	None Proposed	0	1496	1.50	2080	1456	3112	2178	Ceiling Mounted Occupancy Sensor	1	0.00	934	$143.39	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	200 Storage	Interior Fixture - 75W Incandescent Fixture	2	150	0.15	520	78	$12.0	Replace 75W Incandescent Fixture with 13W CFL	2	26	0.03	520	364	14	14	None Proposed	0	0.12	64	$9.90	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$40.0	$10.0	$50.0
13th Street School - Interior	2	Mailroom	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	2	101.4	0.10	2080	211	$32.4	None Proposed	0	101.4	0.10	2080	1456	211	148	Automatic Wall Switch Occupancy Sensor	1	0.00	63	$9.72	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	2	Mailroom	Circline Fixture w/ 2-T8 Lamps	1	55	0.06	2080	114	$17.6	None Proposed	0	55	0.06	2080	1456	114	114	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
13th Street School - Interior	2	Faculty Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	2	Storage 2-2	Circline Fixture w/ 2-T8 Lamps	4	220	0.22	520	114	$17.6	None Proposed	0	220	0.22	520	364	114	114	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	302	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	13	659.1	0.66	2080	1371	$210.6	None Proposed	0	659.1	0.66	2080	1456	1371	960	Ceiling Mounted Occupancy Sensor	1	0.00	411	$63.17	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	Storage	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	Womens Bathroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$143.1	None Proposed	0	448	0.45	2080	1456	932	652	Ceiling Mounted Occupancy Sensor	1	0.00	280	$42.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	306	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$324.0	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$97.19	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	308	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	309	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	26	1318.2	1.32	2080	2742	$421.1	None Proposed	0	1318.2	1.32	2080	1456	2742	1919	Ceiling Mounted Occupancy Sensor	2	0.00	823	$126.34	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	3	309 Storage	13W CFL Fixture	1	13	0.01	520	7	$1.0	None Proposed	0	13	0.01	520	364	7	7	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	Storage	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.0	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	315	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	18	912.6	0.91	2080	1898	$291.6	None Proposed	0	912.6	0.91	2080	1456	1898	1329	Ceiling Mounted Occupancy Sensor	1	0.00	569	$87.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	315 Storage	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	Storage	Circline Fixture w/ 1-T8 Lamps	1	35	0.04	520	18	$2.8	None Proposed	0	35	0.04	520	364	18	18	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	317	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	319	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$129.6	None Proposed	0	405.6	0.41	2080	1456	844	591	Ceiling Mounted Occupancy Sensor	1	0.00	253	$38.88	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Stage Room Above	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	Stage Room Above	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	321	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	8	405.6	0.41	2080	844	$129.6	None Proposed	0	405.6	0.41	2080	1456	844	591	Ceiling Mounted Occupancy Sensor	1	0.00	253	$38.88	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	322	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$259.2	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$77.75	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	303	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	16	811.2	0.81	2080	1687	$259.2	None Proposed	0	811.2	0.81	2080	1456	1687	1181	Ceiling Mounted Occupancy Sensor	1	0.00	506	$77.75	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	304	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	9	792	0.79	2080	1647	$253.0	None Proposed	0	792	0.79	2080	1456	1647	1153	Ceiling Mounted Occupancy Sensor	1	0.00	494	$75.91	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	76	3853.2	3.85	8760	33754	$5,184.6	None Proposed	0	3853.2	3.85	8760	6132	33754	23628	Ceiling Mounted Occupancy Sensor	1	0.00	10126	$1,555.39	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Library	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	18	1584	1.58	2080	3295	$506.1	None Proposed	0	1584	1.58	2080	1456	3295	3295	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	Library Storage	2x4 Fixtures w/ 4-T12 Lamp Fixture w/ Magnetic Ballast	1	171.2	0.17	520	89	$13.7	Replace T12 Bulbs With High Perf. T8 Bulbs, Replace Ballast w/ High Perf., 0.78 Ballast Factor Ballast	1	97.3	0.10	520	364	51	51	None Proposed	0	0.07	38	$5.90	$105.0	$20.0	$65.0	$0.0	$0.0	$65.0	$125.0	$190.0	$65.0	$125.0	$190.0
13th Street School - Interior	3	Library Storage	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	Storage 3-5	Circline Fixture w/ 2-T8 Lamps	1	55	0.06	520	29	$4.4	None Proposed	0	55	0.06	520	364	29	29	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	Boys Restroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Storage 3-5	Circline Fixture w/ 2-T8 Lamps	1	55	0.06	520	29	$4.4	None Proposed	0	55	0.06	520	364	29	29	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	Boys Restroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	3	336	0.34	2080	699	$107.3	None Proposed	0	336	0.34	2080	1456	699	489	Ceiling Mounted Occupancy Sensor	1	0.00	210	$32.20	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Boys Restroom	60W Incandescent Fixture	2	120	0.12	2080	250	$38.3	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	38	Ceiling Mounted Occupancy Sensor	1	0.09	212	$32.52	$0.0	$5.0	$20.0	$103.0	$73.5	$20.0	$5.0	$25.0	$113.5	$113.0	$226.5
13th Street School - Interior	3	310	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	311	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	6	304.2	0.30	2080	633	$97.2	None Proposed	0	304.2	0.30	2080	1456	633	443	Ceiling Mounted Occupancy Sensor	1	0.00	190	$29.16	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	312	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$324.0	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$97.19	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	313	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	24	2112	2.11	2080	4393	$674.8	None Proposed	0	2112	2.11	2080	1456	4393	3075	Ceiling Mounted Occupancy Sensor	2	0.00	1318	$202.43	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	3	313 Bathroom	60W Incandescent Fixture	2	120	0.12	2080	250	$38.3	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	38	Automatic Wall Switch Occupancy Sensor	1	0.09	212	$32.52	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$85.0	$73.5	$158.5
13th Street School - Interior	3	314	2X4 Fixtures w/ 3-T8 Lamps w/ Electronic Ballasts	22	1936	1.94	2080	4027	$618.5	None Proposed	0	1936	1.94	2080	1456	4027	2819	Ceiling Mounted Occupancy Sensor	2	0.00	1208	$185.56	$0.0	$0.0	$0.0	$206.0	$147.0	$0.0	$0.0	$0.0	$294.0	$412.0	$706.0
13th Street School - Interior	3	314 Storage	60W Incandescent Fixture	4	240	0.24	520	125	$19.2	Replace 60W Incandescent Fixture with 13W CFL	4	52	0.05	520	364	27	27	None Proposed	1	0.19	98	$15.02	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$80.0	$20.0	$100.0
13th Street School - Interior	3	314 Bathroom	60W Incandescent Fixture	2	120	0.12	2080	250	$38.3	Replace 60W Incandescent Fixture with 13W CFL	2	26	0.03	2080	1456	54	38	Automatic Wall Switch Occupancy Sensor	1	0.09	212	$32.52	$0.0	$5.0	$20.0	$63.5	$45.0	$20.0	$5.0	$25.0	$85.0	$73.5	$158.5
13th Street School - Interior	3	Storage 3-7	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.0	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	Girls Restroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	4	448	0.45	2080	932	$143.1	None Proposed	0	448	0.45	2080	1456	932	652	Ceiling Mounted Occupancy Sensor	1	0.00	280	$42.94	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	316	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	17	861.9	0.86	2080	1793	$275.4	None Proposed	0	861.9	0.86	2080	1456	1793	1255	Ceiling Mounted Occupancy Sensor	1	0.00	538	$82.61	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	316 Storage	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	1	50.7	0.05	520	26	$4.0	None Proposed	0	50.7	0.05	520	364	26	26	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	3	316 Storage	2X2 Fixtures w/ 2-32W T8 Lamps w/ Electronic Ballasts	2	112	0.11	520	58	$8.9	None Proposed	0	112	0.11	520	364	58	41	Automatic Wall Switch Occupancy Sensor	1	0.00	17	$2.68	$0.0	$0.0	$0.0	$63.5	$45.0	$0.0	$0.0	$0.0	$45.0	$63.5	$108.5
13th Street School - Interior	3	318	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	307	2X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	12	608.4	0.61	2080	1265	$194.4	None Proposed	0	608.4	0.61	2080	1456	1265	886	Ceiling Mounted Occupancy Sensor	1	0.00	380	$58.31	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	Girls Restroom	2X4 Fixtures w/ 4-T8 Lamps w/ Electronic Ballasts	2	224	0.22	2080	466	$71.6	None Proposed	0	224	0.22	2080	1456	466	326	Ceiling Mounted Occupancy Sensor	1	0.00	140	$21.47	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	IDR	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	3	301	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$324.0	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$97.19	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	3	300	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	20	1014	1.01	2080	2109	$324.0	None Proposed	0	1014	1.01	2080	1456	2109	1476	Ceiling Mounted Occupancy Sensor	1	0.00	633	$97.19	$0.0	$0.0	$0.0	$103.0	$73.5	$0.0	$0.0	$0.0	$73.5	$103.0	$176.5
13th Street School - Interior	4	4 Flr. Stairwell	60W Incandescent Fixture	1	60	0.06	520	31	$4.8	Replace 60W Incandescent Fixture with 13W CFL	1	13	0.01	520	364	7	7	None Proposed	0	0.05	24	$3.75	$0.0	$5.0	$20.0	$0.0	$0.0	$20.0	$5.0	$25.0	$20.0	$5.0	$25.0
13th Street School - Interior	4	Storage Hall	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	3	152.1	0.15	520	79	$12.1	None Proposed	0	152.1	0.15	520	364	79	79	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	4	Storage	1X4 Fixtures w/ 2-T8 Lamps w/ Electronic Ballasts	9	456.3	0.46	520	237	$36.4	None Proposed	0	456.3	0.46	520	364	237	237	None Proposed	0	0.00	0	$0.00	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
13th Street School - Interior	-	Exit Signs	CFL Exit Sign	83	1328	1.33	520	691	$106.1	Replace CFL Exit Sign with LED Exit Sign	83	415	0.42	520	364	216	216	None Proposed	0	0.91	475	$72.92	$0.0	$61.0	$63.0	$0.0	$0.0	$63.0	$61.0	$124.0	$5,229.0	$5,063.0	$10,292.0
13th Street School - Exterior	-	Canopy	Exterior Fixture (Assume 70w)	5	450	0.45	4380	1971	$302.7	Replace 70W Fixture with Induction Light Fixture	5	220	0.22	4380	3066	964	964	None Proposed	0	0.23	1007	$154.74	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$685.0	$1,900.0	$2,585.0
13th Street School - Exterior	-	Wall Packs	Exterior Wall Packs (Assume 70w)	3	270	0.27	4380	1183	$181.6	Replace 70W Fixture with Induction Light Fixture	3	132	0.13	4380	3066	578	578	None Proposed	0	0.14	604	$92.84	$0.0	$380.0	$137.0	$0.0	$0.0	$137.0	$380.0	$517.0	$411.0	$1,140.0	$1,551.0

Appendix D - Lighting Spreadsheet

Building	Floor #	Location/Room #	Existing Fixture/Lamp & Ballast Description	Qty of Existing Fixtures	Existing Fixture Watts	Existing kW	Operating Hours	Existing kWh	Existing Annual Energy Cost	Proposed Replacement Solution	Quantity of Proposed Fixtures	Proposed Fixture Watts	Proposed kW Base	Proposed Operational Hours Without Sensors	Proposed Operational Hours With Sensors	Proposed kWh Without Sensors	Proposed kWh With Sensors	Proposed Occupancy Sensor Type	Occupancy Sensor Quantity	Total kW Saved	Total kWh Saved	Energy Cost Savings	Ballast/ Fixture/ Reflector Per Unit Price	Bulb (Per Unit Price)	Labor (Per Unit Price)	Occupancy Sensor (Per Unit Price)	Occupany Sensor (Per Unit Labor Price)	Labor Subtotal	Materials Subtotal	Labor & Materials Subtotal	Labor Total	Materials Total	Labor & Materials Total
13th Street School - Exterior	-	Parking Lights	Pole Mounted Luminare - 1 Head (Assume 400W MH)	7	3206	3.21	4380	14042	$2,156.9	Replace 400W Fixture with Induction Light Fixture	7	1505	1.51	4380	3066	6592	6592	None Proposed	0	1.70	7450	$1,144.38	$0.0	$485.0	$137.0	$0.0	$0.0	$137.0	$485.0	$622.0	$959.0	$3,395.0	$4,354.0

APPENDIX E

SOLAR ENERGY FINANCING WORKSHEET

Essex County Technical Schools - Board Office
Design Goal: Provide
35% of average annual electricity

Existing Conditons

Average Annual Electrical Usage (kWh)	280,320
Current Utility Price ($/kWh)	$0.1629

Calculations

Solar Rating (Zip Code: 07728)	4.60 kWh/sq-m/day
Solar Capacity Required (kW)	80.39
Roof Space Needed (sq-ft)	8,039
Annual Solar kWh (PV Watts)	98,526
Net System installation Cost ($9/kWh)	$723,510
Electrical Service Modification Cost	$100,000
Total System Installation Cost	**$823,510**
Materials	$576,457
Labor	$247,053
Engineers Opinion of Probable Cost	$1,029,388

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	2%

Year	Utility Price	Solar kWh	Utility Savings	SRECS	Maintenance Costs	Annual Cash Flow	Cummulative Cash Flow
Install							
1	0.1629	98,526.0	$16,049.9	$66,505	($1,971)	$80,584.4	$80,584.4
2	0.1678	98,033.4	$16,448.7	$64,518	($1,961)	$79,006.3	$159,590.7
3	0.1728	97,543.2	$16,857.5	$62,571	($1,951)	$77,478.1	$237,068.8
4	0.1780	97,055.5	$17,276.4	$60,391	($1,941)	$75,726.1	$312,794.9
5	0.1833	96,570.2	$17,705.7	$58,286	($1,931)	$74,060.5	$386,855.4
6	0.1888	96,087.4	$18,145.7	$56,255	($1,922)	$72,478.9	$459,334.3
7	0.1945	95,606.9	$18,596.6	$54,294	($1,912)	$70,978.9	$530,313.3
8	0.2003	95,128.9	$19,058.7	$52,402	($1,903)	$69,558.5	$599,871.7
9	0.2064	94,653.2	$19,532.3	$50,576	($1,893)	$68,215.4	$668,087.1
10	0.2125	94,180.0	$20,017.7	$48,814	($1,884)	$66,947.6	$735,034.8
11	0.2189	93,709.1	$20,515.2	$47,112	($1,874)	$65,753.3	$800,788.1
12	0.2255	93,240.5	$21,025.0	$45,470	($1,865)	$64,630.7	$865,418.8
13	0.2323	92,774.3	$21,547.4	$43,886	($1,855)	$63,577.8	$928,996.6
14	0.2392	92,310.5	$22,082.9	$42,356	($1,846)	$62,593.1	$991,589.7
15	0.2464	91,848.9	$22,631.6	$40,880	($1,837)	$61,675.0	$1,053,264.6
16	0.2538	91,389.7	$23,194.0	$2,285	($1,828)	$23,651.0	$1,076,915.6
17	0.2614	90,932.7	$23,770.4	$2,273	($1,819)	$24,225.1	$1,101,140.7
18	0.2692	90,478.0	$24,361.1	$2,262	($1,810)	$24,813.5	$1,125,954.2
19	0.2773	90,025.7	$24,966.5	$2,251	($1,801)	$25,416.6	$1,151,370.8
20	0.2856	89,575.5	$25,586.9	$2,239	($1,792)	$26,034.8	$1,177,405.6
21	0.2942	89,127.7	$26,222.7	$2,228	($1,783)	$26,668.4	$1,204,074.0
22	0.3030	88,682.0	$26,874.4	$2,217	($1,774)	$27,317.8	$1,231,391.8
23	0.3121	88,238.6	$27,542.2	$2,206	($1,765)	$27,983.4	$1,259,375.2
24	0.3215	87,797.4	$28,226.6	$2,195	($1,756)	$28,665.6	$1,288,040.8
25	0.3311	87,358.4	$28,928.1	$2,184	($1,747)	$29,364.8	$1,317,405.6

Essex County Technical Schools - West Caldwell School
Design Goal: Provide
23% of average annual electricity

Existing Conditons

Average Annual Electrical Usage (kWh)	872,400
Current Utility Price ($/kWh)	$0.1623

Calculations

Solar Rating (Zip Code: 07728)	4.60 kWh/sq-m/day
Solar Capacity Required (kW)	163.77
Roof Space Needed (sq-ft)	16,377
Annual Solar kWh (PV Watts)	200,716
Net System installation Cost ($9/kWh)	$1,473,930
Electrical Service Modification Cost	$100,000
Total System Installation Cost	**$1,573,930**
Materials	$1,101,751
Labor	$472,179
Engineers Opinion of Probable Cost	$1,967,413

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	2%

Year	Utility Price	Solar kWh	Utility Savings	SRECS	Maintenance Costs	Annual Cash Flow	Cummulative Cash Flow
Install							
1	0.1623	200,716.0	$32,576.2	$135,483	($4,014)	$164,045.2	$164,045.2
2	0.1672	199,712.4	$33,385.7	$131,436	($3,994)	$160,827.2	$324,872.4
3	0.1722	198,713.9	$34,215.4	$127,470	($3,974)	$157,710.9	$482,583.3
4	0.1773	197,720.3	$35,065.6	$123,028	($3,954)	$154,138.7	$636,722.1
5	0.1827	196,731.7	$35,937.0	$118,740	($3,935)	$150,742.4	$787,464.5
6	0.1882	195,748.0	$36,830.0	$114,602	($3,915)	$147,517.0	$934,981.5
7	0.1938	194,769.3	$37,745.3	$110,608	($3,895)	$144,457.9	$1,079,439.4
8	0.1996	193,795.4	$38,683.2	$106,753	($3,876)	$141,560.7	$1,221,000.1
9	0.2056	192,826.5	$39,644.5	$103,033	($3,857)	$138,821.0	$1,359,821.1
10	0.2118	191,862.3	$40,629.7	$99,442	($3,837)	$136,234.7	$1,496,055.8
11	0.2181	190,903.0	$41,639.3	$95,977	($3,818)	$133,798.0	$1,629,853.8
12	0.2247	189,948.5	$42,674.1	$92,632	($3,799)	$131,507.0	$1,761,360.8
13	0.2314	188,998.8	$43,734.5	$89,404	($3,780)	$129,358.3	$1,890,719.1
14	0.2383	188,053.8	$44,821.3	$86,288	($3,761)	$127,348.2	$2,018,067.3
15	0.2455	187,113.5	$45,935.1	$83,281	($3,742)	$125,473.7	$2,143,541.1
16	0.2529	186,177.9	$47,076.6	$4,654	($3,724)	$48,007.5	$2,191,548.6
17	0.2604	185,247.0	$48,246.5	$4,631	($3,705)	$49,172.7	$2,240,721.2
18	0.2683	184,320.8	$49,445.4	$4,608	($3,686)	$50,367.0	$2,291,088.2
19	0.2763	183,399.2	$50,674.1	$4,585	($3,668)	$51,591.1	$2,342,679.3
20	0.2846	182,482.2	$51,933.3	$4,562	($3,650)	$52,845.8	$2,395,525.1
21	0.2931	181,569.8	$53,223.9	$4,539	($3,631)	$54,131.7	$2,449,656.8
22	0.3019	180,661.9	$54,546.5	$4,517	($3,613)	$55,449.8	$2,505,106.6
23	0.3110	179,758.6	$55,902.0	$4,494	($3,595)	$56,800.8	$2,561,907.4
24	0.3203	178,859.8	$57,291.1	$4,471	($3,577)	$58,185.4	$2,620,092.9
25	0.3299	177,965.5	$58,714.8	$4,449	($3,559)	$59,604.7	$2,679,697.5

Essex County Technical Schools - Newark Technical School
Design Goal: Provide
14% of average annual electricity

Existing Conditons

Average Annual Electrical Usage (kWh)	2,254,539
Current Utility Price ($/kWh)	$0.1680

Calculations

Solar Rating (Zip Code: 07728)	4.60 kWh/sq-m/day
Solar Capacity Required (kW)	265.15
Roof Space Needed (sq-ft)	26,515
Annual Solar kWh (PV Watts)	324,968
Net System installation Cost ($9/kWh)	$2,386,350
Electrical Service Modification Cost	$100,000
Total System Installation Cost	**$2,486,350**
Materials	$1,740,445
Labor	$745,905
Engineers Opinion of Probable Cost	$3,107,938

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	2%

Year	Utility Price	Solar kWh	Utility Savings	SRECS	Maintenance Costs	Annual Cash Flow	Cummulative Cash Flow
Install							
1	0.1680	324,968.0	$54,594.6	$219,353	($6,499)	$267,448.7	$267,448.7
2	0.1730	323,343.2	$55,951.3	$212,800	($6,467)	$262,284.7	$529,733.3
3	0.1782	321,726.4	$57,341.7	$206,379	($6,435)	$257,286.5	$787,019.8
4	0.1836	320,117.8	$58,766.6	$199,187	($6,402)	$251,551.2	$1,038,571.0
5	0.1891	318,517.2	$60,227.0	$192,245	($6,370)	$246,101.9	$1,284,673.0
6	0.1948	316,924.6	$61,723.6	$185,546	($6,338)	$240,930.7	$1,525,603.6
7	0.2006	315,340.0	$63,257.5	$179,079	($6,307)	$236,029.9	$1,761,633.6
8	0.2066	313,763.3	$64,829.4	$172,838	($6,275)	$231,392.5	$1,993,026.1
9	0.2128	312,194.5	$66,440.4	$166,815	($6,244)	$227,011.5	$2,220,037.6
10	0.2192	310,633.5	$68,091.5	$161,001	($6,213)	$222,880.2	$2,442,917.8
11	0.2258	309,080.4	$69,783.5	$155,391	($6,182)	$218,992.5	$2,661,910.3
12	0.2326	307,535.0	$71,517.7	$149,975	($6,151)	$215,342.2	$2,877,252.5
13	0.2395	305,997.3	$73,294.9	$144,749	($6,120)	$211,923.5	$3,089,176.0
14	0.2467	304,467.3	$75,116.2	$139,704	($6,089)	$208,731.0	$3,297,906.9
15	0.2541	302,945.0	$76,982.9	$134,835	($6,059)	$205,759.4	$3,503,666.3
16	0.2617	301,430.2	$78,895.9	$7,536	($6,029)	$80,403.1	$3,584,069.4
17	0.2696	299,923.1	$80,856.5	$7,498	($5,998)	$82,356.1	$3,666,425.4
18	0.2777	298,423.5	$82,865.8	$7,461	($5,968)	$84,357.9	$3,750,783.3
19	0.2860	296,931.3	$84,925.0	$7,423	($5,939)	$86,409.6	$3,837,192.9
20	0.2946	295,446.7	$87,035.4	$7,386	($5,909)	$88,512.6	$3,925,705.5
21	0.3034	293,969.5	$89,198.2	$7,349	($5,879)	$90,668.0	$4,016,373.5
22	0.3125	292,499.6	$91,414.8	$7,312	($5,850)	$92,877.3	$4,109,250.8
23	0.3219	291,037.1	$93,686.4	$7,276	($5,821)	$95,141.6	$4,204,392.4
24	0.3316	289,581.9	$96,014.5	$7,240	($5,792)	$97,462.4	$4,301,854.8
25	0.3415	288,134.0	$98,400.5	$7,203	($5,763)	$99,841.1	$4,401,696.0

Essex County Technical Schools - Bloomfield Technical School
Design Goal: Provide
37% of average annual electricity

Existing Conditons

Average Annual Electrical Usage (kWh)	468,200
Current Utility Price ($/kWh)	$0.1742

Calculations

Solar Rating (Zip Code: 07728)	4.60 kWh/sq-m/day
Solar Capacity Required (kW)	139.55
Roof Space Needed (sq-ft)	13,955
Annual Solar kWh (PV Watts)	171,033
Net System installation Cost ($9/kWh)	$1,255,950
Electrical Service Modification Cost	$100,000
Total System Installation Cost	**$1,355,950**
Materials	$949,165
Labor	$406,785
Engineers Opinion of Probable Cost	$1,694,938

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	2%

Year	Utility Price	Solar kWh	Utility Savings	SRECS	Maintenance Costs	Annual Cash Flow	Cummulative Cash Flow
Install							
1	0.1742	171,033.0	$29,793.9	$115,447	($3,421)	$141,820.6	$141,820.6
2	0.1794	170,177.8	$30,534.3	$111,998	($3,404)	$139,129.1	$280,949.6
3	0.1848	169,326.9	$31,293.1	$108,619	($3,387)	$136,525.5	$417,475.1
4	0.1904	168,480.3	$32,070.7	$104,834	($3,370)	$133,534.7	$551,009.8
5	0.1961	167,637.9	$32,867.7	$101,180	($3,353)	$130,695.0	$681,704.8
6	0.2019	166,799.7	$33,684.5	$97,654	($3,336)	$128,002.4	$809,707.2
7	0.2080	165,965.7	$34,521.5	$94,251	($3,319)	$125,452.9	$935,160.2
8	0.2142	165,135.9	$35,379.4	$90,966	($3,303)	$123,042.7	$1,058,202.9
9	0.2207	164,310.2	$36,258.6	$87,796	($3,286)	$120,768.3	$1,178,971.2
10	0.2273	163,488.7	$37,159.6	$84,736	($3,270)	$118,626.0	$1,297,597.2
11	0.2341	162,671.2	$38,083.0	$81,783	($3,253)	$116,612.7	$1,414,210.0
12	0.2411	161,857.9	$39,029.4	$78,933	($3,237)	$114,725.2	$1,528,935.2
13	0.2484	161,048.6	$39,999.2	$76,182	($3,221)	$112,960.5	$1,641,895.7
14	0.2558	160,243.3	$40,993.2	$73,527	($3,205)	$111,315.6	$1,753,211.3
15	0.2635	159,442.1	$42,011.9	$70,965	($3,189)	$109,787.9	$1,862,999.2
16	0.2714	158,644.9	$43,055.9	$3,966	($3,173)	$43,849.1	$1,906,848.3
17	0.2795	157,851.7	$44,125.8	$3,946	($3,157)	$44,915.1	$1,951,763.4
18	0.2879	157,062.4	$45,222.4	$3,927	($3,141)	$46,007.7	$1,997,771.1
19	0.2966	156,277.1	$46,346.1	$3,907	($3,126)	$47,127.5	$2,044,898.6
20	0.3055	155,495.7	$47,497.8	$3,887	($3,110)	$48,275.3	$2,093,173.9
21	0.3146	154,718.2	$48,678.2	$3,868	($3,094)	$49,451.8	$2,142,625.7
22	0.3241	153,944.7	$49,887.8	$3,849	($3,079)	$50,657.5	$2,193,283.2
23	0.3338	153,174.9	$51,127.5	$3,829	($3,063)	$51,893.4	$2,245,176.6
24	0.3438	152,409.1	$52,398.0	$3,810	($3,048)	$53,160.1	$2,298,336.7
25	0.3541	151,647.0	$53,700.1	$3,791	($3,033)	$54,458.4	$2,352,795.1

Essex County Technical Schools - North 13th Street School
Design Goal: Provide
23% of average annual electricity

Existing Conditons

Average Annual Electrical Usage (kWh)	893,230
Current Utility Price ($/kWh)	$0.1536

Calculations

Solar Rating (Zip Code: 07728)	4.60 kWh/sq-m/day
Solar Capacity Required (kW)	169.96
Roof Space Needed (sq-ft)	16,996
Annual Solar kWh (PV Watts)	208,303
Net System installation Cost ($9/kWh)	$1,529,640
Electrical Service Modification Cost	$100,000
Total System Installation Cost	**$1,629,640**
Materials	$1,140,748
Labor	$488,892
Engineers Opinion of Probable Cost	$2,037,050

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	2%

Year	Utility Price	Solar kWh	Utility Savings	SRECS	Maintenance Costs	Annual Cash Flow	Cummulative Cash Flow
Install							
1	0.1536	208,303.0	$31,995.3	$140,605	($4,166)	$168,433.8	$168,433.8
2	0.1582	207,261.5	$32,790.4	$136,404	($4,145)	$165,049.2	$333,483.0
3	0.1630	206,225.2	$33,605.3	$132,288	($4,125)	$161,768.9	$495,251.9
4	0.1678	205,194.1	$34,440.4	$127,678	($4,104)	$158,014.4	$653,266.3
5	0.1729	204,168.1	$35,296.2	$123,228	($4,083)	$154,441.2	$807,707.5
6	0.1781	203,147.2	$36,173.3	$118,934	($4,063)	$151,044.2	$958,751.7
7	0.1834	202,131.5	$37,072.2	$114,789	($4,043)	$147,818.6	$1,106,570.3
8	0.1889	201,120.8	$37,993.5	$110,789	($4,022)	$144,759.7	$1,251,330.0
9	0.1946	200,115.2	$38,937.6	$106,928	($4,002)	$141,862.9	$1,393,192.9
10	0.2004	199,114.7	$39,905.2	$103,201	($3,982)	$139,124.1	$1,532,317.0
11	0.2064	198,119.1	$40,896.8	$99,605	($3,962)	$136,539.1	$1,668,856.1
12	0.2126	197,128.5	$41,913.1	$96,133	($3,943)	$134,104.0	$1,802,960.1
13	0.2190	196,142.9	$42,954.7	$92,783	($3,923)	$131,815.0	$1,934,775.1
14	0.2256	195,162.1	$44,022.1	$89,550	($3,903)	$129,668.5	$2,064,443.6
15	0.2323	194,186.3	$45,116.0	$86,429	($3,884)	$127,661.2	$2,192,104.8
16	0.2393	193,215.4	$46,237.2	$4,830	($3,864)	$47,203.3	$2,239,308.0
17	0.2465	192,249.3	$47,386.2	$4,806	($3,845)	$48,347.4	$2,287,655.5
18	0.2539	191,288.1	$48,563.7	$4,782	($3,826)	$49,520.2	$2,337,175.6
19	0.2615	190,331.6	$49,770.5	$4,758	($3,807)	$50,722.2	$2,387,897.8
20	0.2693	189,380.0	$51,007.3	$4,734	($3,788)	$51,954.2	$2,439,852.0
21	0.2774	188,433.1	$52,274.9	$4,711	($3,769)	$53,217.0	$2,493,069.1
22	0.2857	187,490.9	$53,573.9	$4,687	($3,750)	$54,511.3	$2,547,580.4
23	0.2943	186,553.5	$54,905.2	$4,664	($3,731)	$55,838.0	$2,603,418.4
24	0.3031	185,620.7	$56,269.6	$4,641	($3,712)	$57,197.7	$2,660,616.1
25	0.3122	184,692.6	$57,667.9	$4,617	($3,694)	$58,591.4	$2,719,207.4

APPENDIX F

FACILITY DATA FORMS

New Jersey's Clean Energy Program
njcleanenergy.com

APPENDIX C - FACILITY DATA FORM

*Complete one Facility Data Form for **each** building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.*

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name Board of Education Office (in DPW Building)			
Street Address 900 Bloomfield Ave		**County**	
City Verona		**State** NJ	**Zip** 07044
Facility's Description			
Total Sq Ft 15,000	**Year Built** 1970	**Hours/Week Occupied** 40-50	**Number of Employees** 55

Building Type (Check only one of the following):

☐	**Emergency Services**	☐	**Garage**
☐	**Center/Meeting Hall/Library**	☒	**Offices**
☐	**Recreation/Entertainment/Parks**	☐	**Religious**
☐	**School**	☐	**School: College**
☐	**Water Treatment/Pumping**	☐	**Other:** _____

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Period: 1/1/2009 to 12/1/2009

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

ELECTRICITY

Electric Utility Name & Account Number(s)	
PSE+G: 65-378-147-07	
Annual kWh Use	**Annual Electricity Cost**
275,840	$ 44,992
Max Summer kW	**Max Winter kW**
—	—

NATURAL GAS

Natural Gas Utility Name & Account Number(s)	
PSE+G: 12-038-101-05	
Annual Use in Therms	**Annual Natural Gas Cost**
10,732	$ 17,783

FUEL OIL

Fuel Oil Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Fuel Oil Cost**

PROPANE

Propane Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Propane Cost**

OTHER

In this section please indicate any other fuel type that the facility uses, such as: solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fuel Type:	
NA	
Annual Energy Use (indicate units)	**Annual Energy Cost**

STAFF USE ONLY

Date Received: _____ Project No.: _____

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

APPENDIX C - FACILITY DATA FORM

*Complete one Facility Data Form for **each** building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.*

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name West Caldwell Technical School			
Street Address 620 Passaic Ave		**County**	
City West Caldwell		**State** NJ	**Zip** 07006
Facility's Description High School			
Total Sq Ft 80,493	**Year Built** 1963	**Hours/Week Occupied** 90-100	**Number of Employees** 59

Building Type (Check only one of the following):

☐	**Emergency Services**	☐	**Garage**
☐	**Center/Meeting Hall/Library**	☐	**Offices**
☐	**Recreation/Entertainment/Parks**	☐	**Religious**
☒	**School**	☐	**School: College**
☐	**Water Treatment/Pumping**	☐	**Other:** _____

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Period: 12/17/2007 to 11/15/2008 (electric)

3/16/2008 to Jan 11, 2009 (gas)

New Jersey's Clean Energy Program
Your Power to Save
njcleanenergy.com

ELECTRICITY

Electric Utility Name & Account Number(s)	
PSE+G 12-429-160-16	
Annual kWh Use	**Annual Electricity Cost**
867,000	$131,660
Max Summer kW	**Max Winter kW**
282	222

NATURAL GAS

Natural Gas Utility Name & Account Number(s)	
PSE+G 12-429-160-16	
Annual Use in Therms	**Annual Natural Gas Cost**
41,821	$55,872

FUEL OIL

Fuel Oil Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Fuel Oil Cost**

PROPANE

Propane Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Propane Cost**

OTHER

In this section please indicate any other fuel type that the facility uses, such as: solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fuel Type:	
NA	
Annual Energy Use (indicate units)	**Annual Energy Cost**

STAFF USE ONLY

Date Received: _____ Project No.: _____

New Jersey's Clean Energy PROGRAM
njcleanenergy.com

APPENDIX C - FACILITY DATA FORM

*Complete one Facility Data Form for **each** building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.*

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name Bloomfield Technical High School			
Street Address 209 Franklin St		**County**	
City Bloomfield		**State** NJ	**Zip** 07003
Facility's Description High School			
Total Sq Ft 93,831	**Year Built** 1931	**Hours/Week Occupied** 90-100	**Number of Employees** 63

Building Type (Check only one of the following):

☐	**Emergency Services**	☐	**Garage**
☐	**Center/Meeting Hall/Library**	☐	**Offices**
☐	**Recreation/Entertainment/Parks**	☐	**Religious**
☒	**School**	☐	**School: College**
☐	**Water Treatment/Pumping**	☐	**Other:** _____

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Period: 2/7/2009 to 1/15/2010

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

ELECTRICITY

Electric Utility Name & Account Number(s)	
PSE+G 12-416-012-08	
Annual kWh Use	**Annual Electricity Cost**
523,400	$87,658
Max Summer kW	**Max Winter kW**
300	256

NATURAL GAS

Natural Gas Utility Name & Account Number(s)	
PSE+G 12-377-101-11	
Annual Use in Therms	**Annual Natural Gas Cost**
100,927	$102,692

FUEL OIL

Fuel Oil Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Fuel Oil Cost**

PROPANE

Propane Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Propane Cost**

OTHER

In this section please indicate any other fuel type that the facility uses, such as: solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fuel Type:	
NA	
Annual Energy Use (indicate units)	**Annual Energy Cost**

STAFF USE ONLY

Date Received: _____ Project No.: _____

New Jersey's Clean Energy Program
njcleanenergy.com

APPENDIX C - FACILITY DATA FORM

*Complete one Facility Data Form for **each** building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.*

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name North 13th Street Technical School			
Street Address 300 North 13th Street		**County**	
City Newark		**State** NJ	**Zip** 07107
Facility's Description High School			
Total Sq Ft 194,772	**Year Built** 1925	**Hours/Week Occupied** 90-100	**Number of Employees** 109

Building Type (Check only one of the following):

☐	**Emergency Services**	☐	**Garage**
☐	**Center/Meeting Hall/Library**	☐	**Offices**
☐	**Recreation/Entertainment/Parks**	☐	**Religious**
☒	**School**	☐	**School: College**
☐	**Water Treatment/Pumping**	☐	**Other:** _____

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Period: 2/24/2009 to 2/3/2010

New Jersey's Clean Energy Program
njcleanenergy.com

ELECTRICITY

Electric Utility Name & Account Number(s)	
PSE+G 11-047-081-08	
Annual kWh Use	**Annual Electricity Cost**
934,940	$141,347
Max Summer kW	**Max Winter kW**
219	213

NATURAL GAS

Natural Gas Utility Name & Account Number(s)	
PSE+G 11-006-014-14	
Annual Use in Therms	**Annual Natural Gas Cost**
112,343	$ 116,380

FUEL OIL

Fuel Oil Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Fuel Oil Cost**

PROPANE

Propane Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Propane Cost**

OTHER

In this section please indicate any other fuel type that the facility uses, such as: solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fuel Type:	
NA	
Annual Energy Use (indicate units)	**Annual Energy Cost**

STAFF USE ONLY

Date Received: _____	Project No.: _____

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APPENDIX C - FACILITY DATA FORM

*Complete one Facility Data Form for **each** building. If you are seeking to energy audit multiple buildings, complete one Facility Data Form for each.*

FACILITY INFORMATION

Please complete the information below for this specific facility that is seeking enrollment in the Program.

Facility Name Newark Technical High School			
Street Address 91 W Market St.		**County**	
City Newark		**State** NJ	**Zip** 07103
Facility's Description High School			
Total Sq Ft 185,339	**Year Built** 1972	**Hours/Week Occupied** 90-100	**Number of Employees** 112

Building Type (Check only one of the following):

☐	**Emergency Services**	☐	**Garage**
☐	**Center/Meeting Hall/Library**	☐	**Offices**
☐	**Recreation/Entertainment/Parks**	☐	**Religious**
☒	**School**	☐	**School: College**
☐	**Water Treatment/Pumping**	☐	**Other:** _____

ENERGY DATA

Please complete the energy information below for the most recent 12 month period available. In order to gain a complete picture of the facility's energy use, be sure to include all types of energy used by the facility. Do not include vehicle fuel.

The Data Below is for the 12 Month Period: 2/6/2009 to 1/14/2010

New Jersey's Clean Energy PROGRAM
Your Power to Save
njcleanenergy.com

ELECTRICITY

Electric Utility Name & Account Number(s)	
PSE+G 11-337-963-11 (meters 778017617 + 778015734)	
Annual kWh Use	**Annual Electricity Cost**
2,642,164	$424,505
Max Summer kW	**Max Winter kW**
685	381

NATURAL GAS

Natural Gas Utility Name & Account Number(s)	
PSE+G 11337-963-11, 11330-414-18, 11388-005-03	
Annual Use in Therms	**Annual Natural Gas Cost**
105,804	$120,485

FUEL OIL

Fuel Oil Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Fuel Oil Cost**

PROPANE

Propane Utility Name & Account Number(s)	
NA	
Annual Use in Gallons	**Annual Propane Cost**

OTHER

In this section please indicate any other fuel type that the facility uses, such as: solar energy, wind energy, bio-fuel, cogeneration, fuel cells.

Other Fuel Type:	
NA.	
Annual Energy Use (indicate units)	**Annual Energy Cost**

STAFF USE ONLY

Date Received: _____ Project No.: _____

APPENDIX G

NJ SMARTSTART INCENTIVES INFORMATION AND WORKSHEETS

New Jersey's Clean Energy PROGRAM™
Your Power to Save
njcleanenergy.com

New Jersey SmartStart BUILDINGS®

BPU

2010 Prescriptive Lighting Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date
Facility Address	City	State	Zip
Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement		Size of Building	
Company Mailing Address	City	State	Zip
Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )	
Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address	
Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature		

Payee Information (must submit W-9 form with application)

Company	Contact Name		Incorporated? Yes No	Email Address Federal Tax ID#	
Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name		Incorporated? ❑ Yes ❑ No	Email Address Federal Tax ID#	
Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Education-Primary School; Education-Community College; Education-University; Grocery; Medical-Hospital; Medical-Clinic; Lodging Hotel(Guest Rooms); Lodging Motel; Manufacturing-Light Industrial; Office-Large; Office-Small; Restaurant-Sit Down; Restaurant-Fast Food; Retail-3 Story Large; Retail- Single Story Large; Retail-Small; Storage Conditioned; Storage Unconditioned; Warehouse; Other

Prescriptive Lighting Incentive

$_____ Total Incentive (per attached worksheet calculations)

Note: Prescriptive Lighting Worksheet must accompany this application.

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives for T-5 and T-8 lamps with electronic ballasts are available only for fixtures with a Total Harmonic Distortion of ≤20%.
4. All eligible lighting devices must be UL listed.
5. Requirements for CFL fixtures (must meet all requirements):
   - Fixtures must be new and ENERGY STAR qualified
   - Fixtures must have replaceable electronic ballasts
   - Total Harmonic Distortion (THD) must not exceed 33%
   - Power factor of the ballast must be no less than 90%
   - The manufacturer must warrant all fixtures for a minimum of 3 years. Warranty does not pertain to lamps or photocells not physically part of the fixture.
   - The installer must warrant fixture installation – minimum of 1 yr.

5.1 Screw-in PAR 38 or 30 Compact Fluorescent Lamps (CFL) with Aluminum Reflectors replacing existing incandescent fixtures.
   - The lamp must be warranted by the manufacturer for 8,000 hours
   - Total Harmonic Distortion must not exceed 33%
   - Power factor of the ballast must be ≥90%

6. Pulse Start Metal Halide (including pole-mounted parking lot lighting) must have a 12% minimum wattage reduction.
7. T-5 or T-8 Fixtures replacing incandescent or T-12 fluorescent fixtures greater than 250 watt or High Intensity Discharge shall comply as follows:

7.1 T-5 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.0; have reflectivity greater than or equal to 91%; have a minimum 2 lamps; and be designated as F54T5 HO.

7.2 T-8 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.14; have reflectivity greater than or equal to 91%; have a minimum of 4 lamps; and be designated as F32T8, minimum 32 watts.

7.3 Incentives for delamped T-8 lamps with new reflectors are available only for fixtures with a Total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures. Eligible delamping can include reduction in linear lamp feet from existing conditions. For example, 1-8' linear fluorescent lamp can be considered as 2-4' linear lamps. U-bend lamps 4' in total length can be considered as 2-F17/T8 lamps.

7.4 Electronic ballast replacement is necessary for all eligible delamped fixtures.

7.5 Reduced wattage T8 (28W/25W 4') (1-4 lamps) retrofit requires lamp and ballast replacement.

8. LED Refridgerated/Freezer Case Lighting must meet NEEP Design Lights Consortium Standards or be on an ENERGY STAR or a SSL Qualified Product list. For new door installations on existing open cases, indicate the number of LED fixtures to be installed. Also indicate "New Door" in the Fixture Type column on the Prescriptive Lighting Worksheet (ie. New Door 5' LED).

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included

ACKNOWLEDGEMENT

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Prescriptive Lighting Measures and Incentives*

Type of Fixture	Incentive
Recessed and Surface-Mounted Compact Fluorescents (New Fixtures Replacing Incandescent Fixtures Only): Only available for hard-wired, electronically ballasted new fixtures with rare earth phosphor lamps and 4-pin based tubes (including: twin tube, quad tube, triple tube, 2D or circline lamps), THD<33% and BF>0.9	$25 per 1-lamp fixture $30 per 2-lamp or more fixture
Screw-in PAR 38 or PAR 30 (CFL) as per 5.1 above	$7 per lamp replaced
High-Efficiency Fluorescent Fixtures: For retrofit of T-12 fixtures to T-5 or T-8 with electronic ballasts	$15 per fixture (1-4 lamps retrofits)

For replacement of fixtures with new T-5 or T-8 fixtures

Type of Old Fixture	Wattage of Old Fixture	Type of New Fixture	Incentive Per Fixture Removed
HID, T-12, Incandescent	≥ 1000 Watts	T-5, T-8	$284
HID, T-12, Incandescent	400-999 Watt	T-5, T-8	$100
HID, T-12, Incandescent	250-399 Watt	T-5, T-8	$50
HID only	175-249 Watt	T-5, T-8	$43
HID only	100-174 Watt	T-5, T-8	$30
HID only	75-99 Watt	T-5, T-8	$16
T-12 only	<250 Watt	T-5, T-8 (1 & 2 lamp)	$25
T-12 only	<250 Watt	T-5, T-8 (3 & 4 lamp)	$30

For retrofit of T-8 fixtures by permanent delamping & new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures.	**$20 per fixture**
New Construction & Complete Renovation	**Performance based only**
LED Exit Signs (new fixtures only):	
For existing facilities with connected load <75 kW	**$20 per fixture**
For existing facilities with connected load ≥ 75 kW	**$10 per fixture**
Pulse Start Metal Halide (for fixtures ≥ 150 watts)	**$25 per fixture (includes parking lot lighting)**
Parking lot low bay - LED	**$43 per fixture**
T-12 to T-8 fixtures by permanent delamping & new reflectors. Electronic ballast replacement is necessary for all eligible delamped fixtures.	**$30 per fixture**
Retrofit of existing 32 watt T-8 system to Reduced Wattage (28W/25W 4')	**$10 per fixture (1-4 lamps)**
LED Refrigerated/Freezer Case Lighting: Incentive for replacement of fluorescent lighting systems in medium or low temperature display cases	**$42 per 5' LED fixture $65 per 6' LED fixture**
Induction Lighting Fixtures	
Retrofit of HID	**$50 per HID (≥100W) fixture retrofitted with induction lamp, power coupler and generator. Replacement unit must use 30% less wattage per fixture than existing HID system**
Replacement of HID	**$70 per HID (≥100W) fixture with a new induction fixture**

Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Energy Program
c/o TRC Energy Services
900 Route 9 North, Suite 104 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com/ssb

*Incentives/Requirements subject to change.

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this Program.

Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Market Manager – TRC Energy Services.

Program – The Commercial and Industrial Energy-Efficient Construction Program (New Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on or before December 31, 2010 in order to be eligible for 2010 incentives. The Market Manager will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures installed under this Program, either prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers must supply their Federal Tax Identification number or social security number to the Market Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Clearance Form (Business Assistance or Incentive Clearance Certificate) that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Market Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

New Jersey's Clean Energy PROGRAM™
Your Power to Save
njcleanenergy.com

New Jersey SmartStart BUILDINGS®

New Jersey BPU Board of Public Utilities

2010 Prescriptive Lighting Incentive Worksheet

Customer Information

Company	Facility Address
☐ Check here if multiple worksheets are being submitted for one project/building.	Date Submitted

Prescriptive Lighting Information

For additional fixtures, attach additional sheets and check here ☐

Reason N–New R–Replaced	**Fixture Type Installed**	**Fixture Type Removed**	**Permanent Delamp w/ New Reflector** (Y/N)	**Location** (Bldg/Rm)	**Size of Replaced Lamps in Watts**	**A Incentive Per Fixture** (Table)	**B # of Units**	**Total Incentives (AxB)**
(Examples) R	2x4 3L T-5	2x4 3L T-12	N	Office	40	$15	8	$15 x 8 = $120
R	2x2 2L T-8	2x2 2L T-12	N	Office	34	$15	10	$15 x 10 = $150
R	28w CFL	100w Incan	N	Supply Room	100	$25	3	$25 x 3 = $75
R	250w Pulse Start Metal Halide	400w Mercury Vapor	N	Warehouse	450	$25	3	$25 x 3 = $75
N	New Doors 5' LED	1L T-8 5'	N	Dairy Case #5	38	$42	25	$42 x 25=$1,050
Total (including additional sheets)								

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. Incentives for T-5 and T-8 lamps with electronic ballasts are available only for fixtures with a Total Harmonic Distortion of ≤20%.
4. All eligible lighting devices must be UL listed.
5. Requirements for CFL fixtures (must meet all requirements):
   - Fixtures must be new and Energy Star qualified
   - Fixtures must have replaceable electronic ballasts
   - Total Harmonic Distortion (THD) must not exceed 33%
   - Power factor of the ballast must be no less than 90%
   - The manufacturer must warrant all fixtures for a minimum of 3 years. Warranty does not pertain to lamps or photocells not physically part of the fixture.
   - The installer must warrant fixture installation – minimum of 1 yr.

5.1 Screw-in PAR 38 or 30 Compact Fluorescent Lamps (CFL) with Aluminum Reflectors replacing existing incandescent fixtures.
   - The lamp must be warranted by the manufacturer for 8,000 hours
   - Total Harmonic Distortion must not exceed 33%
   - Power factor of the ballast must be ≥90%

6. Pulse Start Metal Halide (including pole-mounted parking lot lighting) must have a 12% minimum wattage reduction.
7. T-5 or T-8 Fixtures replacing incandescent or T-12 fluorescent fixtures greater than 250 watt or High Intensity Discharge shall comply as follows:

7.1 T-5 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.0; have reflectivity greater than or equal to 91%; have a minimum 2 lamps; and be designated as F54T5 HO.

7.2 T-8 fixtures replacing T-12 fluorescent or incandescent fixtures 250 watts or greater, or HID fixtures shall have a ballast factor greater than or equal to 1.14; have reflectivity greater than or equal to 91%; have a minimum of 4 lamps; and be designated as F32T8, minimum 32 watts.

7.3 Incentives for delamped T-8 lamps with new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures. Eligible delamping can include reduction in linear lamp feet from existing conditions. For example, 1-8' linear fluorescent lamp can be considered as 2-4' linear lamps. U-bend lamps 4' in total length can be considered as 2-F17/T8 lamps.

7.4 Electronic ballast replacement is necessary for all eligible delamped fixtures.

7.5 Reduced wattage T8 (28W/25W 4') (1-4 lamps) retrofit requires lamp and ballast replacement.

8. LED Refridgerated/Freezer Case Lighting must meet NEEP Design Lights Consortium Standards or be on an ENERGY STAR or a SSL Qualified Product list. For new door installations on existing open cases, indicate the number of LED fixtures to be installed. Also indicate "New Door" in the Fixture Type column on the Prescriptive Lighting Worksheet (ie. New Door 5' LED).

ACKNOWLEDGEMENT

_____

CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Prescriptive Lighting Measures and Incentives*

Type of Fixture	Incentive
Recessed and Surface-Mounted Compact Fluorescents (New Fixtures Replacing Incandescent Fixtures Only): Only available for hard-wired, electronically ballasted new fixtures with rare earth phosphor lamps and 4-pin based tubes (including: twin tube, quad tube, triple tube, 2D or circline lamps), THD<33% and BF>0.9	$25 per 1-lamp fixture $30 per 2-lamp or more fixture
Screw-in PAR 38 or PAR 30 (CFL) as per 5.1 above	$7 per lamp replaced
High-Efficiency Fluorescent Fixtures: For retrofit of T-12 fixtures to T-5 or T-8 with electronic ballasts	$15 per fixture (1-4 lamps retrofits)
For replacement of fixtures with new T-5 or T-8 fixtures	

Type of Old Fixture	Wattage of Old Fixture	Type of New Fixture	Incentive Per Fixture Removed
HID, T-12, Incandescent	≥ 1000 Watts	T-5, T-8	$284
HID, T-12, Incandescent	400-999 Watt	T-5, T-8	$100
HID, T-12, Incandescent	250-399 Watt	T-5, T-8	$50
HID only	175-249 Watt	T-5, T-8	$43
HID only	100-174 Watt	T-5, T-8	$30
HID only	75-99 Watt	T-5, T-8	$16
T-12 only	<250 Watt	T-5, T-8 (1 & 2 lamp)	$25
T-12 only	<250 Watt	T-5, T-8 (3 & 4 lamp)	$30

For retrofit of T-8 fixtures by permanent delamping & new reflectors are available only for fixtures with a total Harmonic Distortion of ≤20%. Electronic ballast replacement required for all eligible delamped fixtures.	**$20 per fixture**
New Construction & Complete Renovation	**Performance based only**
LED Exit Signs (new fixtures only):	
For existing facilities with connected load <75 kW	**$20 per fixture**
For existing facilities with connected load ≥ 75 kW	**$10 per fixture**
Pulse Start Metal Halide (for fixtures ≥ 150 watts)	**$25 per fixture (includes parking lot lighting)**
Parking lot low bay - LED	**$43 per fixture**
T-12 to T-8 fixtures by permanent delamping & new reflectors. Electronic ballast replacement is necessary for all eligible delamped fixtures.	**$30 per fixture**
Retrofit of existing 32 watt T-8 system to Reduced Wattage (28W/25W 4')	**$10 per fixture (1-4 lamps)**
LED Refrigerated/Freezer Case Lighting: Incentive for replacement of fluorescent lighting systems in medium or low temperature display cases	**$42 per 5' LED Fixture $65 per 6' LED Fixture**
Induction Lighting Fixtures	
Retrofit of HID	**$50 per HID (≥100W) fixture retrofitted with induction lamp, power coupler and generator. Replacement unit must use 30% less wattage per fixture than existing HID system**
Replacement of HID	**$70 per HID (≥100W) fixture with a new induction fixture**

Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Energy Program
c/o TRC Energy Services
900 Route 9 North, Suite 104 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: NJCleanEnergy.com/ssb

*Incentives/Requirements subject to change.

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this Program.

Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Market Manager – TRC Energy Services.

Program – The Commercial and Industrial Energy-Efficient Construction Program (New Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on or before December 31, 2010 in order to be eligible for 2010 incentives. The Market Manager will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures installed under this Program, either prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers must supply their Federal Tax Identification number or social security number to the Market Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Clearance Form (Business Assistance or Incentive Clearance Certificate) that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Market Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

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New Jersey SmartStart BUILDINGS®

BPU

2010 Lighting Controls Application

Customer Information

Company	Electric Utility Serving Applicant	Electric Account No.	Installation Date

Facility Address	City	State	Zip

Type of Project ❑ New Construction ❑ Renovation ❑ Equipment Replacement	Size of Building

Company Mailing Address	City	State	Zip

Contact Person (Name/Title)	Telephone No. ( )	Fax No. ( )

Incorporated? ❑ Yes ❑ No ❑ Exempt	Federal Tax ID# or SSN	Email Address

Incentive Payment to ❑ Customer ❑ Contractor ❑ Other	Please assign payment to contractor/vendor/other indicated below Customer Signature

Payee Information (must submit W-9 form with application)

Company	Contact Name	Incorporated? Yes No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Contractor/Vendor Information (if different from Payee)

Company	Contact Name	Incorporated? ❑ Yes ❑ No	Federal Tax ID#	Email Address

Street Address	City	State	Zip	Telephone No. ( )	Fax No. ( )

Building Type (circle one)

Education-Primary School; Education-Community College; Education-University; Grocery; Medical-Hospital; Medical-Clinic; Lodging Hotel(Guest Rooms); Lodging Motel; Manufacturing-Light Industrial; Office-Large; Office-Small; Restaurant-Sit Down; Restaurant-Fast Food; Retail-3 Story Large; Retail- Single Story Large; Retail-Small; Storage Conditioned; Storage Unconditioned; Warehouse; Other

Lighting Control Incentive

$_____ Total Incentive (per attached worksheet calculations)

Note: Lighting Controls Incentive Worksheet must accompany this application.

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements, including special requirements for lighting controls.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. All lighting controls eligible for incentives must be UL listed.
4. Lighting control incentives are only available for control of eligible energy efficient lighting fixtures.
5. If more than one eligible lighting control device is associated with the same eligible fixture, the incentive paid will be for the lighting control device that yields the largest incentive only.
6. Occupancy Sensor Controls (existing facilities only):
   - There is no incentive available for occupancy sensors installed in a space where they are prohibited by state or local building or safety code. Additionally, no incentive is eligible for occupancy sensors in the following specific spaces in all cases: stairways, restrooms (remote mounted only allowed), elevators, corridors/hallways, lobbies, and closets/storage areas.
   - Incentives will only be paid for eligible occupancy sensors (OSW & OSR) controlling at least 2 eligible lighting fixtures and, for OSR installations, a minimum total connected load of 180 watts.
   - Incentives will only be paid for eligible OSRH occupancy sensors controlling eligible fixtures when the controlled wattage is greater than 180 watts.
   - Occupancy sensors with manual override to the "ON" position are ineligible for incentive.
7. High-Low Controls (OHLF and OHLH):
   - Incentives will not be paid for high-low controls on eligible fluorescent fixtures where daylight dimming controls can be effectively employed.
   - Incentives will not be paid for spaces smaller than 250 square feet.
   - Incentives available only when "low level" is no more than 60% of "high level."
   - Incentives are not available for the following spaces: stairways, elevators, corridors/hallways, or lobbies.
   - OHLF will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - OHLH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.
8. Daylight Dimming Controls for eligible fixtures:
   - Incentives will only be paid for eligible daylight dimming controls operating at least 4 eligible ballasts with a minimum total connected load of 240 watts.
   - Dimming shall be continuous or stepped at 4 or more levels.
   - Incentives will be paid only for eligible daylight dimming control systems designed in accordance with IESNA practice as delineated in "RP-5-99, IESNA Recommended Practice of Daylighting."
   - DLD will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - DDH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.

Application Checklist (Before submitting your application, please make sure you have signed in the space below and completed the following items.)

- ❑ Payee Information is filled out and a W-9 form of the payee is included
- ❑ Manufacturer's specification sheets for proposed technology are included
- ❑ A copy (all pages) of a recent month's utility bill is included

ACKNOWLEDGEMENT

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CUSTOMER'S SIGNATURE

By signing, I certify that I have read, understand and agree to the Specific Program Requirements/Terms and Conditions listed on this application form, I will also submit for approval a properly completed application package, which includes this signed application, worksheet (if applicable), manufacturer's specification sheets and complete utility bill (name and address on utility bill must match name and address on application).

Lighting Control Prescriptive Incentives*

Control Device Type	Incentive per Unit
OSW – Occupancy Sensor Wall Mounted (Existing facilities only)	$20 per control
OSR – Occupancy Sensor Remote Mounted (Existing facilities only)	$35 per control
DLD – Fluorescent Daylight Dimming	$25 per fixture controlled
DLD – Fluorescent Daylight Dimming (Office Applications)	$50 per fixture controlled
OHLF – Occupancy Controlled High-Low with Step Ballast	$25 per fixture controlled
OSRH – Occupancy Sensor Remote Mounted	$35 per control
OHLH – Occupancy Controlled High-Low with Step Ballast	$75 per fixture controlled
DDH – Daylight Dimming	$75 per fixture controlled

Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Energy Program
c/o TRC Energy Services
900 Route 9 North, Suite 104 • Woodbridge, NJ 07095
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Visit our web site: www.NJCleanEnergy.com

*Incentives/Requirements subject to change.

NJ SmartStart Buildings®

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Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

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Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Market Manager – TRC Energy Services.

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Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

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Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

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Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Market Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

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2010 Lighting Controls Incentive Worksheet

Customer Information

Company	Facility Address
☐ Check here if multiple worksheets are being submitted for one project/building.	Date Submitted

Lighting Controls Information

For additional fixtures, attach additional sheets and check here ☐

Location	Reason N–New R–Replaced	Control Device Type	Fixture Type Controlled	Watts Controlled per Device	A # of Fixtures Controlled per Device	B # of Units*	C Incentive per Unit	Total Incentive (B x C)
Office 101	(Examples) N	OSW	4-lamp, T8	220	2	4	$20	4 x $20 = $80
Conference Room A	N	OSR	2-lamp, T8	330	6	2	$35	2 x $35 = $70
Large Office 400	N	DLD	2-lamp, T8	275	N/A	6	$50	6 x $50 = $300
Warehouse A	N	OHLF	4-lamp, T8	140	N/A	12	$25	12 x $25 = $300
Warehouse B	N	OSRH	4-lamp, T5	234	1	5	$35	5 x $35 = $175

*For OSW and OSR, insert number of control devices; for DLD and OHLF, insert total number of ballasts controlled; for OHLH and DDH, insert total number of fixtures controlled.

Total (including additional sheets) ________

Specific Program Requirements* (These requirements are in addition to the Program Terms and Conditions.)

1. Please refer to the Program Guide for additional applicable technical requirements, including special requirements for lighting controls.
2. Include the manufacturer's specification sheet with the application package and mail or fax directly to the Commercial/Industrial Market Manager.
3. All lighting controls eligible for incentives must be UL listed.
4. Lighting control incentives are only available for control of eligible energy efficient lighting fixtures.
5. If more than one eligible lighting control device is associated with the same eligible fixture, the incentive paid will be for the lighting control device that yields the largest incentive only.
6. Occupancy Sensor Controls (existing facilities only):
   - There is no incentive available for occupancy sensors installed in a space where they are prohibited by state or local building or safety code. Additionally, no incentive is eligible for occupancy sensors in the following specific spaces in all cases: stairways, restrooms (remote mounted only allowed), elevators, corridors/hallways, lobbies, and closets/storage areas.
   - Incentives will only be paid for eligible occupancy sensors (OSW & OSR) controlling at least 2 eligible lighting fixtures and, for OSR installations, a minimum total connected load of 180 watts.
   - Incentives will only be paid for eligible OSRH occupancy sensors controlling eligible fixtures when the controlled wattage is greater than 180 watts.
   - Occupancy sensors with manual override to the "ON" position are ineligible for incentive.
7. High-Low Controls (OHLF and OHLH):
   - Incentives will not be paid for high-low controls on eligible fluorescent fixtures where daylight dimming controls can be effectively employed.
   - Incentives will not be paid for spaces smaller than 250 square feet.
   - Incentives available only when "low level" is no more than 60% of "high level."
   - Incentives are not available for the following spaces: stairways, elevators, corridors/hallways, or lobbies.
   - OHLF will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - OHLH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.
8. Daylight Dimming Controls for Eligible Fixtures:
   - Incentives will only be paid for eligible daylight dimming controls operating at least 4 eligible ballasts with a minimum total connected load of 240 watts.
   - Dimming shall be continuous or stepped at 4 or more levels.
   - Incentives will be paid only for eligible daylight dimming control systems designed in accordance with IESNA practice as delineated in "RP-5-99, IESNA Recommended Practice of Daylighting."
   - DLD will control fixtures that have a ballast factor less than 1.0 for T-5s and 1.14 for T-8s.
   - DDH will control fixtures that have a ballast factor greater than or equal to 1.0 for T-5s and 1.14 for T-8s.

Lighting Control Prescriptive Incentives*

Control Device Type	Incentive per Unit
OSW – Occupancy Sensor Wall Mounted (Existing facilities only)	$20 per control
OSR – Occupancy Sensor Remote Mounted (Existing facilities only)	$35 per control
DLD – Fluorescent Daylight Dimming	$25 per fixture controlled
DLD – Fluorescent Daylight Dimming (Office Applications)	$50 per fixture controlled
OHLF – Occupancy Controlled High-Low with Step Ballast	$25 per fixture controlled
OSRH – Occupancy Sensor Remote Mounted	$35 per control
OHLH – Occupancy Controlled High-Low with Step Ballast	$75 per fixture controlled
DDH – Daylight Dimming	$75 per fixture controlled

Mail or fax your application package DIRECTLY to the Commercial/Industrial Market Manager.

New Jersey's Clean Energy Program
c/o TRC Energy Services
900 Route 9 North, Suite 104 • Woodbridge, NJ 07095
Phone: 866-657-6278 • Fax: 732-855-0422

Visit our web site: www.NJCleanEnergy.com

NJ SmartStart Buildings®

Program Terms and Conditions

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this Program.

Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Market Manager – TRC Energy Services.

Program – The Commercial and Industrial Energy-Efficient Construction Program (New Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above. Program Incentives for new construction are available only for projects in areas designated for growth in the State Plan. Public school (K-12) new construction projects are exempted from this restriction and are eligible for new Program incentives throughout the State. Customers, or their trade allies, can determine if a location is in a designated growth area by referring to the Smart Growth Locator available from the HMFA website or contact the Market Manager if you are uncertain about project eligibility.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy efficient measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Market Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Market Manager on or before December 31, 2010 in order to be eligible for 2010 incentives. The Market Manager will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Market Manager's approval letter is not eligible for an incentive. The Market Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Unitary HVAC or Motors having an incentive amount less than $5,000. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Market Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Market Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Market Manager's initial approval letter.

Please refer to the Program Guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Market Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures installed under this Program, either prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Market Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to $500,000 per utility account in a calendar year. Contact the Market Manager regarding any questions.

Tax Liability – The Market Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers must supply their Federal Tax Identification number or social security number to the Market Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Clearance Form (Business Assistance or Incentive Clearance Certificate) that is dated within 90 days of equipment installation.

Endorsement – The Market Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE MARKET MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Market Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Market Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Market Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Market Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Market Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

New Jersey Clean Energy Program

Technical Worksheet – Solar Electric Equipment Information

Please carefully read all of the following information. With the help of your Installation Contractor, fully complete Sections A through D, as applicable, of the attached Technical Worksheet for Solar Electric Equipment, as well as the New Jersey Clean Energy Program Rebate Application Form.

GENERAL TERMS AND CONDITIONS

Rebates will be processed based on the date the New Jersey Clean Energy Program (NJCEP) approves the Final Application Form, not on the purchase date of the equipment. Program procedures and rebates are subject to change or cancellation without notice.

To qualify for a rebate, Applicant must comply with all Program Eligibility Requirements, Terms and Conditions, and Installation Requirements, and submit a completed Pre-Installation Application Form. For more information about the New Jersey Clean Energy Program, or for assistance in completing applications or forms, please see www.njcleanenergy.com or call 866-NJSMART

INSTALLATION REQUIREMENTS

Equipment installation must meet the following minimum requirements in order to qualify for payment under the provisions of the New Jersey Clean Energy Program; proposed changes to the requirements will be considered, but they must be documented by the Applicant or Installation Contractor and approved by the NJCEP. These requirements are not all-encompassing and are intended only to address certain minimum safety and efficiency standards.

A: Code Requirements

1. The installation must comply with the provisions of the National Electrical Code and all other applicable local, state and federal codes or practices.
2. All required permits must be properly obtained and posted.
3. The NJCEP Inspection must be performed before the local Building Code Enforcement Office. If not, this may delay the processing of the rebate
4. All required inspections must be performed (i.e., Electrical/NEC, Local Building Codes Enforcement Office, etc.). Note: In order to ensure compliance with provisions of the NEC, an inspection by a state-licensed electrical inspector is mandatory.

B: Solar Electric Module Array

1. Modules must be UL Listed and must be properly installed according to manufacturer's instructions.
2. The maximum amount of sunlight available year-round on a daily basis should not be obstructed. All applications must include documentation of the impact from any obstruction on the annual performance of the solar electric array. This analysis can be performed by using the New Jersey Clean Power Estimator on the program website www.njcep.com.
3. In order to qualify for program incentives, the solar electric system must adhere to a minimum design threshold, relative to the estimated system production using PVWATTS:
    - Solar electric array orientations require that the calculated system output must be at least 80% of the default output calculated by PVWatts. Additionally, all individual series strings of modules output must be at least 70% of the default output calculated by PVWatts.
    - For building integrated solar electric systems (i.e., part of the building envelope materials are comprised of solar electric components), the estimated system output must be 40% of the default output estimated by PVWATTS.
4. System wiring must be installed in accordance with the provisions of the NEC.
5. All modules installed in a series string must be installed in the same plane.

C: Inverter and Controls

1. The inverter and controls must be properly installed according to manufacturer's instructions.
2. The inverter must be certified as compliant with the requirements of IEEE 929 for small photovoltaic systems and with UL 1741.
3. The system should be equipped with the following visual indicators and/or controls:
    - On/off switch • Operating mode setting indicator • AC/DC over current protection • Operating status indicator
4. Warning labels must be posted on the control panels and junction boxes indicating that the circuits are energized by an alternate power source independent of utility-provided power.
5. Operating instructions must be posted on or near the system, or on file with facilities operation and maintenance documents.
6. Systems must have monitoring capability that is readily accessible to the owner. This monitor (meter or display) must at minimum display instantaneous and cumulative production. All projects greater than 10kW must have an output meter that meets ANSI C.12 standards

D: Control Panel to Solar Electric Array Wire Runs

1. Areas where wiring passes through ceilings, walls or other areas of the building must be properly restored, booted and sealed.
2. All interconnecting wires must be copper. (Some provisions may be made for aluminum wiring; approval must be received from utility engineering departments prior to acceptance.)
3. Thermal insulation in areas where wiring is installed must be replaced to "as found or better condition." Access doors to these areas must be properly sealed and gasketed.
4. Wiring connections must be properly made, insulated and weather-protected.
5. All wiring must be attached to the system components by the use of strain relief's or cable clamps, unless enclosed in conduit.
6. All outside wiring must be rated for wet conditions and/or encased in liquid-tight conduit.
7. Insulation on any wiring located in areas with potential high ambient temperature must be rated at 90° C or higher.
8. All wiring splices must be contained in UL-approved workboxes.

E: Batteries (If Applicable)

1. The batteries must be installed according to the manufacturer's instructions.
2. Battery terminals must be adequately protected from accidental contact.
3. DC-rated over current protection must be provided in accordance with the provisions of the NEC.

New Jersey Clean Energy Program

Technical Worksheet – Solar Electric Equipment Information

Original Application Date: _____ Revised Application Date: _____

Customer Name: _____ Application Number: _____

(Corresponding to Rebate Application Form) (Assigned by the NJBPU)

A: EQUIPMENT INFORMATION

1. Solar Electric Module Manufacturer: _____ Module Model Number: _____
2. Power Rating per Module: _____ DC Watts (Refer to STC conditions) Number of Modules: _____
3. Total Array Output: _____ DC Watts (No. of Modules x Power Rating)
4. Inverter Manufacturer: _____ Inverter Model Number: _____
5. Inverter's Continuous AC Rating: _____ AC Watts Number of Inverters: _____
6. Total Inverter Output: _____ AC Watts (Inverter Continuous AC Rating x Number of Inverters)
7. Inverter's Peak Efficiency: _____ (Refer to manufacturer's peak efficiency rating)

B: PROPOSED INSTALLATION/INTERCONNECTION INFORMATION

1. Solar Electric Array Location: _ Rooftop _ Pole Mount or Ground Mount Location:
2. Solar Electric Module Orientation: _____ degrees (e.g., 180 degrees magnetic south)

   Note: in Central New Jersey, magnetic south compass reading is 10 degrees east of true south.
3. Solar Electric Module Tilt: _____ degrees (e.g., flat mount = 0 degrees; vertical mount = 90 degrees)
4. Solar Electric Module Tracking: _Fixed _Single-axis _Double-axis
5. Inverter Location: _ Indoor _ Outdoor Location: _____
6. Utility-Accessible AC Disconnect Switch Location: _____
7. System Type and Mode of Operation:
   - _ Utility interactive (parallel/capable of back feeding the meter) (_ with battery backup)
   - _ Dedicated circuit, utility power as backup (transfer switch) (_ with battery charging)
   - _ Stand-alone (system confined to an independent circuit, no utility backup) (_ with battery charging)

C: INCENTIVE REQUEST CALCULATION

1. System rated output (Section A, line 3 above): _____ DC Watts
2. Incentive Calculation (Calculate appropriate incentive based on System Rated Output):

Residential Applicants that perform Energy Efficiency Audit

a. 0 to 10,000 Watts x $1.75/Watt = $_____+

Residential Applicants that <u>do not</u> perform Energy Efficiency Audit

b. 0 to 10,000 Watts x $1.55/Watt = $_____+

Commercial, Farm, Public and Non-Profit

0 to 50,000 Watts x $1.00/Watt = $_____+

<u>Large PV Project Applications</u>

> 50,000 Watts = $____Not eligible for rebates_____

d. Total Rebate Calculation: $_____

Total Rebate Calculation: $_____

3. School Applicants: Maximum Annual School Rebate: $_____
   (For Public School applicants, enter the lesser value from no. 6 on the School Application form or $50,000)
4. Total Installed System Cost: $_____
   (Eligible installed system cost includes all equipment, installation, and applicable interconnection costs before the New Jersey Clean Energy Program incentive.)
5. **Requested Incentive** (Enter the appropriate value from C2. b or c): $_____

D: WARRANTY INFORMATION

1. Module: _____ Years at _____ Percent of Rated Power Output 2. Inverter: _____ Years 3. Installation: _____ Years

Revised January 2009

New Jersey's Clean Energy PROGRAM™
Your Power to Save
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New Jersey SmartStart BUILDINGS®

BPU New Jersey Board of Public Utilities

Incentive Structure for NJ Pay For Performance Program

Incentive #1: Energy Reduction Plan

Incentive Amount: ..... **$0.10 per sq ft**
Minimum Incentive: **$5,000**
Maximum Incentive:: ..... **$50,000 or 50% of facility annual energy cost**

This incentive will be developed to offset the cost of services associated with the development of the Energy Reduction Plan. Projects must identify efficiency improvements that meet the minimum performance level in order to become eligible for Incentive #1. Incentive amount will be based on the square footage of the building.

Incentive #2: Installation of Recommended Measures

Minimum Performance Target: **15%**

Electric Incentives

Base Incentive based on 15% savings: ..... **$0.11 per projected kWh saved**
For each % over 15% add: ..... **$0.005 per projected kWh saved**
Maximum Incentive: ..... **$0.13 per projected kWh saved**

Gas Incentives

Base Incentive base on 15% savings: ..... **$1.10 per projected Therm saved**
For each % over 15% add: ..... **$0.05 per projected Therm saved**
Maximum Incentive: ..... **$1.45 per projected Therm saved**

Incentive Cap: ..... **30% of total project cost**

This incentive will be based on projected energy savings and designed to pay approximately 60% of the total performance-based incentive. Savings projections will be calculated using calibrated energy simulation and rounded to the nearest percent. Incentive #2 may not exceed 30% of the total project cost.

Incentive #3: Post-Construction Benchmarking Report

Minimum Performance Target: **15%**

Electric Incentives

Base Incentive based on 15% savings: ..... **$0.07 per projected kWh saved**
For each % over 15% add: ..... **$0.005 per projected kWh saved**
Maximum Incentive: ..... **$0.09 per projected kWh saved**

Gas Incentives

Base Incentive base on 15% savings: ..... **$0.70 per projected Therm saved**
For each % over 15% add: ..... **$0.05 per projected Therm saved**
Maximum Incentive: ..... **$1.05 per projected Therm saved**

Incentive Cap: ..... **20% of total project cost**

This incentive will be released upon submittal of a Post-Construction Benchmarking Report that verifies that the level of savings actually achieved by the installed measures meets or exceeds the minimum performance threshold. To validate the savings and achievement of the Energy Target, the EPA Portfolio Manager shall be used. Savings should be rounded to the nearest percent. Total value of Incentive #2 and Incentive #3 may not exceed 50% of the total project cost. This incentive will "true up" proposed savings and the related payment for Incentive #2 so that the total incentive is based on actual savings. For buildings not covered by EPA, the process used by LEED EB shall be followed.

Advanced Measure Incentive: Combined Heat and Power

Eligible Technology	Incentive (per Watt) Max: $1 Million	Maximum % of Project Cost
Level 1:		
Fuel cells not fueled by Class I renewable fuel	$4.00	60%
Level 2:		
Microturbines	$1.00	30%(1)
Internal Combustion Engines		
Combustion Turbines		
Level 3:		
Heat Recovery or other Mechanical Recovery from Existing Equipment	$0.50	30%

(1) The maximum % of project cost will go to 40% where a cooling application is used or included with the CHP system.
Note: Incentives for renewable fueled projects (Class 1) are currently being developed. This document will be updated when the incentive levels are finalized.

01-05/09

New Jersey SmartStart BUILDINGS

WHAT IS DIRECT INSTALL?

Designed for small to medium-sized facilities, Direct Install, by New Jersey's Clean Energy Program, cuts energy costs by replacing eligible lighting, HVAC, motors, natural gas, refrigeration and other equipment with higher efficiency alternatives. The program pays up to 80% of retrofit costs, dramatically lowering your upfront costs and improving your payback on the project. Services are provided by a network of Participating Contractors who perform Energy Assessments to identify eligible alternatives and then install the qualifying measures.

WHO'S ELIGIBLE?

Owners of existing small buildings to mid-size commercial and industrial facilities with a peak electric demand that did not exceed 200 kW in any of the preceding 12 months are eligible to participate in Direct Install. Buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies.

WHAT TO EXPECT?

- **The program is completely turnkey!**
  Participating Contractors are approved to perform Energy Assessments and install the energy efficient equipment in your building.

- **Costs to you are minimal!**
  Your share of the project's cost will be approximately 20%, New Jersey's Clean Energy Program pays the remaining 80%. With incentives so dramatic, your payback can be less than 2 years.

- **Turnaround time is quick!**
  Direct Install is designed to fast-track project implementation so your business can begin saving on energy costs sooner rather than later. Participating Contractors will perform the Energy Assessments and implement the recommended efficiency measures quickly.

Contact us today at 866-NJSMART and get started on a path to savings.

New Jersey SmartStart BUILDINGS®

BPU New Jersey Board of Public Utilities

New Jersey's Clean Energy PROGRAM™ Your Power to Save

APPENDIX H

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COSTS

CDM

11 British American Blvd
Latham, NY 12110
Phone (518) 782-4500
Fax (518) 786-3810

ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	**Board Office** Interior Lighting Upgrades	1	ls.		$ 5,850.50	1	ls.	$ 4,900.00	$ 4,900.00	$ 10,750.50
	Subtotal				5,850.50				4,900.00	

SUBTOTAL =	$	10,750.50
MARKUP % =	$	0.15
MARKUP =	$	1,612.58
SUB-TOTAL w/ OH & P =	$	12,363.08
CONTINGENCY % =		0.25
CONTINGENCY =	$	3,090.77
BUDGET COST ESTIMATE =	$	15,453.84

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
2	**Board Office** Exterior Lighting Upgrades	1	ls.		$ 1,530.00	1	ls.	$ 588.00	$ 588.00	$ 2,118.00
	Subtotal				1,530.00				588.00	

SUBTOTAL =	$	2,118.00
MARKUP % =	$	0.15
MARKUP =	$	317.70
SUB-TOTAL w/ OH & P =	$	2,435.70
CONTINGENCY % =		0.25
CONTINGENCY =	$	608.93
BUDGET COST ESTIMATE =	$	3,044.63

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
3	**Board Office** Combined Lighting Upgrades	1	ls.		$ 7,380.50	1	ls.	$ 5,488.00	$ 5,488.00	$ 12,868.50
	Subtotal				7,380.50				5,488.00	

SUBTOTAL =	$	12,868.50
MARKUP % =	$	0.15
MARKUP =	$	1,930.28
SUB-TOTAL w/ OH & P =	$	14,798.78
CONTINGENCY % =		0.25
CONTINGENCY =	$	3,699.69
BUDGET COST ESTIMATE =	$	18,498.47

CDM

11 British American Blvd
Latham, NY 12110
Phone (518) 782-4500
Fax (518) 786-3810

ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	**West Caldwell School** Interior Lighting Upgrades	1	ls.		$ 12,858.50	1	ls.	$ 9,681.50	$ 9,681.50	$ 22,540.00
	Subtotal				12,858.50				9,681.50	

SUBTOTAL =	$	22,540.00
MARKUP % =	$	0.15
MARKUP =	$	3,381.00
SUB-TOTAL w/ OH & P =	$	25,921.00
CONTINGENCY % =		0.25
CONTINGENCY =	$	6,480.25
BUDGET COST ESTIMATE =	$	32,401.25

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
2	**West Caldwell School** Exterior Lighting Upgrades	1	ls.		$ 5,345.00	1	ls.	$ 1,535.00	$ 1,535.00	$ 6,880.00
	Subtotal				5,345.00				1,535.00	

SUBTOTAL =	$	6,880.00
MARKUP % =	$	0.15
MARKUP =	$	1,032.00
SUB-TOTAL w/ OH & P =	$	7,912.00
CONTINGENCY % =		0.25
CONTINGENCY =	$	1,978.00
BUDGET COST ESTIMATE =	$	9,890.00

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
3	**West Caldwell School** Combined Lighting Upgrades	1	ls.		$ 18,203.50	1	ls.	$ 11,216.50	$ 11,216.50	$ 29,420.00
	Subtotal				18,203.50				11,216.50	

SUBTOTAL =	$	29,420.00
MARKUP % =	$	0.15
MARKUP =	$	4,413.00
SUB-TOTAL w/ OH & P =	$	33,833.00
CONTINGENCY % =		0.25
CONTINGENCY =	$	8,458.25
BUDGET COST ESTIMATE =	$	42,291.25

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	**Newark Technical School** Interior Lighting Upgrades	1	ls.		$ 27,229.00	1	ls.	$ 19,388.00	$ 19,388.00	$ 46,617.00
	Subtotal				27,229.00				19,388.00	

SUBTOTAL =	$	46,617.00
MARKUP % =	$	0.15
MARKUP =	$	6,992.55
SUB-TOTAL w/ OH & P =	$	53,609.55
CONTINGENCY % =		0.25
CONTINGENCY =	$	13,402.39
BUDGET COST ESTIMATE =	$	67,011.94

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
2	**Newark Technical School** Exterior Lighting Upgrades	1	ls.		$ 16,200.00	1	ls.	$ 5,640.00	$ 5,640.00	$ 21,840.00
	Subtotal				16,200.00				5,640.00	

SUBTOTAL =	$	21,840.00
MARKUP % =	$	0.15
MARKUP =	$	3,276.00
SUB-TOTAL w/ OH & P =	$	25,116.00
CONTINGENCY % =		0.25
CONTINGENCY =	$	6,279.00
BUDGET COST ESTIMATE =	$	31,395.00

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
3	**Newark Technical School** Combined Lighting Upgrades	1	ls.		$ 43,429.00	1	ls.	$ 25,028.00	$ 25,028.00	$ 68,457.00
	Subtotal				43,429.00				25,028.00	

SUBTOTAL =	$	68,457.00
MARKUP % =	$	0.15
MARKUP =	$	10,268.55
SUB-TOTAL w/ OH & P =	$	78,725.55
CONTINGENCY % =		0.25
CONTINGENCY =	$	19,681.39
BUDGET COST ESTIMATE =	$	98,406.94

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	**Bloomfield Technical School** Interior Lighting Upgrades	1	ls.		$ 12,082.50	1	ls.	$ 11,284.50	$ 11,284.50	$ 23,367.00
	Subtotal				12,082.50				11,284.50	

SUBTOTAL =	$	23,367.00
MARKUP % =	$	0.15
MARKUP =	$	3,505.05
SUB-TOTAL w/ OH & P =	$	26,872.05
CONTINGENCY % =		0.25
CONTINGENCY =	$	6,718.01
BUDGET COST ESTIMATE =	$	33,590.06

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
2	**Bloomfield Technical School** Exterior Lighting Upgrades	1	ls.		$ 6,985.00	1	ls.	$ 2,329.00	$ 2,329.00	$ 9,314.00
	Subtotal				6,985.00				2,329.00	

SUBTOTAL =	$	9,314.00
MARKUP % =	$	0.15
MARKUP =	$	1,397.10
SUB-TOTAL w/ OH & P =	$	10,711.10
CONTINGENCY % =		0.25
CONTINGENCY =	$	2,677.78
BUDGET COST ESTIMATE =	$	13,388.88

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
3	**Bloomfield Technical School** Combined Lighting Upgrades	1	ls.		$ 19,067.50	1	ls.	$ 13,613.50	$ 13,613.50	$ 32,681.00
	Subtotal				19,067.50				13,613.50	

SUBTOTAL =	$	32,681.00
MARKUP % =	$	0.15
MARKUP =	$	4,902.15
SUB-TOTAL w/ OH & P =	$	37,583.15
CONTINGENCY % =		0.25
CONTINGENCY =	$	9,395.79
BUDGET COST ESTIMATE =	$	46,978.94

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
1	**13th Street School** Interior Lighting Upgrades	1	ls.		$ 19,895.50	1	ls.	$ 15,995.50	$ 15,995.50	$ 35,891.00
	Subtotal				19,895.50				15,995.50	

SUBTOTAL =	$	35,891.00
MARKUP % =	$	0.15
MARKUP =	$	5,383.65
SUB-TOTAL w/ OH & P =	$	41,274.65
CONTINGENCY % =		0.25
CONTINGENCY =	$	10,318.66
BUDGET COST ESTIMATE =	$	51,593.31

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
2	**13th Street School** Exterior Lighting Upgrades	1	ls.		$ 6,435.00	1	ls.	$ 2,055.00	$ 2,055.00	$ 8,490.00
	Subtotal				6,435.00				2,055.00	

SUBTOTAL =	$	8,490.00
MARKUP % =	$	0.15
MARKUP =	$	1,273.50
SUB-TOTAL w/ OH & P =	$	9,763.50
CONTINGENCY % =		0.25
CONTINGENCY =	$	2,440.88
BUDGET COST ESTIMATE =	$	12,204.38

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
3	**13th Street School** Combined Lighting Upgrades	1	ls.		$ 26,330.50	1	ls.	$ 18,050.50	$ 18,050.50	$ 44,381.00
	Subtotal				26,330.50				18,050.50	

SUBTOTAL =	$	44,381.00
MARKUP % =	$	0.15
MARKUP =	$	6,657.15
SUB-TOTAL w/ OH & P =	$	51,038.15
CONTINGENCY % =		0.25
CONTINGENCY =	$	12,759.54
BUDGET COST ESTIMATE =	$	63,797.69

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Board Office									
1	Boiler, Gas-Fired, Condensing High Efficiency 2,000 MBH*	1	ea.	$ 34,000.00	$ 34,000.00	1	ea.	$ 5,750.00	$ 5,750.00	$ 39,750.00
2	Removal of Existing Firetube Boiler	1	ea.	$0	$ -	1	ea.	$ 5,850.00	$ 5,850.00	$ 5,850.00
3	New Flue, all fuel, pressure tight, double wall, U.L. listed, 1400 deg F, 304 stainless steel liner, aluminized steel outer jacket, 6" dia	20	LF	$ 47.00	$ 940.00	20	LF	$ 15.35	$ 307.00	$ 1,247.00
	Subtotal				34,940.00				11,907.00	

*Pricing from boiler manufacturer quote, dated May, 2009
All other pricing per RS Means Costworks 2010

SUBTOTAL =	$	46,847.00
MARKUP % =	$	0.15
MARKUP =	$	7,027.05
SUB-TOTAL w/ OH & P =	$	53,874.05
CONTINGENCY % =		0.25
CONTINGENCY =	$	13,468.51
BUDGET COST ESTIMATE =	$	67,342.56

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL & LABOR UNIT COST	MATERIAL & LABOR SUBTOTAL	TOTAL
1	**West Caldwell School** DDC Control System	80,493	SF	$ 0.60	$ 48,295.80	$ 48,295.80
	Subtotal				48,295.80	

Notes:
1. DDC Control System Pricing is estimated at $0.60 per square foot
2. At an assumed $400 per control point, this will allow for 173 points, or roughly 10 per RTU

SUBTOTAL =	$	48,295.80
MARKUP % =	$	0.15
MARKUP =	$	7,244.37
SUB-TOTAL w/ OH & P =	$	55,540.17
CONTINGENCY % =		0.25
CONTINGENCY =	$	13,885.04
BUDGET COST ESTIMATE =	$	69,425.21

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL & LABOR UNIT COST	MATERIAL & LABOR SUBTOTAL	TOTAL
1	**Newark Technical School** DDC Control System	185,339	SF	$ 0.60	$ 111,203.40	$ 111,203.40
	Subtotal				111,203.40	

Notes:
1. DDC Control System Pricing is estimated at $0.60 per square foot
2. At an assumed $400 per control point, this will allow for 399 points

SUBTOTAL =	$	111,203.40
MARKUP % =	$	0.15
MARKUP =	$	16,680.51
SUB-TOTAL w/ OH & P =	$	127,883.91
CONTINGENCY % =		0.25
CONTINGENCY =	$	31,970.98
BUDGET COST ESTIMATE =	$	159,854.89

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Newark Technical School									
1	Boiler, Gas-Fired, Condensing High Efficiency 2,000 MBH*	5	ea.	$ 34,000.00	$ 170,000.00	5	ea.	$ 5,750.00	$ 28,750.00	$ 198,750.00
2	Removal of Existing Firetube Boiler	2	ea.	$0	$ -	2	ea.	$ 24,400.00	$ 48,800.00	$ 48,800.00
3	New Flue, all fuel, pressure tight, double wall, U.L. listed, 1400 deg F, 304 stainless steel liner, aluminized steel outer jacket, 6" dia	40	LF	$ 47.00	$ 1,880.00	40	LF	$ 15.35	$ 614.00	$ 2,494.00
	Subtotal				171,880.00				78,164.00	

*Pricing from boiler manufacturer quote, dated May, 2009
All other pricing per RS Means Costworks 2010

SUBTOTAL =	$	250,044.00
MARKUP % =	$	0.15
MARKUP =	$	37,506.60
SUB-TOTAL w/ OH & P =	$	287,550.60
CONTINGENCY % =		0.25
CONTINGENCY =	$	71,887.65
BUDGET COST ESTIMATE =	$	359,438.25

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Bloomfield Technical School									
1	Boiler, Gas-Fired, Condensing High Efficiency 2,000 MBH*	4	ea.	$ 34,000.00	$ 136,000.00	4	ea.	$ 5,750.00	$ 23,000.00	$ 159,000.00
2	Removal of Existing Cast Iron Boiler	2	ea.	$0	$ -	2	ea.	$ 18,300.00	$ 36,600.00	$ 36,600.00
3	New Flue, all fuel, pressure tight, double wall, U.L. listed, 1400 deg F, 304 stainless steel liner, aluminized steel outer jacket, 6" dia	40	LF	$ 47.00	$ 1,880.00	40	LF	$ 15.35	$ 614.00	$ 2,494.00
4	Heating system, hydronic, natural gas, fin tube radiation, cast iron boiler, entire system pricing	93,831	SF	$ 5.60	$ 525,453.60	93,831	SF	$ 8.35	$ 783,488.85	$ 1,308,942.45
5	Cast iron boiler, hot water, 3,808 MBH gross output (included in system cost estimate, but not necessary as pricing for high-efficiency condensing boilers is included already)	2	ea.	$ (27,800.00)	$ (55,600.00)	2	ea.	$ (13,500.00)	$ (27,000.00)	$ (82,600.00)
	Subtotal				607,733.60				816,702.85	

*Pricing from boiler manufacturer quote, dated May, 2009
All other pricing per RS Means Costworks 2010

SUBTOTAL =	$	1,424,436.45
MARKUP % =	$	0.15
MARKUP =	$	213,665.47
SUB-TOTAL w/ OH & P =	$	1,638,101.92
CONTINGENCY % =		0.25
CONTINGENCY =	$	409,525.48
BUDGET COST ESTIMATE =	$	2,047,627.40

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ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

Location: Essex County Vocational School District
Estimate by: RKA
Checked by: MG

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	North 13th Street School									
1	Boiler, Gas-Fired, Condensing High Efficiency, 2,000 MBH*	4	ea.	$ 34,000.00	$ 136,000.00	4	ea.	$ 5,750.00	$ 23,000.00	$ 159,000.00
2	Removal of Existing Cast Iron Boiler	4	ea.	$0	$ -	4	ea.	$ 12,500.00	$ 50,000.00	$ 50,000.00
3	New Flue, all fuel, pressure tight, double wall, U.L. listed, 1400 deg F, 304 stainless steel liner, aluminized steel outer jacket, 6" dia	40	LF	$ 47.00	$ 1,880.00	40	LF	$ 15.35	$ 614.00	$ 2,494.00
4	Heating system, hydronic, natural gas, fin tube radiation, cast iron boiler, entire system pricing	194,772	SF	$ 5.60	$ 1,090,723.20	194,772	SF	$ 8.35	$ 1,626,346.20	$ 2,717,069.40
5	Cast iron boiler, hot water, 3,808 MBH gross output (included in system cost estimate, but not necessary as pricing for high-efficiency condensing boilers is included already)	2	ea.	$ (27,800.00)	$ (55,600.00)	2	ea.	$ (13,500.00)	$ (27,000.00)	$ (82,600.00)
	Subtotal				1,173,003.20				1,672,960.20	

*Pricing from boiler manufacturer quote, dated May, 2009
All other pricing per RS Means Costworks 2010

SUBTOTAL =	$	2,845,963.40
MARKUP % =	$	0.15
MARKUP =	$	426,894.51
SUB-TOTAL w/ OH & P =	$	3,272,857.91
CONTINGENCY % =		0.25
CONTINGENCY =	$	818,214.48
BUDGET COST ESTIMATE =	$	4,091,072.39

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JTM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Board Office									
1	Solar PV System	1	ls.		$ 576,457.00	1	ls.	$ 247,053.00	$ 247,053.00	$ 823,510.00
	Subtotal				576,457.00				247,053.00	

SUBTOTAL =	$ 823,510.00
CONTINGENCY % =	$ 0.25
CONTINGENCY =	$ 205,877.50
BUDGET COST ESTIMATE =	$ 1,029,387.50

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	West Caldwell School									
1	Solar PV System	1	ls.		$ 1,101,751.00	1	ls.	$ 472,179.00	$ 472,179.00	$ 1,573,930.00
	Subtotal				1,101,751.00				472,179.00	

SUBTOTAL =	$ 1,573,930.00
CONTINGENCY % =	$ 0.25
CONTINGENCY =	$ 393,482.50
BUDGET COST ESTIMATE =	$ 1,967,412.50

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Newark Technical School									
1	Solar PV System	1	ls.		$ 1,740,445.00	1	ls.	$ 745,905.00	$ 745,905.00	$ 2,486,350.00
	Subtotal				1,740,445.00				745,905.00	

SUBTOTAL =	$ 2,486,350.00
CONTINGENCY % =	$ 0.25
CONTINGENCY =	$ 621,587.50
BUDGET COST ESTIMATE =	$ 3,107,937.50

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JTM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Bloomfield Technical School									
1	Solar PV System	1	ls.		$ 949,165.00	1	ls.	$ 406,785.00	$ 406,785.00	$ 1,355,950.00
	Subtotal				949,165.00				406,785.00	

SUBTOTAL =	$	1,355,950.00
CONTINGENCY % =	$	0.25
CONTINGENCY =	$	338,987.50
BUDGET COST ESTIMATE =	$	1,694,937.50

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	13th Street School									
1	Solar PV System	1	ls.		$ 1,140,748.00	1	ls.	$ 488,892.00	$ 488,892.00	$ 1,629,640.00
	Subtotal				1,140,748.00				488,892.00	

SUBTOTAL =	$	1,629,640.00
CONTINGENCY % =	$	0.25
CONTINGENCY =	$	407,410.00
BUDGET COST ESTIMATE =	$	2,037,050.00

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ENGINEER'S OPINION OF CONSTRUCTION COST ESTIMATE

Location: Essex County Vocational Schools
Estimate by: PS
Checked by: JTM

ITEM	DESCRIPTION	QTY	UNIT	MATERIAL UNIT COST	MATERIAL SUBTOTAL	QTY	UNIT	LABOR COST	LABOR SUBTOTAL	TOTAL
	Essex County Vocational Schools									
1	10KW Wind Turbine	1	ls.		$ 43,645.00	1	ls.	$ 4,000.00	$ 4,000.00	$ 47,645.00
	Subtotal				43,645.00				4,000.00	

SUBTOTAL =	$	47,645.00
MARKUP % =	$	0.15
MARKUP =	$	7,146.75
SUB-TOTAL w/ OH & P =	$	54,791.75
CONTINGENCY % =		0.25
CONTINGENCY =	$	13,697.94
BUDGET COST ESTIMATE =	$	68,489.69

APPENDIX I

ECRM FINANCIAL ANALYSES

IRR, NPV, AROI

Inflation Rate: **3%**

Lighting - Interior Board Office		**Lighting - Interior West Caldwell**		**Lighting - Interior Newark Technical**		**Lighting - Interior Bloomfield Techical**		**Lighting - Interior 13th Street School**	
Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**
Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow
0	**($14,147.84)**	0	**($30,126.25)**	0	**($59,415.94)**	0	**($30,690.06)**	0	**($47,183.31)**
1	**$4,175.67**	1	**$5,891.43**	1	**$13,996.31**	1	**$9,316.99**	1	**$15,687.61**
2	$4,300.94	2	$6,068.17	2	$14,416.20	2	$9,596.50	2	$16,158.24
3	$4,429.97	3	$6,250.22	3	$14,848.69	3	$9,884.39	3	$16,642.99
4	$4,562.87	4	$6,437.72	4	$15,294.15	4	$10,180.93	4	$17,142.28
5	$4,699.75	5	$6,630.86	5	$15,752.97	5	$10,486.35	5	$17,656.54
6	$4,840.75	6	$6,829.78	6	$16,225.56	6	$10,800.94	6	$18,186.24
7	$4,985.97	7	$7,034.68	7	$16,712.33	7	$11,124.97	7	$18,731.83
8	$5,135.55	8	$7,245.72	8	$17,213.70	8	$11,458.72	8	$19,293.78
9	$5,289.61	9	$7,463.09	9	$17,730.11	9	$11,802.48	9	$19,872.59
10	$5,448.30	10	$7,686.98	10	$18,262.01	10	$12,156.56	10	$20,468.77
11	$5,611.75	11	$7,917.59	11	$18,809.87	11	$12,521.26	11	$21,082.84
12	$5,780.10	12	$8,155.12	12	$19,374.17	12	$12,896.89	12	$21,715.32
13	$5,953.51	13	$8,399.77	13	$19,955.39	13	$13,283.80	13	$22,366.78
14	$6,132.11	14	$8,651.76	14	$20,554.05	14	$13,682.31	14	$23,037.78
15	$6,316.08	15	$8,911.32	15	$21,170.67	15	$14,092.78	15	$23,728.92
IRR	31.78%	IRR	20.76%	IRR	25.31%	IRR	32.68%	IRR	35.72%
NPV	$46,662.89	NPV	$55,671.27	NPV	$144,413.82	NPV	$104,994.26	NPV	$181,277.03
AROI	22.85%	AROI	12.89%	AROI	16.89%	AROI	23.69%	AROI	26.58%

Lighting - Exterior Board Office		**Lighting - Exterior West Caldwell**		**Lighting - Exterior Newark Technical**		**Lighting - Exterior Bloomfield Techical**		**Lighting - Exterior 13th Street School**	
Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**
Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow
0	**($2,764.63)**	0	**($9,400.00)**	0	**($29,295.00)**	0	**($12,688.88)**	0	**($11,714.38)**
1	**$400.95**	1	**$1,720.36**	1	**$3,903.24**	1	**$1,563.26**	1	**$1,404.98**
2	$412.98	2	$1,771.97	2	$4,020.34	2	$1,610.16	2	$1,447.13
3	$425.37	3	$1,825.13	3	$4,140.95	3	$1,658.46	3	$1,490.54
4	$438.13	4	$1,879.88	4	$4,265.18	4	$1,708.22	4	$1,535.26
5	$451.27	5	$1,936.28	5	$4,393.13	5	$1,759.46	5	$1,581.32
6	$464.81	6	$1,994.37	6	$4,524.92	6	$1,812.25	6	$1,628.76
7	$478.76	7	$2,054.20	7	$4,660.67	7	$1,866.61	7	$1,677.62
8	$493.12	8	$2,115.83	8	$4,800.49	8	$1,922.61	8	$1,727.95
9	$507.91	9	$2,179.30	9	$4,944.51	9	$1,980.29	9	$1,779.79
10	$523.15	10	$2,244.68	10	$5,092.84	10	$2,039.70	10	$1,833.18
11	$538.84	11	$2,312.02	11	$5,245.63	11	$2,100.89	11	$1,888.18
12	$555.01	12	$2,381.38	12	$5,403.00	12	$2,163.92	12	$1,944.82
13	$571.66	13	$2,452.82	13	$5,565.09	13	$2,228.83	13	$2,003.17
14	$588.81	14	$2,526.41	14	$5,732.04	14	$2,295.70	14	$2,063.26
15	$606.47	15	$2,602.20	15	$5,904.00	15	$2,364.57	15	$2,125.16
IRR	14.56%	IRR	19.27%	IRR	13.01%	IRR	11.64%	IRR	11.18%
NPV	$3,074.45	NPV	$15,653.79	NPV	$27,548.30	NPV	$10,077.04	NPV	$8,746.49
AROI	7.84%	AROI	11.64%	AROI	6.66%	AROI	5.65%	AROI	5.33%

Lighting - Combined Board Office		**Lighting - Combined West Caldwell**		**Lighting - Combined Newark Technical**		**Lighting - Combined Bloomfield Techical**		**Lighting - Combined 13th Street School**	
Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**15**
Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow
0	**($16,912.47)**	0	**($39,526.25)**	0	**($88,710.94)**	0	**($43,378.94)**	0	**($58,897.69)**
1	**$4,576.62**	1	**$7,611.79**	1	**$17,899.55**	1	**$10,880.25**	1	**$17,092.59**
2	$4,713.92	2	$7,840.14	2	$18,436.54	2	$11,206.66	2	$17,605.37
3	$4,855.34	3	$8,075.35	3	$18,989.63	3	$11,542.86	3	$18,133.53
4	$5,001.00	4	$8,317.61	4	$19,559.32	4	$11,889.14	4	$18,677.53
5	$5,151.03	5	$8,567.14	5	$20,146.10	5	$12,245.82	5	$19,237.86
6	$5,305.56	6	$8,824.15	6	$20,750.48	6	$12,613.19	6	$19,815.00
7	$5,464.72	7	$9,088.88	7	$21,373.00	7	$12,991.59	7	$20,409.45
8	$5,628.67	8	$9,361.54	8	$22,014.19	8	$13,381.34	8	$21,021.73
9	$5,797.53	9	$9,642.39	9	$22,674.61	9	$13,782.78	9	$21,652.38
10	$5,971.45	10	$9,931.66	10	$23,354.85	10	$14,196.26	10	$22,301.95
11	$6,150.59	11	$10,229.61	11	$24,055.50	11	$14,622.15	11	$22,971.01
12	$6,335.11	12	$10,536.50	12	$24,777.16	12	$15,060.81	12	$23,660.14
13	$6,525.17	13	$10,852.59	13	$25,520.48	13	$15,512.63	13	$24,369.95
14	$6,720.92	14	$11,178.17	14	$26,286.09	14	$15,978.01	14	$25,101.04
15	$6,922.55	15	$11,513.52	15	$27,074.68	15	$16,457.35	15	$25,854.08
IRR	29.15%	IRR	20.41%	IRR	21.48%	IRR	27.00%	IRR	31.26%
NPV	$49,737.34	NPV	$71,325.06	NPV	$171,962.12	NPV	$115,071.30	NPV	$190,023.52
AROI	20.39%	AROI	12.59%	AROI	13.51%	AROI	18.42%	AROI	22.35%

ECM	Board Office - Interior Lighting	West Caldwell - Interior Lighting	Newark Technical - Interior Lighting	Bloomfield Technical - Interior Lighting	13th Street School - Interior Lighting
Assumed Inflation (Gas)	2%	2%	2%	2%	2%
Initial Yearly Savings (Gas)					
Assumed Inflation (Electricity)	3%	3%	3%	3%	3%
Initial Yearly Savings (Electricity)	$3,041.37	$5,461.11	$13,362.19	$8,058.40	$13,766.59
Assumed Average Useful Life (Years)	15	15	15	15	15
Lifetime Savings	**$56,566.18**	**$101,570.71**	**$248,522.22**	**$149,877.49**	**$256,043.62**
Year	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings
1	$3,041.37	$5,461.11	$13,362.19	$8,058.40	$13,766.59
2	$3,132.61	$5,624.94	$13,763.06	$8,300.15	$14,179.59
3	$3,226.59	$5,793.69	$14,175.95	$8,549.16	$14,604.98
4	$3,323.39	$5,967.50	$14,601.23	$8,805.63	$15,043.12
5	$3,423.09	$6,146.53	$15,039.26	$9,069.80	$15,494.42
6	$3,525.78	$6,330.92	$15,490.44	$9,341.89	$15,959.25
7	$3,631.55	$6,520.85	$15,955.15	$9,622.15	$16,438.03
8	$3,740.50	$6,716.48	$16,433.81	$9,910.82	$16,931.17
9	$3,852.72	$6,917.97	$16,926.82	$10,208.14	$17,439.10
10	$3,968.30	$7,125.51	$17,434.63	$10,514.38	$17,962.28
11	$4,087.35	$7,339.28	$17,957.67	$10,829.82	$18,501.15
12	$4,209.97	$7,559.45	$18,496.40	$11,154.71	$19,056.18
13	$4,336.27	$7,786.24	$19,051.29	$11,489.35	$19,627.87
14	$4,466.35	$8,019.82	$19,622.83	$11,834.03	$20,216.70
15	$4,600.35	$8,260.42	$20,211.51	$12,189.05	$20,823.20

ECM	Board Office - Exterior Lighting	West Caldwell - Exterior Lighting	Newark Technical - Exterior Lighting	Bloomfield Technical - Exterior Lighting	13th Street School - Exterior Lighting
Assumed Inflation (Gas)	2%	2%	2%	2%	2%
Initial Yearly Savings (Gas)					
Assumed Inflation (Electricity)	3%	3%	3%	3%	3%
Initial Yearly Savings (Electricity)	$349.62	$1,659.89	$3,677.73	$1,550.41	$1,391.96
Assumed Average Useful Life (Years)	15	15	15	15	15
Lifetime Savings	**$6,502.55**	**$30,872.15**	**$68,401.78**	**$28,835.94**	**$25,888.94**
Year	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings
1	$349.62	$1,659.89	$3,677.73	$1,550.41	$1,391.96
2	$360.11	$1,709.69	$3,788.06	$1,596.92	$1,433.72
3	$370.91	$1,760.98	$3,901.70	$1,644.83	$1,476.73
4	$382.04	$1,813.81	$4,018.75	$1,694.17	$1,521.03
5	$393.50	$1,868.22	$4,139.32	$1,745.00	$1,566.66
6	$405.31	$1,924.27	$4,263.50	$1,797.35	$1,613.66
7	$417.46	$1,982.00	$4,391.40	$1,851.27	$1,662.07
8	$429.99	$2,041.46	$4,523.14	$1,906.81	$1,711.94
9	$442.89	$2,102.70	$4,658.84	$1,964.01	$1,763.29
10	$456.17	$2,165.78	$4,798.60	$2,022.93	$1,816.19
11	$469.86	$2,230.75	$4,942.56	$2,083.62	$1,870.68
12	$483.96	$2,297.68	$5,090.84	$2,146.13	$1,926.80
13	$498.47	$2,366.61	$5,243.56	$2,210.51	$1,984.60
14	$513.43	$2,437.60	$5,400.87	$2,276.83	$2,044.14
15	$528.83	$2,510.73	$5,562.90	$2,345.13	$2,105.46

ECM	Board Office - Combined Lighting	West Caldwell - Combined Lighting	Newark Technical - Combined Lighting	Bloomfield Technical - Combined Lighting	13th Street School - Combined Lighting
Assumed Inflation (Gas)	2%	2%	2%	2%	2%
Initial Yearly Savings (Gas)					
Assumed Inflation (Electricity)	3%	3%	3%	3%	3%
Initial Yearly Savings (Electricity)	$3,390.99	$7,121.00	$17,039.92	$9,608.81	$15,158.55
Assumed Average Useful Life (Years)	15	15	15	15	15
Lifetime Savings	**$63,068.73**	**$132,442.87**	**$316,924.00**	**$178,713.43**	**$281,932.57**
Year	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings
1	$3,390.99	$7,121.00	$17,039.92	$9,608.81	$15,158.55
2	$3,492.72	$7,334.63	$17,551.12	$9,897.07	$15,613.31
3	$3,597.50	$7,554.67	$18,077.65	$10,193.99	$16,081.71
4	$3,705.43	$7,781.31	$18,619.98	$10,499.81	$16,564.16
5	$3,816.59	$8,014.75	$19,178.58	$10,814.80	$17,061.08
6	$3,931.09	$8,255.19	$19,753.94	$11,139.24	$17,572.91
7	$4,049.02	$8,502.85	$20,346.56	$11,473.42	$18,100.10
8	$4,170.49	$8,757.93	$20,956.95	$11,817.62	$18,643.10
9	$4,295.60	$9,020.67	$21,585.66	$12,172.15	$19,202.40
10	$4,424.47	$9,291.29	$22,233.23	$12,537.32	$19,778.47
11	$4,557.21	$9,570.03	$22,900.23	$12,913.44	$20,371.82
12	$4,693.92	$9,857.13	$23,587.23	$13,300.84	$20,982.98
13	$4,834.74	$10,152.84	$24,294.85	$13,699.87	$21,612.47
14	$4,979.78	$10,457.43	$25,023.70	$14,110.86	$22,260.84
15	$5,129.18	$10,771.15	$25,774.41	$14,534.19	$22,928.67

Lighting Maintenance Cost Savings

T12 to T8 Retrofit	T12 Bulb Cost	T8 Bulb Cost	T12 Bulb Average Lifetime (Years)	T8 Bulb Average Lifetime (Years)	Quantity of T12 Replacements vs. T8 Replacements	Cost of T12 Replacement over T8 Life	T8 Bulb Replacements Over Lifetime (15 Yrs)
1 Lamp	$25.0	$23.5	4.6	5.7	1.25	$31.2	3
2 Lamp	$69.9	$67.0	4.6	5.7	1.25	$87.4	3
3 Lamp	$94.9	$90.5	4.6	5.7	1.25	$118.6	3
4 Lamp	$119.8	$114.0	4.6	5.7	1.25	$149.8	3

Incandescent to CFL Retrofit	Incandescent Cost	CFL Cost	Incandescent Average Lifetime (Years)	CFL Average Lifetime (Years)	Quantity of Incandescent Replacements vs. CFL Replacements	Cost of Incandescent Replacement over CFL Life	CFL Replacements Over Lifetime (15 Yrs)
13 Watt	$23.0	$25.0	0.5	2.3	5	$115.0	7
15 Par 38 Watt	$23.0	$35.0	0.5	2.3	5	$115.0	7
23 Par 38 Watt	$23.0	$40.0	0.5	2.3	5	$115.0	7
25 Watt	$23.0	$27.0	0.5	2.3	5	$115.0	7
40 Watt	$23.0	$32.0	0.5	2.3	5	$115.0	7
65 Watt	$23.4	$45.0	0.5	2.3	5	$117.0	7

Metal Halide to Induction Retrofit		Metal Halide Cost	Induction Cost	Metal Halide Average Lifetime (Years)	Induction Average Lifetime (years)	Quantity of Metal Halide Replacements vs. Induction Replacements	Cost of Metal Halide Replacement over Induction Life	Induction Replacements Over Lifetime (15 Yrs)
400	Watt	$86.0	$485.0	4.6	22.8	5	$430.0	1
250	Watt	$80.0	$390.0	4.6	22.8	5	$400.0	1

150W HPS to 70W HPS		150 HPS Fixture Cost	70W HPS Fixture Cost	150 HPS Average Lifetime (Years)	70W HPS Average Lifetime (years)	Quantity of 150W HPS vs. 70W HPS Replacements	Cost of 150W HPS over 70W HPS	Replacements Over Lifetime (15 Yrs)
150	Watt	$475.0	$400.0	4.6	4.6	1.0074	$478.5	1

HPS to Indcution Retrofit		HPS Cost	Induction Cost	HPS Average Lifetime (Years)	Induction Average Lifetime (years)	Quantity of HPS Replacements vs. Induction Replacements	Cost of HPS over Induction Life	Induction Replacements Over Lifetime (15 Yrs)
250	Watt	$80.0	$390.0	4.6	22.8	5	$400.0	1
175	Watt	$78.0	$380.0	4.6	22.8	5	$390.0	1
150	Watt	$74.0	$380.0	4.6	22.8	5	$370.0	1
100	Watt	$55.0	$380.0	4.6	22.8	5	$275.0	1
70	Watt	$25.0	$380.0	4.6	22.8	5	$125.0	1

Incandescent to Induction Retrofit		Incandescent Cost	Induction Cost	Incandescent Average Lifetime (Years)	Induction Average Lifetime (years)	Quantity of Incandescent Replacements vs. Inductiion Replacements	Cost of Incandescent over Induction Life	Induction Replacements Over Lifetime (15 Yrs)
100	Watt	$1.8	$380.0	0.2	22.8	114	$205.5	1
75	Watt	$1.5	$380.0	0.2	22.8	114	$171.2	1

High Pressure Sodium/Metal Halide to Fluorescent		Metal Halide Cost	Fluorescent Cost	Metal Halide Average Lifetime (Years)	Fluorescent Average Lifetime (years)	Quantity of Metal Halide Replacements vs. Fluorescent Replacements	Cost of Metal Halide Replacement over Fluorescent Life	Fluorescent Replacements Over Lifetime (15 Yrs)
4	Lamp	$86.0	$216.0	4.6	5.7	1.25	$107.4	3
6	Lamp	$86.0	$288.0	4.6	5.7	1.25	$107.5	3

Interior Option

Building	INC-CFL (13W)	INC-CFL (40W)	T12->T8 (1 Lamp)	T12->T8 (2 Lamp)	T12->T8 (3 Lamp)	T12->T8 (4 Lamp)	MH->Fluorescent	INC-CFL (25W)	Total Maintenance Cost Savings	Annual Maintenance Cost Savings	Building
Board Office	$11,988.1	$1,057.8	$0.0	$597.0	$0.0	$551.0	$0.0	$2,820.7	$17,014.5	$1,134.30	Board Office
West Caldwell	$5,641.4	$0.0	$16.4	$91.8	$0.0	$0.0	$0.0	$705.2	$6,454.9	$430.32	West Caldwell
Newark Technical	$7,051.8	$0.0	$65.6	$642.9	$0.0	$0.0	$1,751.6	$0.0	$9,511.9	$634.12	Newark Technical
Bloomfield	$5,994.0	$8,609.3	$0.0	$1,102.2	$0.0	$0.0	$0.0	$3,173.3	$18,878.9	$1,258.59	Bloomfield
13th Street School	$18,687.3	$8,609.3	$0.0	$734.8	$0.0	$78.7	$0.0	$705.2	$28,815.3	$1,921.02	13th Street School

Exterior Option

Building	MH->Induction (400W)	INC->CFL (13W)	INC-CFL (25W)	HPS->Induction (150W)	HPS->Induction (70W)	Total Maintenance Cost Savings	Annual Maintenance Cost Savings	Building
Board Office	$0.0	$705.2	$0.0	$64.8	$0.0	$770.0	$51.33	Board Office
West Caldwell	$131.8	$705.2	$0.0	$70.1	$0.0	$907.1	$60.47	West Caldwell
Newark Technical	$150.7	$0.0	$2,820.7	$356.5	$54.8	$3,382.7	$225.51	Newark Technical
Bloomfield	$94.2	$0.0	$0.0	$60.2	$38.3	$192.7	$12.85	Bloomfield
13th Street School	$131.8	$0.0	$0.0	$36.1	$27.4	$195.3	$13.02	13th Street School

IRR, NPV, AROI (HVAC)

Inflation Rate: **3%**

Board Office		**West Caldwell School**		**Newark Technical School**		**Newark Technical School**		**Bloomfield Technical School**		**North 13th Street School**	
Boiler Upgrade		DDC BMS		Boiler Upgrade		DDC BMS		Hot Water System & Condensing Boilers		Hot Water System & Condensing Boilers	
Life of ECRM (Yrs):	**24**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**24**	Life of ECRM (Yrs):	**15**	Life of ECRM (Yrs):	**24**	Life of ECRM (Yrs):	**24**
Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow	Year	Cash Flow
0	**($65,353.00)**	0	**($69,425.00)**	0	**($349,438.00)**	0	**($159,855.00)**	0	**($2,039,627.00)**	0	**($4,083,072.00)**
1	**$6,835.00**	1	**$8,850.00**	1	**$38,572.00**	1	**$35,626.00**	1	**$49,248.00**	1	**$13,692.00**
2	$7,040.05	2	$9,115.50	2	$39,729.16	2	$36,694.78	2	$50,725.44	2	$14,102.76
3	$7,251.25	3	$9,388.97	3	$40,921.03	3	$37,795.62	3	$52,247.20	3	$14,525.84
4	$7,468.79	4	$9,670.63	4	$42,148.67	4	$38,929.49	4	$53,814.62	4	$14,961.62
5	$7,692.85	5	$9,960.75	5	$43,413.13	5	$40,097.38	5	$55,429.06	5	$15,410.47
6	$7,923.64	6	$10,259.58	6	$44,715.52	6	$41,300.30	6	$57,091.93	6	$15,872.78
7	$8,161.35	7	$10,567.36	7	$46,056.99	7	$42,539.31	7	$58,804.69	7	$16,348.96
8	$8,406.19	8	$10,884.38	8	$47,438.69	8	$43,815.49	8	$60,568.83	8	$16,839.43
9	$8,658.37	9	$11,210.92	9	$48,861.86	9	$45,129.95	9	$62,385.89	9	$17,344.62
10	$8,918.12	10	$11,547.24	10	$50,327.71	10	$46,483.85	10	$64,257.47	10	$17,864.95
11	$9,185.67	11	$11,893.66	11	$51,837.54	11	$47,878.36	11	$66,185.19	11	$18,400.90
12	$9,461.24	12	$12,250.47	12	$53,392.67	12	$49,314.72	12	$68,170.75	12	$18,952.93
13	$9,745.08	13	$12,617.98	13	$54,994.45	13	$50,794.16	13	$70,215.87	13	$19,521.52
14	$10,037.43	14	$12,996.52	14	$56,644.28	14	$52,317.98	14	$72,322.35	14	$20,107.16
15	$10,338.55	15	$13,386.42	15	$58,343.61	15	$53,887.52	15	$74,492.02	15	$20,710.38
16	$10,648.71			16	$60,093.92			16	$76,726.78	16	$21,331.69
17	$10,968.17			17	$61,896.74			17	$79,028.58	17	$21,971.64
18	$11,297.21			18	$63,753.64			18	$81,399.44	18	$22,630.79
19	$11,636.13			19	$65,666.25			19	$83,841.42	19	$23,309.71
20	$11,985.21			20	$67,636.24			20	$86,356.67	20	$24,009.00
21	$12,344.77			21	$69,665.32			21	$88,947.37	21	$24,729.28
22	$12,715.11			22	$71,755.28			22	$91,615.79	22	$25,471.15
23	$13,096.57			23	$73,907.94			23	$94,364.26	23	$26,235.29
24	$13,489.46			24	$76,125.18			24	$97,195.19	24	$27,022.35
IRR	12.08%	IRR	12.23%	IRR	9.82%	IRR	23.89%	IRR	-8.23%	IRR	-23.00%
NPV	$93,909.14	NPV	$59,458.50	NPV	$549,327.05	NPV	$358,970.24	NPV	($892,100.79)	NPV	($3,764,035.11)
AROI	6.29%	AROI	6.08%	AROI	6.87%	AROI	15.62%	AROI	-1.75%	AROI	-3.83%

ECRM	**Board Office** Boiler Upgrade	**West Caldwell School** DDC BMS	**Newark Technical School** Boiler Upgrade	**Newark Technical School** DDC BMS	**Bloomfield Technical School** Hot Water System & Condensing Boilers	**North 13th Street School** Hot Water System & Condensing Boilers
Assumed Inflation (Gas)	2%	2%	2%	2%	2%	2%
Initial Yearly Savings (Gas)	$5,335.00	$4,098.00	$37,072.00	$11,211.00	$47,748.00	$12,192.00
Assumed Inflation (Electricity)	3%	3%	3%	3%	3%	3%
Initial Yearly Savings (Electricity)		$4,752.00		$24,415.00		
Assumed Average Useful Life (Years)	24	15	24	15	24	24
Lifetime Savings	**$162,300.64**	**$159,250.46**	**$1,127,799.29**	**$647,968.98**	**$1,452,583.09**	**$370,903.35**
Year	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings
1	$5,335.00	$8,850.00	$37,072.00	$35,626.00	$47,748.00	$12,192.00
2	$5,441.70	$9,074.52	$37,813.44	$36,582.67	$48,702.96	$12,435.84
3	$5,550.53	$9,304.96	$38,569.71	$37,565.80	$49,677.02	$12,684.56
4	$5,661.54	$9,541.47	$39,341.10	$38,576.13	$50,670.56	$12,938.25
5	$5,774.78	$9,784.22	$40,127.93	$39,614.44	$51,683.97	$13,197.01
6	$5,890.27	$10,033.39	$40,930.48	$40,681.53	$52,717.65	$13,460.95
7	$6,008.08	$10,289.15	$41,749.09	$41,778.19	$53,772.00	$13,730.17
8	$6,128.24	$10,551.67	$42,584.08	$42,905.29	$54,847.44	$14,004.78
9	$6,250.80	$10,821.15	$43,435.76	$44,063.66	$55,944.39	$14,284.87
10	$6,375.82	$11,097.77	$44,304.47	$45,254.22	$57,063.28	$14,570.57
11	$6,503.34	$11,381.73	$45,190.56	$46,477.86	$58,204.55	$14,861.98
12	$6,633.40	$11,673.23	$46,094.37	$47,735.54	$59,368.64	$15,159.22
13	$6,766.07	$11,972.47	$47,016.26	$49,028.21	$60,556.01	$15,462.40
14	$6,901.39	$12,279.67	$47,956.59	$50,356.87	$61,767.13	$15,771.65
15	$7,039.42	$12,595.05	$48,915.72	$51,722.55	$63,002.47	$16,087.09
16	$7,180.21		$49,894.03		$64,262.52	$16,408.83
17	$7,323.81		$50,891.91		$65,547.77	$16,737.00
18	$7,470.29		$51,909.75		$66,858.73	$17,071.74
19	$7,619.69		$52,947.94		$68,195.90	$17,413.18
20	$7,772.09		$54,006.90		$69,559.82	$17,761.44
21	$7,927.53		$55,087.04		$70,951.02	$18,116.67
22	$8,086.08		$56,188.78		$72,370.04	$18,479.00
23	$8,247.80		$57,312.56		$73,817.44	$18,848.58
24	$8,412.76		$58,458.81		$75,293.79	$19,225.56
25						

IRR, NPV, AROI - PV Solar Energy Systems

Financial Calculations
Based on inflation of: 3%
O&M inflation: 3%

Board Office - PV Solar System				West Caldwell School School - PV Solar System				Newark Technical School - PV Solar System				Bloomfield Technical School - PV Solar System				North 13th Street School - PV Solar System			
Year	Energy Savings	SREC Sales	Cash Flow	Year	Energy Savings	SREC Sales	Cash Flow	Year	Energy Savings	SREC Sales	Cash Flow	Year	Energy Savings	SREC Sales	Cash Flow	Year	Energy Savings	SREC Sales	Cash Flow
0			($1,029,388)	0			($1,967,413)	0			($3,107,938)	0			($1,694,938)	0			($2,037,050)
1	$16,049.9	$66,505	$82,555	1	$32,576.2	$135,483	$168,060	1	$54,594.6	$219,353	$273,948	1	$29,793.9	$115,447	$145,241	1	$31,995.3	$140,605	$172,600
2	$16,448.7	$64,518	$80,967	2	$33,385.7	$131,436	$164,821	2	$55,951.3	$212,800	$268,752	2	$30,534.3	$111,998	$142,533	2	$32,790.4	$136,404	$169,194
3	$16,857.5	$62,571	$79,429	3	$34,215.4	$127,470	$161,685	3	$57,341.7	$206,379	$263,721	3	$31,293.1	$108,619	$139,912	3	$33,605.3	$132,288	$165,893
4	$17,276.4	$60,391	$77,667	4	$35,065.6	$123,028	$158,093	4	$58,766.6	$199,187	$257,954	4	$32,070.7	$104,834	$136,904	4	$34,440.4	$127,678	$162,118
5	$17,705.7	$58,286	$75,992	5	$35,937.0	$118,740	$154,677	5	$60,227.0	$192,245	$252,472	5	$32,867.7	$101,180	$134,048	5	$35,296.2	$123,228	$158,525
6	$18,145.7	$56,255	$74,401	6	$36,830.0	$114,602	$151,432	6	$61,723.6	$185,546	$247,269	6	$33,684.5	$97,654	$131,338	6	$36,173.3	$118,934	$155,107
7	$18,596.6	$54,294	$72,891	7	$37,745.3	$110,608	$148,353	7	$63,257.5	$179,079	$242,337	7	$34,521.5	$94,251	$128,772	7	$37,072.2	$114,789	$151,861
8	$19,058.7	$52,402	$71,461	8	$38,683.2	$106,753	$145,437	8	$64,829.4	$172,838	$237,668	8	$35,379.4	$90,966	$126,345	8	$37,993.5	$110,789	$148,782
9	$19,532.3	$50,576	$70,108	9	$39,644.5	$103,033	$142,678	9	$66,440.4	$166,815	$233,255	9	$36,258.6	$87,796	$124,054	9	$38,937.6	$106,928	$145,865
10	$20,017.7	$48,814	$68,831	10	$40,629.7	$99,442	$140,072	10	$68,091.5	$161,001	$229,093	10	$37,159.6	$84,736	$121,896	10	$39,905.2	$103,201	$143,106
11	$20,515.2	$47,112	$67,628	11	$41,639.3	$95,977	$137,616	11	$69,783.5	$155,391	$225,174	11	$38,083.0	$81,783	$119,866	11	$40,896.8	$99,605	$140,501
12	$21,025.0	$45,470	$66,495	12	$42,674.1	$92,632	$135,306	12	$71,517.7	$149,975	$221,493	12	$39,029.4	$78,933	$117,962	12	$41,913.1	$96,133	$138,047
13	$21,547.4	$43,886	$65,433	13	$43,734.5	$89,404	$133,138	13	$73,294.9	$144,749	$218,043	13	$39,999.2	$76,182	$116,181	13	$42,954.7	$92,783	$135,738
14	$22,082.9	$42,356	$64,439	14	$44,821.3	$86,288	$131,109	14	$75,116.2	$139,704	$214,820	14	$40,993.2	$73,527	$114,520	14	$44,022.1	$89,550	$133,572
15	$22,631.6	$40,880	$63,512	15	$45,935.1	$83,281	$129,216	15	$76,982.9	$134,835	$211,818	15	$42,011.9	$70,965	$112,977	15	$45,116.0	$86,429	$131,545
16	$23,194.0	$2,285	$25,479	16	$47,076.6	$4,654	$51,731	16	$78,895.9	$7,536	$86,432	16	$43,055.9	$3,966	$47,022	16	$46,237.2	$4,830	$51,068
17	$23,770.4	$2,273	$26,044	17	$48,246.5	$4,631	$52,878	17	$80,856.5	$7,498	$88,355	17	$44,125.8	$3,946	$48,072	17	$47,386.2	$4,806	$52,192
18	$24,361.1	$2,262	$26,623	18	$49,445.4	$4,608	$54,053	18	$82,865.8	$7,461	$90,326	18	$45,222.4	$3,927	$49,149	18	$48,563.7	$4,782	$53,346
19	$24,966.5	$2,251	$27,217	19	$50,674.1	$4,585	$55,259	19	$84,925.0	$7,423	$92,348	19	$46,346.1	$3,907	$50,253	19	$49,770.5	$4,758	$54,529
20	$25,586.9	$2,239	$27,826	20	$51,933.3	$4,562	$56,495	20	$87,035.4	$7,386	$94,422	20	$47,497.8	$3,887	$51,385	20	$51,007.3	$4,734	$55,742
21	$26,222.7	$2,228	$28,451	21	$53,223.9	$4,539	$57,763	21	$89,198.2	$7,349	$96,547	21	$48,678.2	$3,868	$52,546	21	$52,274.9	$4,711	$56,986
22	$26,874.4	$2,217	$29,091	22	$54,546.5	$4,517	$59,063	22	$91,414.8	$7,312	$98,727	22	$49,887.8	$3,849	$53,736	22	$53,573.9	$4,687	$58,261
23	$27,542.2	$2,206	$29,748	23	$55,902.0	$4,494	$60,396	23	$93,686.4	$7,276	$100,962	23	$51,127.5	$3,829	$54,957	23	$54,905.2	$4,664	$59,569
24	$28,226.6	$2,195	$30,422	24	$57,291.1	$4,471	$61,763	24	$96,014.5	$7,240	$103,254	24	$52,398.0	$3,810	$56,208	24	$56,269.6	$4,641	$60,910
25	$28,928.1	$2,184	$31,112	25	$58,714.8	$4,449	$63,164	25	$98,400.5	$7,203	$105,604	25	$53,700.1	$3,791	$57,491	25	$57,667.9	$4,617	$62,285
		IRR	2.9%			IRR	3.7%			IRR	4.1%			IRR	3.8%			IRR	3.5%
		NPV	($5,740)			NPV	$115,196			NPV	$306,259			NPV	$126,230			NPV	$82,835
		AROI	4.0%			AROI	4.5%			AROI	4.8%			AROI	4.6%			AROI	4.5%

ECM	Board Office - PV Solar System	West Caldwell School - PV Solar System	Newark Technical School - PV Solar System	Bloomfield Technical School - PV Solar System	North 13th Street School - PV Solar System
Assumed Inflation (Gas)					
Initial Yearly Savings (Gas)					
Assumed Inflation (Electricity)	3%	3%	3%	3%	3%
Initial Yearly Savings (Electricity)	$16,049.90	$32,576.20	$54,594.60	$29,793.90	$31,995.30
Assumed Average Useful Life (Years)	25	25	25	25	25
Lifetime Savings	**$585,167.55**	**$1,187,704.29**	**$1,990,478.95**	**$1,086,263.68**	**$1,166,525.10**
Year	Annual Savings	Annual Savings	Annual Savings	Annual Savings	Annual Savings
1	$16,049.90	$32,576.20	$54,594.60	$29,793.90	$31,995.30
2	$16,531.40	$33,553.49	$56,232.44	$30,687.72	$32,955.16
3	$17,027.34	$34,560.09	$57,919.41	$31,608.35	$33,943.81
4	$17,538.16	$35,596.89	$59,656.99	$32,556.60	$34,962.13
5	$18,064.30	$36,664.80	$61,446.70	$33,533.30	$36,010.99
6	$18,606.23	$37,764.74	$63,290.10	$34,539.30	$37,091.32
7	$19,164.42	$38,897.69	$65,188.81	$35,575.47	$38,204.06
8	$19,739.35	$40,064.62	$67,144.47	$36,642.74	$39,350.18
9	$20,331.53	$41,266.56	$69,158.81	$37,742.02	$40,530.69
10	$20,941.48	$42,504.55	$71,233.57	$38,874.28	$41,746.61
11	$21,569.72	$43,779.69	$73,370.58	$40,040.51	$42,999.01
12	$22,216.82	$45,093.08	$75,571.69	$41,241.73	$44,288.98
13	$22,883.32	$46,445.87	$77,838.85	$42,478.98	$45,617.65
14	$23,569.82	$47,839.25	$80,174.01	$43,753.35	$46,986.18
15	$24,276.91	$49,274.43	$82,579.23	$45,065.95	$48,395.76
16	$25,005.22	$50,752.66	$85,056.61	$46,417.93	$49,847.63
17	$25,755.38	$52,275.24	$87,608.31	$47,810.46	$51,343.06
18	$26,528.04	$53,843.50	$90,236.56	$49,244.78	$52,883.36
19	$27,323.88	$55,458.80	$92,943.65	$50,722.12	$54,469.86
20	$28,143.60	$57,122.56	$95,731.96	$52,243.78	$56,103.95
21	$28,987.90	$58,836.24	$98,603.92	$53,811.10	$57,787.07
22	$29,857.54	$60,601.33	$101,562.04	$55,425.43	$59,520.68
23	$30,753.27	$62,419.37	$104,608.90	$57,088.19	$61,306.30
24	$31,675.87	$64,291.95	$107,747.17	$58,800.84	$63,145.49
25	$32,626.14	$66,220.71	$110,979.58	$60,564.86	$65,039.86

IRR, NPV, AROI - Wind Energy Systems

Financial Calculations

Based on inflation of: 3%

O&M inflation: 3%

Wind Turbine - Minimum Wind Speed

REIP Incentive: $17,395

Year	Energy Savings	REC Sales	Cash Flow
0			($51,095)
1	$858.3	$136	$994
2	$879.7	$135	$1,015
3	$901.5	$135	$1,036
4	$923.9	$134	$1,058
5	$946.9	$133	$1,080
6	$970.4	$133	$1,103
7	$994.5	$132	$1,126
8	$1,019.3	$131	$1,150
9	$1,044.6	$131	$1,175
10	$1,070.5	$130	$1,200
11	$1,097.1	$129	$1,226
12	$1,124.4	$129	$1,253
13	$1,152.4	$128	$1,280
14	$1,181.0	$127	$1,308
15	$1,210.3	$127	$1,337
16	$1,240.4	$126	$1,366
17	$1,271.2	$125	$1,397
18	$1,302.8	$125	$1,428
19	$1,335.2	$124	$1,459
20	$1,368.4	$124	$1,492
21	$1,402.4	$123	$1,525
22	$1,437.2	$122	$1,560
23	$1,473.0	$122	$1,595
24	$1,509.6	$121	$1,631
25	$1,547.1	$120	$1,668
		IRR	-3.0%
		NPV	-$29,218
		AROI	-2.1%

Wind Turbine - Maximum Wind Speed

REIP Incentive: $50,890

Year	Energy Savings	REC Sales	Cash Flow
0			($17,600)
1	$2,428.5	$385	$2,813
2	$2,488.9	$383	$2,871
3	$2,550.7	$381	$2,931
4	$2,614.1	$379	$2,993
5	$2,679.0	$377	$3,056
6	$2,745.6	$375	$3,121
7	$2,813.8	$373	$3,187
8	$2,883.8	$371	$3,255
9	$2,955.4	$369	$3,325
10	$3,028.9	$368	$3,396
11	$3,104.1	$366	$3,470
12	$3,181.3	$364	$3,545
13	$3,260.3	$362	$3,622
14	$3,341.4	$360	$3,702
15	$3,424.4	$358	$3,783
16	$3,509.5	$357	$3,866
17	$3,596.7	$355	$3,952
18	$3,686.1	$353	$4,039
19	$3,777.7	$351	$4,129
20	$3,871.5	$350	$4,221
21	$3,967.8	$348	$4,316
22	$4,066.4	$346	$4,412
23	$4,167.4	$344	$4,512
24	$4,271.0	$343	$4,614
25	$4,377.1	$341	$4,718
		IRR	17.6%
		NPV	$44,297
		AROI	12.0%

Wind Turbine - Average Wind Speed

REIP Incentive: $33,082

Year	Energy Savings	REC Sales	Cash Flow
0			($35,408)
1	$1,632.4	$258	$1,891
2	$1,672.9	$257	$1,930
3	$1,714.5	$256	$1,970
4	$1,757.1	$255	$2,012
5	$1,800.8	$253	$2,054
6	$1,845.5	$252	$2,098
7	$1,891.4	$251	$2,142
8	$1,938.4	$250	$2,188
9	$1,986.6	$248	$2,235
10	$2,035.9	$247	$2,283
11	$2,086.5	$246	$2,332
12	$2,138.4	$245	$2,383
13	$2,191.5	$243	$2,435
14	$2,246.0	$242	$2,488
15	$2,301.8	$241	$2,543
16	$2,359.0	$240	$2,599
17	$2,417.6	$239	$2,656
18	$2,477.7	$237	$2,715
19	$2,539.2	$236	$2,775
20	$2,602.3	$235	$2,837
21	$2,667.0	$234	$2,901
22	$2,733.3	$233	$2,966
23	$2,801.2	$231	$3,033
24	$2,870.8	$230	$3,101
25	$2,942.2	$229	$3,171
		IRR	4.4%
		NPV	$6,197
		AROI	1.3%

ECM	Wind Turbine - Min Wind Speed	Wind Turbine - Max Wind Speed	Wind Turbine - Avg Wind Speed
Assumed Inflation (Gas)			
Initial Yearly Savings (Gas)			
Assumed Inflation (Electricity)	3%	3%	3%
Initial Yearly Savings (Electricity)	$858.30	$2,428.50	$1,632.40
Assumed Average Useful Life (Years)	25	25	25
Lifetime Savings	**$31,292.99**	**$88,541.32**	**$59,516.10**
Year	Annual Savings	Annual Savings	Annual Savings
1	$858.30	$2,428.50	$1,632.40
2	$884.05	$2,501.36	$1,681.37
3	$910.57	$2,576.40	$1,731.81
4	$937.89	$2,653.69	$1,783.77
5	$966.02	$2,733.30	$1,837.28
6	$995.00	$2,815.30	$1,892.40
7	$1,024.86	$2,899.76	$1,949.17
8	$1,055.60	$2,986.75	$2,007.65
9	$1,087.27	$3,076.35	$2,067.88
10	$1,119.89	$3,168.64	$2,129.91
11	$1,153.48	$3,263.70	$2,193.81
12	$1,188.09	$3,361.61	$2,259.62
13	$1,223.73	$3,462.46	$2,327.41
14	$1,260.44	$3,566.33	$2,397.23
15	$1,298.26	$3,673.32	$2,469.15
16	$1,337.20	$3,783.52	$2,543.23
17	$1,377.32	$3,897.03	$2,619.52
18	$1,418.64	$4,013.94	$2,698.11
19	$1,461.20	$4,134.36	$2,779.05
20	$1,505.03	$4,258.39	$2,862.42
21	$1,550.19	$4,386.14	$2,948.30
22	$1,596.69	$4,517.73	$3,036.74
23	$1,644.59	$4,653.26	$3,127.85
24	$1,693.93	$4,792.85	$3,221.68
25	$1,744.75	$4,936.64	$3,318.33

APPENDIX J

WIND CAD MODELING

WindCad Turbine Performance Model

BWC EXCEL-S, Grid - Intertie

Tier/neo-SH3055-23-BWC

Prepared For:	**Essex County Vocational Schools**
Site Location:	**Essex County**
Data Source:	**NASA**
Date:	**4/5/2010**

10 kW

Inputs:

Ave. Wind (m/s) =	3.75
Weibull K =	2
Site Altitude (m) =	72
Wind Shear Exp. =	0.180
Anem. Height (m) =	30
Tower Height (m) =	30
Turbulence Factor =	5.0%

Results:

Hub Average Wind Speed (m/s) =	3.75
Air Density Factor =	-1%
Average Output Power (kW) =	0.62
Daily Energy Output (kWh) =	14.9
Annual Energy Output (kWh) =	**5,436**
Monthly Energy Output =	453
Percent Operating Time =	50.1%

Weibull Performance Calculations

Wind Speed Bin (m/s)	Power (kW)	Wind Probability (f)	Net kW @ V
1	0.00	10.65%	0.000
2	0.00	17.99%	0.000
3	0.13	20.36%	0.027
4	0.41	18.30%	0.074
5	0.83	13.78%	0.114
6	1.43	8.90%	0.127
7	2.22	4.99%	0.111
8	3.24	2.45%	0.079
9	4.53	1.06%	0.048
10	6.06	0.40%	0.024
11	7.75	0.14%	0.011
12	9.46	0.04%	0.004
13	10.73	0.01%	0.001
14	11.10	0.00%	0.000
15	11.38	0.00%	0.000
16	11.46	0.00%	0.000
17	11.47	0.00%	0.000
18	11.42	0.00%	0.000
19	11.25	0.00%	0.000
20	10.80	0.00%	0.000
2008, BWC	Totals:	99.06%	0.621

Weibull Calculations:
Wind speed probability is calculated as a Weibull curve defined by the average wind speed and a shape factor, K. To facilitate piece-wise integration, the wind speed range is broken down into "bins" of 1 m/s in width (Column 1). For each wind speed bin, instantaneous wind turbine power (W, Column 2)) is multiplied by the Weibull wind speed probability (f, Column 3). This cross product (Net W, Column 4) is the contribution to average turbine power output contributed by wind speeds in that bin. The sum of these contributions is the average power output of the turbine on a continuous, 24 hour, basis.
Best results are achieved using annual or monthly average wind speeds. Use of daily or hourly average speeds is not recommended.

WindCad Turbine Performance Model

BWC EXCEL-S, Grid - Intertie

Tier/neo-SH3055-23-BWC

Prepared For:	**Essex County Vocational Schools**
Site Location:	**Essex County**
Data Source:	**NASA**
Date:	**4/5/2010**

10 kW

Inputs:

Ave. Wind (m/s) =	5.41
Weibull K =	2
Site Altitude (m) =	72
Wind Shear Exp. =	0.180
Anem. Height (m) =	30
Tower Height (m) =	30
Turbulence Factor =	5.0%

Results:

Hub Average Wind Speed (m/s) =	5.41
Air Density Factor =	-1%
Average Output Power (kW) =	1.76
Daily Energy Output (kWh) =	42.1
Annual Energy Output (kWh) =	**15,380**
Monthly Energy Output =	1,282
Percent Operating Time =	71.8%

Weibull Performance Calculations

Wind Speed Bin (m/s)	Power (kW)	Wind Probability (f)	Net kW @ V
1	0.00	5.27%	0.000
2	0.00	9.71%	0.000
3	0.13	12.73%	0.017
4	0.41	14.04%	0.057
5	0.83	13.76%	0.114
6	1.43	12.26%	0.175
7	2.22	10.06%	0.223
8	3.24	7.66%	0.248
9	4.53	5.44%	0.246
10	6.06	3.61%	0.219
11	7.75	2.25%	0.175
12	9.46	1.32%	0.125
13	10.73	0.73%	0.078
14	11.10	0.38%	0.042
15	11.38	0.18%	0.021
16	11.46	0.08%	0.010
17	11.47	0.04%	0.004
18	11.42	0.02%	0.002
19	11.25	0.01%	0.001
20	10.80	0.00%	0.000
2008, BWC	Totals:	99.55%	1.756

Weibull Calculations:
Wind speed probability is calculated as a Weibull curve defined by the average wind speed and a shape factor, K. To facilitate piece-wise integration, the wind speed range is broken down into "bins" of 1 m/s in width (Column 1). For each wind speed bin, instantaneous wind turbine power (W, Column 2)) is multiplied by the Weibull wind speed probability (f, Column 3). This cross product (Net W, Column 4) is the contribution to average turbine power output contributed by wind speeds in that bin. The sum of these contributions is the average power output of the turbine on a continuous, 24 hour, basis.
Best results are achieved using annual or monthly average wind speeds. Use of daily or hourly average speeds is not recommended.

WindCad Turbine Performance Model

BWC EXCEL-S, Grid - Intertie

Tier/neo-SH3055-23-BWC

Prepared For:	**Essex County Vocational Schools**
Site Location:	**Essex County**
Data Source:	**NASA**
Date:	**4/5/2010**

10 kW

Inputs:

Ave. Wind (m/s) =	4.67
Weibull K =	2
Site Altitude (m) =	72
Wind Shear Exp. =	0.180
Anem. Height (m) =	30
Tower Height (m) =	30
Turbulence Factor =	5.0%

Results:

Hub Average Wind Speed (m/s) =	4.67
Air Density Factor =	-1%
Average Output Power (kW) =	1.18
Daily Energy Output (kWh) =	28.3
Annual Energy Output (kWh) =	**10,338**
Monthly Energy Output =	862
Percent Operating Time =	64.1%

Weibull Performance Calculations

Wind Speed Bin (m/s)	Power (kW)	Wind Probability (f)	Net kW @ V
1	0.00	7.00%	0.000
2	0.00	12.56%	0.000
3	0.13	15.72%	0.021
4	0.41	16.25%	0.066
5	0.83	14.65%	0.122
6	1.43	11.79%	0.168
7	2.22	8.58%	0.190
8	3.24	5.69%	0.184
9	4.53	3.45%	0.156
10	6.06	1.92%	0.116
11	7.75	0.99%	0.076
12	9.46	0.47%	0.044
13	10.73	0.20%	0.022
14	11.10	0.08%	0.009
15	11.38	0.03%	0.004
16	11.46	0.01%	0.001
17	11.47	0.00%	0.000
18	11.42	0.00%	0.000
19	11.25	0.00%	0.000
20	10.80	0.00%	0.000
2008, BWC	Totals:	99.39%	1.180

Weibull Calculations:
Wind speed probability is calculated as a Weibull curve defined by the average wind speed and a shape factor, K. To facilitate piece-wise integration, the wind speed range is broken down into "bins" of 1 m/s in width (Column 1). For each wind speed bin, instantaneous wind turbine power (W, Column 2)) is multiplied by the Weibull wind speed probability (f, Column 3). This cross product (Net W, Column 4) is the contribution to average turbine power output contributed by wind speeds in that bin. The sum of these contributions is the average power output of the turbine on a continuous, 24 hour, basis.
Best results are achieved using annual or monthly average wind speeds. Use of daily or hourly average speeds is not recommended.

APPENDIX K

WIND ENERGY FINANCING WORKSHEET

Essex County Vocational Schools
(Minimum Average Site Wind Speed @30m – 8.4 mph)

Annual kWh	5,436
Engineer's Opinion of Probable Cost	$68,489.69

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	$0.02/kWh Production
REC Factor	$25/MWh Production
REIP Incentive	$3.20/kWh First 16,000 kWh
	$0.50/kWh 16,000 kWh - 750,000 kWh

Year	Utility Price	Annual Wind kWh Production	Utility Savings	Renewable Energy Credits (RECs)	Renewable Energy Incentive Program (REIP)	Maintenance Costs	Annual Cash Flow	Cumulative Cash Flow
1	0.1579	5,436.0	$858.3	$136	$17,395	($109)	$885.5	$885.5
2	0.1626	5,408.8	$879.7	$135	$0	($108)	$906.7	$1,792.2
3	0.1675	5,381.8	$901.5	$135	$0	($108)	$928.4	$2,720.7
4	0.1725	5,354.9	$923.9	$134	$0	($107)	$950.7	$3,671.4
5	0.1777	5,328.1	$946.9	$133	$0	($107)	$973.5	$4,644.9
6	0.1830	5,301.5	$970.4	$133	$0	($106)	$996.9	$5,641.9
7	0.1885	5,274.9	$994.5	$132	$0	($105)	$1,020.9	$6,662.8
8	0.1942	5,248.6	$1,019.3	$131	$0	($105)	$1,045.5	$7,708.3
9	0.2000	5,222.3	$1,044.6	$131	$0	($104)	$1,070.7	$8,779.0
10	0.2060	5,196.2	$1,070.5	$130	$0	($104)	$1,096.5	$9,875.5
11	0.2122	5,170.2	$1,097.1	$129	$0	($103)	$1,123.0	$10,998.5
12	0.2186	5,144.4	$1,124.4	$129	$0	($103)	$1,150.1	$12,148.6
13	0.2251	5,118.7	$1,152.4	$128	$0	($102)	$1,177.9	$13,326.6
14	0.2319	5,093.1	$1,181.0	$127	$0	($102)	$1,206.5	$14,533.0
15	0.2388	5,067.6	$1,210.3	$127	$0	($101)	$1,235.7	$15,768.7
16	0.2460	5,042.3	$1,240.4	$126	$0	($101)	$1,265.6	$17,034.3
17	0.2534	5,017.1	$1,271.2	$125	$0	($100)	$1,296.3	$18,330.7
18	0.2610	4,992.0	$1,302.8	$125	$0	($100)	$1,327.8	$19,658.4
19	0.2688	4,967.0	$1,335.2	$124	$0	($99)	$1,360.0	$21,018.5
20	0.2769	4,942.2	$1,368.4	$124	$0	($99)	$1,393.1	$22,411.6
21	0.2852	4,917.5	$1,402.4	$123	$0	($98)	$1,427.0	$23,838.5
22	0.2937	4,892.9	$1,437.2	$122	$0	($98)	$1,461.7	$25,300.2
23	0.3026	4,868.4	$1,473.0	$122	$0	($97)	$1,497.3	$26,797.5
24	0.3116	4,844.1	$1,509.6	$121	$0	($97)	$1,533.8	$28,331.3
25	0.3210	4,819.8	$1,547.1	$120	$0	($96)	$1,571.2	$29,902.5

Essex County Vocational Schools
(Maximum Average Site Wind Speed @30m - 12.1 mph)

Annual kWh	15,380
Engineer's Opinion of Probable Cost	$68,489.69

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	$0.02/kWh Production
REC Factor	$25/MWh Production
REIP Incentive	$3.20/kWh First 16,000 kWh
	$0.50/kWh 16,000 kWh - 750,000 kWh

Year	Utility Price	Annual Wind kWh Production	Utility Savings	Renewable Energy Credits (RECs)	Renewable Energy Incentive Program (REIP)	Maintenance Costs	Annual Cash Flow	Cumulative Cash Flow
1	0.1579	15,380.0	$2,428.5	$385	$50,890	($308)	$2,505.4	$2,505.4
2	0.1626	15,303.1	$2,488.9	$383	$0	($306)	$2,565.4	$5,070.8
3	0.1675	15,226.6	$2,550.7	$381	$0	($305)	$2,626.8	$7,697.6
4	0.1725	15,150.5	$2,614.1	$379	$0	($303)	$2,689.8	$10,387.4
5	0.1777	15,074.7	$2,679.0	$377	$0	($301)	$2,754.4	$13,141.9
6	0.1830	14,999.3	$2,745.6	$375	$0	($300)	$2,820.6	$15,962.5
7	0.1885	14,924.3	$2,813.8	$373	$0	($298)	$2,888.5	$18,850.9
8	0.1942	14,849.7	$2,883.8	$371	$0	($297)	$2,958.0	$21,809.0
9	0.2000	14,775.5	$2,955.4	$369	$0	($296)	$3,029.3	$24,838.3
10	0.2060	14,701.6	$3,028.9	$368	$0	($294)	$3,102.4	$27,940.6
11	0.2122	14,628.1	$3,104.1	$366	$0	($293)	$3,177.3	$31,117.9
12	0.2186	14,554.9	$3,181.3	$364	$0	($291)	$3,254.1	$34,372.0
13	0.2251	14,482.2	$3,260.3	$362	$0	($290)	$3,332.7	$37,704.7
14	0.2319	14,409.7	$3,341.4	$360	$0	($288)	$3,413.4	$41,118.1
15	0.2388	14,337.7	$3,424.4	$358	$0	($287)	$3,496.1	$44,614.2
16	0.2460	14,266.0	$3,509.5	$357	$0	($285)	$3,580.8	$48,195.0
17	0.2534	14,194.7	$3,596.7	$355	$0	($284)	$3,667.7	$51,862.7
18	0.2610	14,123.7	$3,686.1	$353	$0	($282)	$3,756.7	$55,619.4
19	0.2688	14,053.1	$3,777.7	$351	$0	($281)	$3,847.9	$59,467.3
20	0.2769	13,982.8	$3,871.5	$350	$0	($280)	$3,941.5	$63,408.8
21	0.2852	13,912.9	$3,967.8	$348	$0	($278)	$4,037.3	$67,446.1
22	0.2937	13,843.3	$4,066.4	$346	$0	($277)	$4,135.6	$71,581.6
23	0.3026	13,774.1	$4,167.4	$344	$0	($275)	$4,236.3	$75,817.9
24	0.3116	13,705.3	$4,271.0	$343	$0	($274)	$4,339.5	$80,157.4
25	0.3210	13,636.7	$4,377.1	$341	$0	($273)	$4,445.3	$84,602.7

Essex County Vocational Schools
(Average Site Wind Speed @30m - 10.5 mph)

Annual kWh	10,338
Engineer's Opinion of Probable Cost	$68,489.69

Assumptions

Annual System Degredation	0.50%
Annual Utility Inflation	3.00%
Annual Maintenance Costs	$0.02/kWh Production
REC Factor	$25/MWh Production
REIP Incentive	$3.20/kWh First 16,000 kWh
	$0.50/kWh 16,000 kWh - 750,000 kWh

Year	Utility Price	Annual Wind kWh Production	Utility Savings	Renewable Energy Credits (RECs)	Renewable Energy Incentive Program (REIP)	Maintenance Costs	Annual Cash Flow	Cumulative Cash Flow
1	0.1579	10,338.0	$1,632.4	$258	$33,082	($207)	$1,684.1	$1,684.1
2	0.1626	10,286.3	$1,672.9	$257	$0	($206)	$1,724.4	$3,408.4
3	0.1675	10,234.9	$1,714.5	$256	$0	($205)	$1,765.7	$5,174.1
4	0.1725	10,183.7	$1,757.1	$255	$0	($204)	$1,808.0	$6,982.1
5	0.1777	10,132.8	$1,800.8	$253	$0	($203)	$1,851.4	$8,833.6
6	0.1830	10,082.1	$1,845.5	$252	$0	($202)	$1,895.9	$10,729.5
7	0.1885	10,031.7	$1,891.4	$251	$0	($201)	$1,941.5	$12,671.1
8	0.1942	9,981.6	$1,938.4	$250	$0	($200)	$1,988.3	$14,659.4
9	0.2000	9,931.6	$1,986.6	$248	$0	($199)	$2,036.2	$16,695.6
10	0.2060	9,882.0	$2,035.9	$247	$0	($198)	$2,085.3	$18,780.9
11	0.2122	9,832.6	$2,086.5	$246	$0	($197)	$2,135.7	$20,916.6
12	0.2186	9,783.4	$2,138.4	$245	$0	($196)	$2,187.3	$23,103.9
13	0.2251	9,734.5	$2,191.5	$243	$0	($195)	$2,240.2	$25,344.0
14	0.2319	9,685.8	$2,246.0	$242	$0	($194)	$2,294.4	$27,638.4
15	0.2388	9,637.4	$2,301.8	$241	$0	($193)	$2,350.0	$29,988.4
16	0.2460	9,589.2	$2,359.0	$240	$0	($192)	$2,406.9	$32,395.3
17	0.2534	9,541.3	$2,417.6	$239	$0	($191)	$2,465.3	$34,860.6
18	0.2610	9,493.6	$2,477.7	$237	$0	($190)	$2,525.1	$37,385.8
19	0.2688	9,446.1	$2,539.2	$236	$0	($189)	$2,586.5	$39,972.2
20	0.2769	9,398.9	$2,602.3	$235	$0	($188)	$2,649.3	$42,621.6
21	0.2852	9,351.9	$2,667.0	$234	$0	($187)	$2,713.8	$45,335.3
22	0.2937	9,305.1	$2,733.3	$233	$0	($186)	$2,779.8	$48,115.2
23	0.3026	9,258.6	$2,801.2	$231	$0	($185)	$2,847.5	$50,962.7
24	0.3116	9,212.3	$2,870.8	$230	$0	($184)	$2,916.9	$53,879.5
25	0.3210	9,166.2	$2,942.2	$229	$0	($183)	$2,988.0	$56,867.5