ENERGY AUDIT – FINAL REPORT

MILLVILLE BOARD OF EDUCATION
RIECK AVENUE SCHOOL

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CEG PROJECT NO. 9C09072

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Table of Contents

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I. EXECUTIVE SUMMARY

This report presents the findings of the energy audit conducted for:

Millville Board of Education
Rieck Avenue School
339 Rieck Avenue
Millville, NJ 08332

Municipal Contact Person: Toni Basich
Facility Contact Person: Esteban Garcia

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	$135,725
Natural Gas	$34,050
Total	$169,776

The potential annual energy cost savings for each energy conservation measure (ECM) and renewable energy measure (REM) are shown below in Table 1. Be aware that the ECM's and REM' are not additive because of the interrelation of some of the measures. This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is ± 20%. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Table 1
Financial Summary Table

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Gymnasium Lighting Replacement w/ Day-Light Dimming Controls	$20,000	$2,095	9.5	57.1%
ECM #2	Lighting Controls	$14,000	$2,675	5.2	186.6%
ECM #3	Premium Efficient Motor Replacement	$1,892	$173	10.9	37.2%
ECM #4	Air Handling Unit Replacement	$48,758	$10,098	4.8	314.2%
ECM #5	Roof Top Unit Replacement	$7,990	$345	23.2	-35.2%
ECM #6	UV Replamcement - Air to Air Heat Pumps	$92,535	$1,670	55.4	-63.9%
ECM #7	UV Replacement - Geothermal Water to Water Heat Pumps	$955,820	$10,530	90.8	-78.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Photovoltaic Panel Installation	$1,092,960	$73,757	14.8	1.2%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

The estimated demand and energy savings for each ECM and REM is shown below in Table 2. The descriptions in this table correspond to the ECM's and REM's listed in Table 1.

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Gymnasium Lighting Replacement w/ Day-Light Dimming Controls	5.0	18,875.0	0.0
ECM #2	Lighting Controls	0.0	24,113.0	0.0
ECM #3	Premium Efficient Motor Replacement	0.4	1,559.0	0.0
ECM #4	Air Handling Unit Replacement	2.3	140,645.0	(4,445.0)
ECM #5	Roof Top Unit Replacement	1.7	3,085.0	0.0
ECM #6	UV Replamcement - Air to Air Heat Pumps	6.0	15,012.0	0.0
ECM #7	UV Replacement - Geothermal Water to Water Heat Pumps	20.0	94,852.0	0.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Photovoltaic Panel Installation	0.0	159,994.0	0.0

Concord Engineering Group (CEG) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years. The following Energy Conservation Measures are recommended for the facility:

- **ECM #1:** Gymnasium Lighting Replacement w/ Day-Light Dimming Control
- **ECM #2:** Lighting Controls
- **ECM #3:** Premium Efficient Motor Replacement
- **ECM #4:** Air Handling Unit Replacement

CEG recommends the BOE undergo a feasibility study to evaluate the best option for the replacement of A, B and C-wing HVAC systems prior to a decision being made. Many replacement options exist, the energy usage and installation cost of each system varying greatly. The Rieck Avenue School would greatly benefit from the installation of a geothermal heating and cooling system. Due to the expense of this system it is necessary to evaluate the geothermal system side by side with other less expensive alternatives to give an accurate comparison of utility cost.

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

All in all, incentives provide financial motivation and much needed support for the implementation of energy conservation measures. Along with the NJ Smart Start program, the Pay for Performance Program incentives, sponsored by NJ Clean Energy Program, are applicable for this facility. The existing average operating demand above 200 KW and high energy consumption qualifies for the Pay for Performance Program. The incentive based on a 15% electrical energy reduction for this facility would qualify for an additional $12,820 in the Pay for Performance Program. If natural gas consumption could be reduced by 15% the resultant incentive would be approximately $2,375. This would equate to a total incentive equal to approximately $15,195. This option is one to consider for a whole-building approach to energy reduction. The Pay for Performance Program represents a significant commitment to energy

reduction of a facility. This option should be reviewed in more detail with a Pay for Performance Program partner.

II. INTRODUCTION

The comprehensive energy audit covers the 102,000 square foot Rieck Avenue School, which includes the following spaces: classrooms, cafeteria, kitchen facility, library, computer labs, science labs, administration offices and a gymnasium.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of the building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved. If multiple ECM's are recommended to be implemented, the combined savings is calculated and identified appropriately.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated base on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$Simple\ Payback = \left(\frac{Net\ Cost}{Yearly\ Savings} \right)$$

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ Lifetime \right)$$

$$Simple\ Lifetime\ ROI = \frac{(Simple\ Lifetime\ Savings - Net\ Cost)}{Net\ Cost}$$

$$Lifetime\ Ma\,\mathrm{int}\,enance\ Savings = \left(Yearly\ Ma\,\mathrm{int}\,enance\ Savings \times ECM\ Lifetime \right)$$

$$Internal\ Rate\ of\ \mathrm{Re}\,turn = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + IRR)^n} \right)$$

$$Net\ \mathrm{Pr}\,esent\ Value = \sum_{n=0}^{N} \left(\frac{Cash\ Flow\ of\ Period}{(1 + DR)^n} \right)$$

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

The electric usage profile represents the actual electrical usage for the facility. Atlantic City Electric provides electricity to the facility under their Basic General Service (BGS) rate structure. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The gas usage profile shows the actual natural gas energy usage for the facility. South Jersey Natural Gas provides the natural gas to the facility under the Basic General Supply Service (BGSS) rate structures. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The third party commodity provider PEPCO Energy Service, Co is responsible for providing the commodities of Natural Gas to the Board of Education. Commodity and delivery is billed separately for each respective utility service.

The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	11.1¢ / kWh
Natural Gas	$1.50 / Therm

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Annual General Service (AGS)
Meter No: 8642263 & 86422465
Customer ID No: -
Third Party Utility -
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
Jan-09	194,450	568.4	$25,690
Feb-09	183,745	558.7	$24,463
Mar-09	139,959	465.1	$17,277
Apr-09	96,173	371.5	$10,091
May-09	64,551	239.3	$6,773
Jun-08	60,536	238.2	$9,602
Jul-08	41,489	124.0	$7,111
Aug-08	34,934	131.2	$5,806
Sep-08	59,595	226.6	$8,302
Oct-08	70,843	190.6	$7,172
Nov-08	111,869	323.3	$6,446
Dec-08	162,803	323.5	$6,991
Totals	**1,220,947**	**568.4 Max**	**$135,725**

AVERAGE DEMAND **313.4 KW average**
AVERAGE RATE **$0.111** **$/kWh**

Estimate Value, Utility Information Not Provided

Figure 1
Electricity Usage Profile

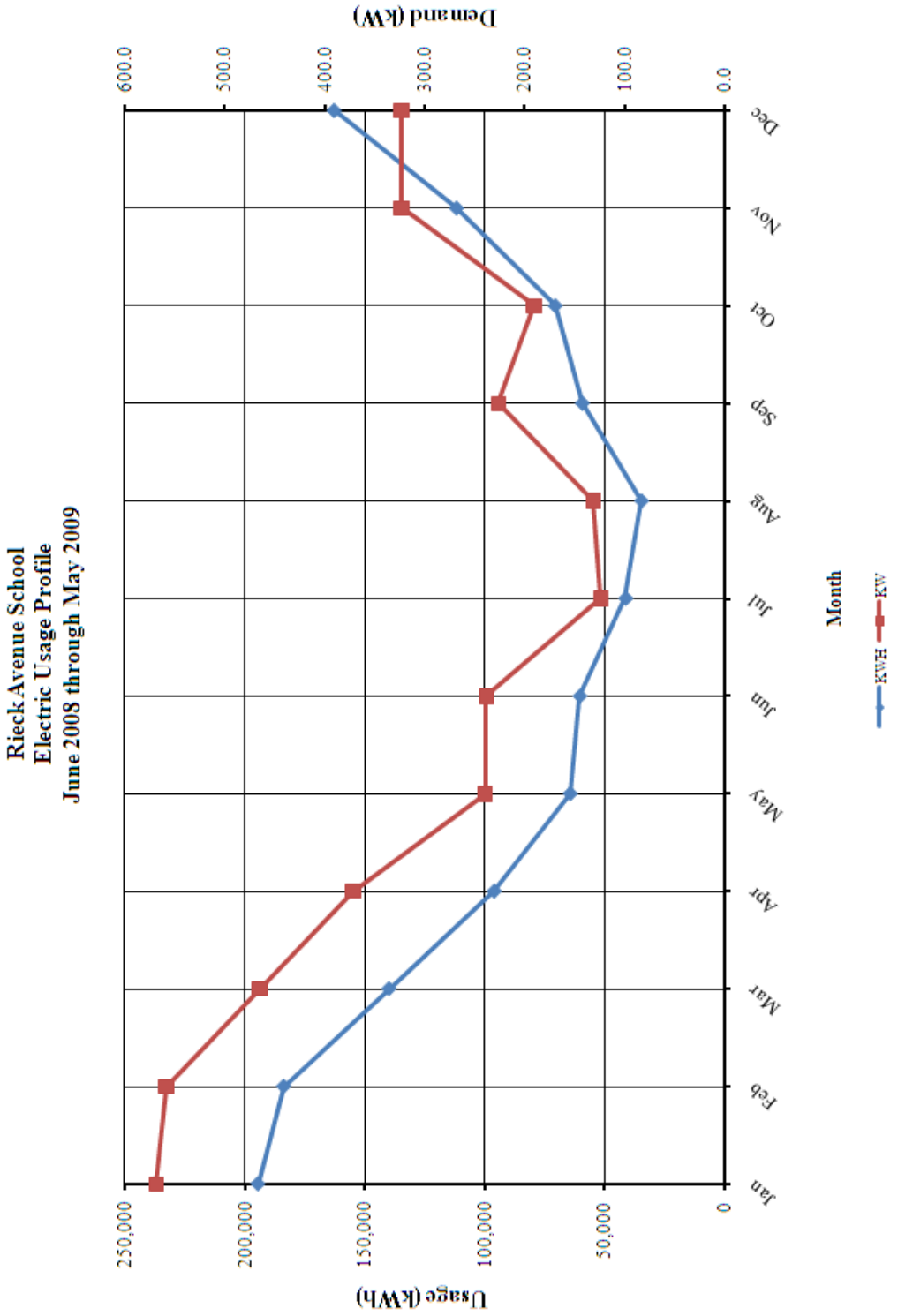
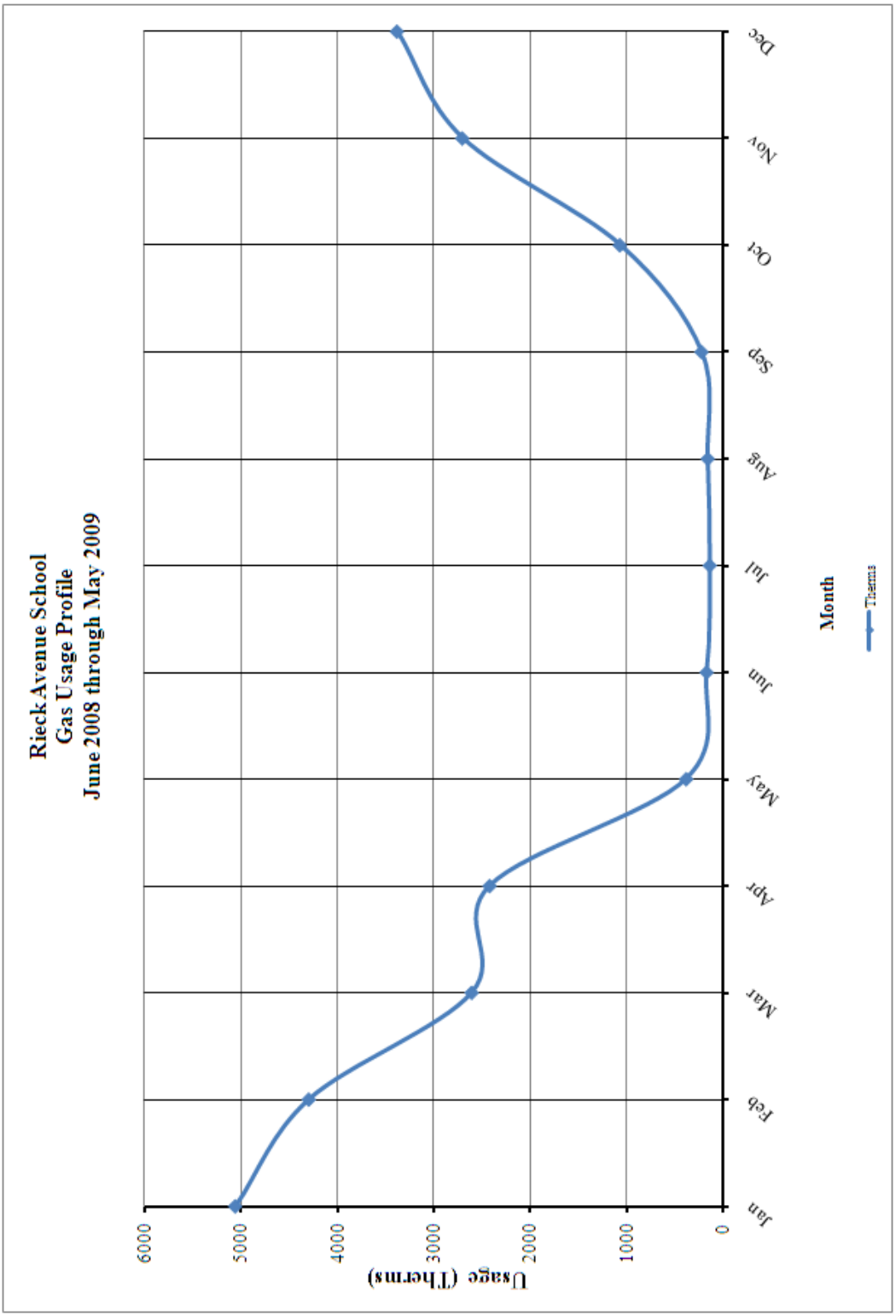


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	South Jersey Gas	
Rate:	BGSS	
Meter No:	486620	
Point of Delivery ID:	-	
Third Party Utility Provider:	PEPCO Energy Service, Inc.	
TPS Meter No:	-	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Jan-09	5,063.00	$7,548.80
Feb-09	4,300.00	$6,560.64
Mar-09	2,609.00	$3,986.75
Apr-09	2,423.00	$3,725.73
May-09	383.00	$604.96
Jun-08	171.00	$343.14
Jul-08	138.00	$298.71
Aug-08	159.00	$276.88
Sep-08	224.00	$360.60
Oct-08	1,072.00	$1,509.22
Nov-08	2,707.00	$3,826.96
Dec-08	3,385.00	$5,008.34
TOTALS	**22,634.00**	**$34,050.73**
AVERAGE RATE:	**$1.50**	**$/THERM**

Estimate Value, Utility Information Not Provided

Figure 2
Natural Gas Usage Profile



B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$Building\ Site\ EUI = \frac{(Electric\ Usage\ in\ kBtu + Gas\ Usage\ in\ kBtu)}{Building\ Square\ Footage}$$

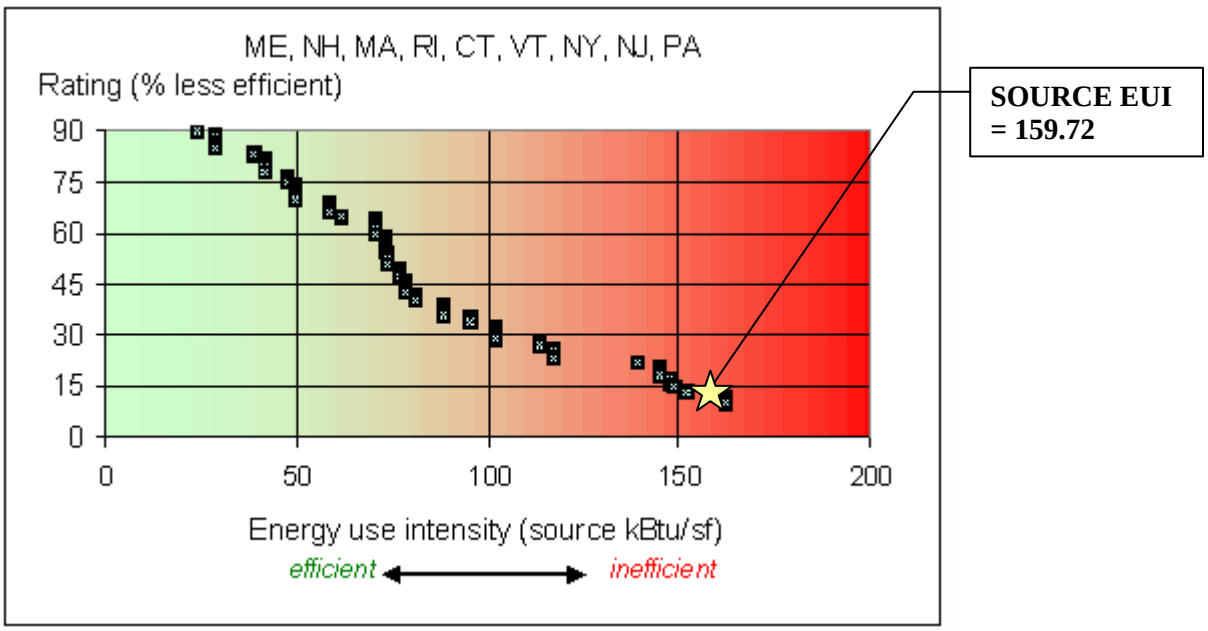
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	1220947.0			4,168,313	3.340	13,922,166
NATURAL GAS		22634.0		2,263,400	1.047	2,369,780
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				6,431,713		16,291,945
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		102,000	SQUARE FEET			
BUILDING SITE EUI		*63.06*	kBtu/SF/YR			
BUILDING SOURCE EUI		*159.72*	kBtu/SF/YR			

Figure 3 below depicts a national EUI grading for the source use of an Elementary School.

Figure 3
Source Energy Use Intensity Distributions: Elementary School



C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than $10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, CEG has created an ENERGY STAR account for the municipality to access and monitoring the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login

User Name: millvilleboe
Password: lgeaceg2009

Security Question: What city were you born in?
Security Answer: "millville"

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 6
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Rieck Avenue School	20	50

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary.

V. FACILITY DESCRIPTION

The 102,000 SF Rieck Avenue School is a two story facility comprised of classrooms, kitchen, gymnasium, administration/faculty offices, a library and computer labs. The building is divided in to 4 wings A, B, C and D, B and C-wings are single story. The typical hours of operation for this facility are between 9:00 am and 4:00 pm. Exterior walls are brick and block construction with minimum insulation typical of the time period. The total amount of insulation within the wall is unknown. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the facility are double pane, ¼" clear glass with aluminum frames. Blinds are utilized throughout the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat gain in the summer. The roof is of typical built up rubber construction with light gray stone covering with the exception of D-wing which has a red collared asphalt single roof. The amount of insulation below the roofing is unknown. The building was built in 1969 with the addition of D-wing in 1981.

HVAC Systems

The 1969 construction of the school, A, B and C-wings, utilize an all electric design to condition the space. Building original Hermon Nelson unit ventilators (UV's) equipped with electric resistance heating are located in all classrooms and office areas of the facility. The units serving B-wing are also equipped with DX coiling coils; B and C wings are not air conditioned. All units are self contained and have no input from a central plant of any kind. Four (4) of the UV's serving B-wing have been replaced new McQuay-AAF units that utilize air to air heat pumps to satisfy space heating and cooling requirements. Electric resistance heating, although technically 100% efficient is an expensive means of heating a space, this design is typical of the time period when the availability of natural gas was scarce.

The 1981 construction, D-wing, utilizes an entirely different system from the original section of the school. A 1,600 MBH Weil McLain hot water section boiler satisfies the wings heating requirements. Two (2) 3 hp end-suction pumps circulate the hot water around the facility. A VAV air distribution system is used to condition the space. A 30-Ton Trane cooling only roof-top unit provides conditioned air and ventilation to the space. Each VAV box is equipped with a hot water heating coil that is piped off the D-wing hot water loop.

The Library, cafeteria and kitchen are conditioned by heating only AAF indoor air handling units, two (2) units total. An electric resistance heating coil in each unit provides heating to the space. Ceiling fans are used in these areas to prevent stratification of the air.

The front administration office is provided conditioned air from a York cooling only packaged roof top unit equipped with a DX cooling coil. A ceiling forced air distribution system is utilized during the cooling season. Electric resistance baseboard is used for heating. The Principal and Vice Principal's offices are conditioned by packaged terminal air conditioner (PTAC) units that utilize DX cooling and electric resistance heating.

Entrance doorways are heated via electric resistance cabinet heaters in A, B and C-wings and hot water cabinet heaters in D-wing.

HVAC System Controls

The HVAC system within D-wing of the facility is controlled via a Honeywell control system. This section of the building utilizes electronic controls. The remaining areas of the school utilize point of use control for the individual units that serve the space.

Domestic Hot Water

Domestic hot water for A, B and C-wings is provided by two (2) 65 gallon Bradford White natural gas fired hot water heaters, each has a capacity of 370 MBH located in the B-wing boiler room. The domestic hot water piping insulation appeared to be in good condition. Domestic hot water is provided to D-wing by a shell and tube heat exchanger located in the boiler room. The hot water heating boiler is used to heat the necessary domestic hot water. This system is currently not in use due to plugging of the shell and tube heat exchanger, domestic hot water is currently not supplied to D-wing. After discussion with the facilities director it was found the heat exchanger is slated to be replaced with a standalone domestic hot water heater, once funding becomes available.

Lighting

Typical lighting throughout the building is fluorescent tube lay-in fixtures with T-8 lamps and electronic ballasts. Storage rooms and closets are lit with a mixture of incandescent lamps and compact fluorescent lamps. All existing incandescent lighting should be replaced with its compact fluorescent equivalent. A detailed list containing all building light fixtures can be found in the **Investment Grade Lighting Audit Appendix** of this report.

VI. MAJOR EQUIPMENT LIST

The equipment list is considered major energy consuming equipment and through energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Gymnasium Lighting Replacement with Day-Light Dimming Control

Description:

Day-light dimming systems have become more and more common as a means to provide lighting in various types of buildings. Through the use of day-lighting a space can be provided lighting via an innovative and environmentally friendly lighting system. This ECM is two part: first the existing 250 Watt metal halide high bays will be replaces with an energy efficient T5HO equivalent, these lights will then be connected to day light dimming controls.

The system works by monitoring the lumen value being delivered to the floor of the space: either from natural light of from the light fixtures. An allowable lumen set point is set for the space; this set point is the bench mark for the dimming control system. If enough natural light is coming into the space to meet the set point the light fixtures are turned off. As the lumen level starts to drop below the set point the light fixtures slowly ramp up, only providing enough light to meet the lumen set point. This allows the light fixtures to work at a reduced input wattage through the daylight hours.

CEG proposes that a day-lighting system be installed in the Gymnasium that includes the installation of new pendent mount fluorescent fixtures and day-light dimming control system.

Energy Savings Calculations:

A detailed **Day-Light Dimming Calculation Appendix** can be found in the appendix section of this report. The calculation details electrical savings and outlines the proposed fixture.

NJ Smart Start® Program Incentives are applicable for this installation and are detailed in the appendix.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$22,400
NJ Smart Start Equipment Incentive ($):	$2,400
Net Installation Cost ($):	$20,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,095
Total Yearly Savings ($/Yr):	$2,095
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.5
Simple Lifetime ROI	57.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$31,425
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	$5,009.97

ECM #2: Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights on when the room is first occupied. This is common in storage rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas. Photocell control senses light levels and turn off or reduce lights when there is adequate daylight. Photocells are mostly used outside, but are becoming more popular in energy-efficient interior lighting designs as well.

ASHRAE Standard 90.1-2004, Appendix G is a reference standard for modeling building efficiency. The standard estimates that lighting controls provide a 10% reduction in lighting power usage for daytime occupancies in buildings over 5,000 SF, and 15% reduction in buildings under 5,000 SF. This ECM implements dual technology occupancy sensors in classrooms (that are not already controlled), offices, private study rooms and storage areas.

The ECM includes replacement of standard wall switches with sensors wall switches for individual rooms, ceiling mount sensors for large areas or restrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The "Investment Grade Lighting Audit" appendix of this indicates which areas of the facility would benefit from lighting control. The calculations adjust the lighting power usage by 10% for all areas that include occupancy sensor lighting controls.

Energy Savings Calculations:

$$Energy\ Savings = 10\% \times Occuapancy\ Sensored\ Light\ Energy\ \left(kWh/Yr\right)$$

$$Energy\ Savings = 10\% \times 241{,}135\ \left(kWh\right) = 24{,}113\ \left(kWh\right)$$

$$Savings. = Energy\ Savings\ \left(kWh\right) \times Ave\ Elec\ Cost\left(\frac{\$}{kWh}\right)$$

$$Savings. = 24{,}113\,(kWh) \times 0.111\left(\frac{\$}{kWh}\right) = \$2{,}675$$

Installation cost per dual-technology sensor (Basis: Sensorswitch or equivalent) is $160/unit including material and labor.

$$Installation\ Cost = (\#\ of\ \ sensors \times\ \ \$\ \ per\ sensor) = (100 \times \$160) = \underline{\$\,16{,}000}$$

NJ Smart Start® Program Incentives are calculated as follows:

From Appendix C, the incentive for installing a lighting control is $20 per controller.

$$\text{Smart Start®}\ \ Incentive = (\#\ of\ \ controller \times\ \ \$\ 20) = (100 \times \$\ 20) = \underline{\$2{,}000}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,000
NJ Smart Start Equipment Incentive ($):	$2,000
Net Installation Cost ($):	$14,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,675
Total Yearly Savings ($/Yr):	$2,675
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.2
Simple Lifetime ROI	186.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$40,125
Internal Rate of Return (IRR)	17%
Net Present Value (NPV)	$17,933.98

ECM #3: Premium Efficient Motor Replacement

Description:

Replacing the hot water circulation pump motors with new NEMA premium efficient motors is a simple change that can provide substantial savings.

Existing electric motors equal to or greater than one horsepower ranged from 78 to 93% efficient. The improved efficiency of the NEMA premium efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

This energy conservation measure would replace all motors equal to or greater than 1 HP with NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. Using MotorMaster+, Version 4, the energy & cost savings were calculated for the fan/pump motors in this facility that are greater than or equal to 1 HP.

Energy Savings Calculations:

The following calculation was used to calculate the efficiency increase for switching to a NEMA Premium® Efficient Motor.

1 HP = 0.746 kW
Load Factor = 75%
Annual Hours of Operations = 3,696(Average)
Cost of electricity = $0.111/ kWh

$$Motor\ \ Savings\ = \frac{(0.746\,kW\ /1HP)\times(Motor\ \ HP)\times(Load\ \ Factor\ )\times(Hrs\ \ of\ \ Operation\ )}{(New\ \ Motor\ \ Efficiency\ )}$$
$$- \frac{(0.746\,kW\ /1HP)\times(Motor\ \ HP)\times(Load\ \ Factor\ )\times(Hrs\ \ of\ \ Operation\ )}{(Old\ \ Motor\ \ Efficiency\ )}$$

NEMA Premium Efficient Motor Replacement						
Equipment Tag	**Motor HP**	**Existing Efficiency**	**NEMA Premium Efficiency**	**kW Savings**	**kWh Savings**	**Cost Savings**
P-1	3	82.5%	89.5%	0.16	588	$65
P-2	3	78.5%	89.5%	0.26	971	$108
Total Savings				**0.4**	**1,559**	**$173**

$$\text{Smart Start®}\ \textit{Incentive} = (\#\ 3\ \textit{HP Motors} \times\ \$\ 54) = (2 \times \$\ 54) = \$108$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,000
NJ Smart Start Equipment Incentive ($):	$108
Net Installation Cost ($):	$1,892
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$173
Total Yearly Savings ($/Yr):	$173
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.9
Simple Lifetime ROI	37.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,595
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	$173.26

ECM #4: Air Handling Unit Replacement

Description:

The library, cafeteria and associated spaces are conditioned by a two (2) heating only, 100% outdoor air, indoor air handling units (AHUs) manufactured by the AAF Company. The two units are original to the school making them 1969 vintage. The units have exceeded their expected service life by 20 years. Each unit is equipped with an electric resistance heating coil.

This ECM involves the replacement of the existing AHUs with new AAON RM010 roof top units (RTUs) or equivalent. Each RTU will be equipped with natural gas fired heat exchanger and energy recovery wheel. The Energy recovery unit preheats the incoming outside air by wringing the heat from the exhaust air stream, the air stream do not mix in the process. This free heating increases the thermal heating capacity of the unit by 28%. The natural gas fired heat exchanger alone is 80% efficient, the addition of the free heating boosts the units overall thermal efficiency to 108%. Prior installation the buildings natural gas service and roof structure needs to be thoroughly evaluated.

Energy Savings Calculations:

Heating Assumptions:

Unit #1	=196,646 Btu/h
Unit #2	=245,808 Btu/h
Existing Heating Efficiency	=100% for Electric Resistance Heating
New Unit Efficiency	=108% for Natural Gas with Energy Recovery
Average Cost of Electricity	= $0.111/kWh
Average Cost of Natural Gas	= $0.150/kWh

Heating Savings Calculations

$$Heating\ Energy\ Used = \frac{H_L \times HDD \times Hrs}{\Delta t \times Eff \times V}$$

Where:

HDD = number of Heating Degree Days as Specified Base Temperature
(Warm Air $HDD_{65^\circ F}$ = 4,604, Millville, NJ Airport)

Hrs = Hours per Day

Δt = Design temperature difference, º F (Warm Air = 70 º F)

Eff = Efficiency of Energy Utilization (Existing NG Boiler = 0.70)

V = Heating value of fuel, BTU/Therm (Natural Gas = 100,000 Btu/ 1 Therm, Electric= 1kW/3,414Btu)

Estimated Energy Consumption of Existing Units:

$$Electric\ Heating\ Energy\ Used = \frac{(196{,}646 + 245{,}808 Btu/h) \times (4{,}604°F) \times 16.5h}{70°F \times 100\%} = 480{,}163{,}720\ Btu/Year$$

Estimated Energy Consumption of New Units:

$$Gas\ Heating\ Energy\ Used = \frac{(196{,}646 + 245{,}808 Btu/h) \times (4{,}604°F) \times 16.5h}{70°F \times 108\%} = 444{,}596{,}040\ Btu/Year$$

Electric Heating Usage Reduction = 480,163,720 Btu/h x 1kW/3,414 Btu/h = 140,645 kWh

Heating Cost if Electric = 480,163,720 Btu/Year x 1kW/3,414 Btu/h x $0.111/kWh = $15,612

Heating Cost for Gas = 444,596,040 Btu/Year x 1Therm/100,000 Btuh x $1.50/Therm = $6,670

Fuel Conversion Cost Savings = Electric Heating Cost – Gas Heating Cost

Fuel Conversion Cost Savings = $15,612- $6,670 = $8942

Total Cost Savings = Efficiency Savings + Conversion Savings

Total Cost Savings = $1,156 + $8,942 = **$10,098/Year**

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{10{,}418\ (kWh)}{4{,}380\ Hrs.} = 2.3\ kW$$

$$\text{Smart Start®}\ Incentive = (\$\ 2/MBh) = (621 \times \$\ 2) = \$1{,}242$$

Unit #1 = 351 MBh and Unit #2 = 270 MBh

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$50,000
NJ Smart Start Equipment Incentive ($):	$1,242
Net Installation Cost ($):	$48,758
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,098
Total Yearly Savings ($/Yr):	$10,098
Estimated ECM Lifetime (Yr):	20
Simple Payback	4.8
Simple Lifetime ROI	314.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$201,960
Internal Rate of Return (IRR)	20%
Net Present Value (NPV)	$101,474.74

ECM #5: Roof Top Unit Replacement

Description:

The administration office and associated spaces are conditioned by a cooling only York packages roof top containing direct expansion (DX) cooling coil and integral condensing unit. The roof top unit is approximately 20 year years of age and has exceeded its expected service life of 15 years.

This measure would replace the roof top unit serving the administration office with a new energy-efficient cooling only roof top unit, manufactured by York DNQ series or equivalent. The rooftop unit would be outfitted with economizer section and DDC controls.

Note: Equipment sizing is based on a one-for-one replacement. CEG recommends the Owner investigate further the cooling requirements of the space with a HVAC Engineering Professional.

Energy Savings Calculations:

A comparative analysis between the existing HVAC equipment and new HVAC equipment is utilized to calculate the estimated savings. The following are the assumptions utilized in creating the calculation:

Cooling Assumptions:

Total Classroom Cooling Capacity	= 4 Tons
Average Unit Efficiency	= 8.4 EER
New Unit Efficiency	= 12.0 EER
Average Cost of Electricity	= \$0.111/kWh

Cooling Savings Calculation:

$$EnergySavings = \frac{Cooling(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{EER_{OLD}} - \frac{1}{EER_{NEW}}\right) \times Cooling\ \ Hrs.$$

$$EnergySavings = \frac{4\,(Tons) \times 12{,}000\left(\frac{Btu}{Ton\ hr}\right)}{1000\left(\frac{Wh}{kWh}\right)} \times \left(\frac{1}{8.4\left(\frac{Btu}{W}\right)} - \frac{1}{12.0\left(\frac{Btu}{W}\right)}\right) \times 1{,}800\ hours$$

$$= \underline{3{,}085\ kWh}$$

$$Demand\ Savings = \frac{Energy\ Savings\ (kWh)}{Hrs\ of\ Cooling}$$

$$Demand\ Savings = \frac{3{,}085\ (kWh)}{1{,}800\ Hrs.} = \underline{1.7\ kW}$$

Total Energy Cost Savings = 3,085 kWh x $0.111/kWh = $345 per year

$$\text{Smart Start®}\ Incentive = (Number\ of\ Tons \times\ \$\ 65/Ton) = (4 \times \$\ 65) = \underline{\$260}$$

Maintenance Savings have not been calculated at this time because information was not available to baseline the savings.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$8,250
NJ Smart Start Equipment Incentive ($):	$260
Net Installation Cost ($):	$7,990
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$345
Total Yearly Savings ($/Yr):	$345
Estimated ECM Lifetime (Yr):	15
Simple Payback	23.2
Simple Lifetime ROI	-35.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$5,175
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($3,871.41)

ECM #6: UV Replacement – Air to Air Heat Pumps

Description:

The classrooms of B-wing are conditioned by Hermon Nelson unit ventilators. Each unit is equipped with a 10 kW Electric resistance heating coil and has a 3 ½ ton DX coiling capacity. The unit ventilators are original to the school which makes them 40 years old; they have surpassed their expected service live by 20 years.

This ECM involves the replacement of the existing unit ventilators serving B-wing, six (6) in total, with new McQuay-AAF air to air heat pump unit ventilators equipped with electric resistance back up heating coil AE models or equivalent. The units are self contained making for easy one for one replacement. Utility savings will be seen on both cooling and heating sides of the equipment. A handful of the existing units have already been replaced with this style and model unit ventilator.

Energy Model Comparison Results:

Heating and cooling calculations were performed using the Trane Trace® 700 comprehensive building analysis software. The existing cooling load was calculated at 3.6 Tons/classroom and the heating load of 64.5 MBH/classroom.

Cooling Assumptions:

Total Classroom Cooling Capacity	= 21.6 Tons (Total for six (6) units)
Old Unit Cooling Efficiency	= 8.0 EER
New Unit Cooling Efficiency	= 10.5 EER

Heating Assumptions:

Total Classroom Heating Capacity	= 387 MBh (Total for six (6) units)
Old Unit Heating Efficiency	=1.0 COP
New Unit Heating Efficiency	=2.9 COP
Average Cost of Electricity	= $0.111/kWh

Implementation of an air to air heat pump system would reduce the building's overall electrical usage. This ECM will reduce the buildings electrical usage by 1.3%.

Existing System Usage	= 1,220,947 kWh
Existing System Demand	= 313.4 kW
New System Usage	= 1,205,935 kWh
New System Demand	= 307.4 kW

Annual Energy Savings = Existing Usage – New Usage

Annual Energy Savings = 1,220,947 kWh - 1,205,935 kWh = 15,012 kWh

Annual Demand Savings = Existing Demand – New Demand

Annual Demand Savings = 313.4 kW – 307.4 kW = 6 kW

Annual Cost Savings = 15,012 kWh x $0.111/kWh = $1,670

Note: Sizing indicated within the calculation of this ECM is based on a one for one replacement of the existing equipment. Owner should have a Professional Engineer verify heating and cooling loads prior to moving forward with this ECM.

$$\text{Smart Start®}\ \textit{Incentive} = (\textit{Number of Tons} \times \$\,65/\textit{Ton}) = (21 \times \$\,65) = \underline{\$1{,}365}$$

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$93,900
NJ Smart Start Equipment Incentive ($):	$1,365
Net Installation Cost ($):	$92,535
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,670
Total Yearly Savings ($/Yr):	$1,670
Estimated ECM Lifetime (Yr):	15
Simple Payback	55.4
Simple Lifetime ROI	-72.9%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$25,050
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	($72,598.65)

ECM #7: UV Replacement – Geothermal Water to Water Heat Pumps

Description:

The classrooms throughout the school are conditioned by Hermon Nelson unit ventilators. Each unit serving B-wing is equipped with a 10 kW Electric resistance heating coil and has a 3 ½ ton DX coiling capacity. The units serving A & C-wings are heating only units, only heating savings have been accounted for in the calculation below. Alls unit ventilators are original to the school which makes them 40 years old; they have surpassed their expected service live by 20 years.

This ECM involves the replacement of the existing unit ventilators with new McQuay Geothermal water to water heat pump unit ventilators equipped with electric resistance back up heating coil AR/ER Series or equivalent. The units are self contained making for easy one for one replacement. Utility savings will be seen on both cooling and heating sides of the equipment. A handful of the existing units have already been replaced with this style of unit ventilator.

The design of the geothermal system would only include the classroom areas of the facility approximately 68,500 SF. The geothermal system would require (not limited to) the following major components:

1. 120-Ton bore field located in field adjacent to the School (Sized for cooling of A, B and C wings. Pricing only. Only cooling tonnage of B-wing accounted for in ECM.)
2. (2) Loop condenser water pumps.
3. Condenser water piping distribution system from the well field to the mechanical room
4. Installation of approximately thirty-two (32) high-efficiency (14.6 EER) water to water unit ventilator units. Basis of design: McQuay AR/ER Series or equivalent. Removal of the existing rooftop AC units.
5. Condenser water loop piping installation.

Energy Model Comparison Results:

Heating and cooling calculations were performed using the Trane Trace® 700 comprehensive building analysis software. The existing cooling load was calculated at 3.6 Tons/classroom and the heating load of 64.5 MBH/classroom.

Cooling Assumptions:

Total Classroom Cooling Capacity	= 36 Tons
Old Unit Cooling Efficiency	= 8.0 EER
New Unit Cooling Efficiency	= 14.6 EER

Heating Assumptions:

Total Classroom Heating Capacity	= 2,064 MBh
Old Unit Heating Efficiency	= 1.0 COP

New Unit Heating Efficiency = 3.0 COP

Average Cost of Electricity = $0.111/kWh

Implementation of a geothermal heat pump system would reduce the building's overall electrical usage. This ECM will reduce the buildings electrical usage by 22%.

Existing System Usage	= 1,220,947 kWh
Existing System Demand	= 313.4 kW
New System Usage	= 1,126,095 kWh
New System Demand	= 293.4 kW

Annual Energy Savings = Existing Usage – New Usage

Annual Energy Savings = 1,220,947 kWh - 1,126,095 kWh = 94,852 kWh

Annual Demand Savings = Existing Demand – New Demand

Annual Demand Savings = 313.4 kW – 293.4 kW = 20 kW

Annual Cost Savings = 94,852 kWh x $0.111/kWh = $10,530

Note: Sizing indicated within the calculation of this ECM is based on a one for one replacement of the existing equipment. Owner should have a Professional Engineer verify heating and cooling loads prior to moving forward with this ECM.

$$\text{Smart Start®}\ \textit{Incentive} = \left(\textit{Number of Tons} \times \$\,81/\textit{Ton}\right) = \left(120 \times \$\,81\right) = \$9{,}720$$

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$965,540
NJ Smart Start Equipment Incentive ($):	$9,720
Net Installation Cost ($):	$955,820
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,530
Total Yearly Savings ($/Yr):	$10,530
Estimated ECM Lifetime (Yr):	20
Simple Payback	90.8
Simple Lifetime ROI	-78.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$210,600
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	($799,160.19)

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy. CEG has assessed the feasibility of installing renewable energy technologies for the Millville Board of Education, to evaluate if there is any potential for solar or wind energy generation.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which can be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park a vehicle under the array, this way no parking lot area is lost. The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

CEG has reviewed the facility and believes a roof mounted system is best suited. A depiction of the proposed area layouts is shown in **Renewable / Distributed Energy Measures Calculation, Appendix**. Based on measurements of the roof it was determined that a system size of 121.4 kilowatts could be installed. The total system has an estimated kilowatt hour production of 159,994 KWh annually, reducing the overall electric consumption by approximately 13%. A detailed financial analysis can be found in **Renewable / Distributed Energy Measures Calculation, Appendix**. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

Estimated solar array generation was then calculated based on the National Renewable Energy Laboratory PVWatts Version 1.0 Calculator. In order to calculate the array generation an

appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the Renewable/Distributed Energy Measures Calculation appendix.

The proposed solar array is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

Direct purchase involves the BOE paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM				
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**NET PRESENT VALUE**	**INTERNAL RATE OF RETURN**
Direct Purchase	14.8 Years	6.8%	$841,365	4.8 %

*The solar energy measure is shown for reference in the executive summary REM table as REM#1.

Given the large amount of capital required by the BOE to invest in a solar system through a Direct Purchase CEG does not recommend the BOE pursue this route. It would be more advantageous for the BOE to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the BOE at a reduced rate compared to their existing electric rate.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG's review of the applicability of wind energy for the facility found; the low average wind speed and proximity to residential neighborhoods make facility a poor candidate for wind energy production.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to the Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

This facility comprised of classrooms, kitchen, gymnasium, administration/faculty offices, a library and computer labs. The typical hours of operation for this facility are between 9:00 am and 4:00 pm. The building was built in 1969 with the addition of D-wing in 1981.

The Electric Usage Profile demonstrates a typical load consumption profile for a school. Schools typically close for the summer (May-August) and in this case the load profile demonstrates the drop off of electric consumption. Consumption is elevated but escalating throughout the balance of the year, but not in a consistent usage pattern. Reasons for the winter increased usage are due to the following: The 1969 construction of the school, A, B and C-wings, utilize an all electric design to condition the space. Building original Hermon Nelson unit ventilators (UV's) equipped with electric resistance heating and DX coiling coil are located in all classroom and office areas of the facility. All units are self contained and have no input from a central plant of any kind. As the UV's slowly start to breakdown and fail, they are replaced with new AAF units that utilize the same means of heating and cooling. Electric resistance heating, although technically 100% efficient is an expensive means of heating a space, this design is typical of the time period when the availability of natural gas was scarce.

The Library, cafeteria and kitchen are conditioned by heating only AAF indoor air handling units, two (2) units total. An electric resistance heating coil in each unit provides heating to the space. Ceiling fans are used in these areas to prevent stratification of the air.

The front administration office utilizes electric resistance baseboard heating is used for heating. Principal and Vice Principal's offices are conditioned by packaged terminal air conditioner (PTAC) units that utilize DX cooling and electric resistance heating.

Entrance doorways are heated via electric resistance cabinet heaters in A, B and C-wings and hot water cabinet heaters in D-wing.

This facility receives its electric delivery service via Atlantic City Electric (ACE) on an AGS rate schedule. This facility receives its electric Commodity service from South Jersey Energy Company through the ACES agreement. A flat (base-load) shaping is important because it will yield more competitive pricing when shopping for alternative energy supply.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical heating load profile, with increasing consumption in the winter months (October – March) and a dramatic drop in consumption in the summer months (May – September). Heating is the obvious reason for the winter consumption and in this facility the 1981 construction, D-wing, utilizes an entirely different system from the original section of the school. A 1,600 MBH Weil McLain hot water section boiler satisfies the wings heating requirements. Two (2) 3 hp end-suction pumps circulate the hot water around the facility. A VAV air distribution system is used to condition the space. A 30-Ton Trane cooling only roof-top unit provides conditioned air and ventilation to the space. Each VAV box is equipped with a hot water heating coil that is piped off the D-wing hot water loop. Otherwise the heating is supplied via electric heat.

Domestic hot water for the facility is provided by two (2) 65 gallon Bradford White natural gas fired hot water heater, capacity of 370 MBH located in the B-wing boiler room.

Natural gas delivery service in this facility is provided by South Jersey Gas Company on a GSG rate schedule. The natural gas commodity service is provided by PEPCO Energy Services through the ACES agreement. A flat load profile will always allow for the most competitive price available when shopping for alternative energy supplies.

Tariff Analysis:

Electricity:

This facility receives electrical delivery Service from Atlantic City Electric on an AGS Secondary (Annual General Service) utility rate. This rate is available at any point in the utility's system where facilities of adequate character and capacity exist for the entire electric service requirements of any customer contracting for annual service delivered at one point and metered at or compensated to the voltage of delivery. This delivery service includes the following charges: Delivery Service Charges, Distribution Demand Charges, Reactive Demand Charges, Distribution Rates, Non-Utility Generation Charges, Societal Benefits Charges, Regulatory Assets Recovery Charges, Transition Bond Charges, Market Transition Charge Tax, Transmission Demand Charge, Regional Greenhouse Gas Initiative Recovery Charge, and Infrastructure Investment Surcharge.

This facility receives electrical supply service through the ACES agreement (Alliance for Competitive Energy Services). ACES, is an alliance composed of the NJSBA and the NJASBO and is administered by Gable Associates. CEG believes that if the BOE wants to procure alternative energy, they must through the ACES agreement. CEG will make a recommendation that is counter to this agreement. The term of the ACES agreement is the first meter read date on or after April 30, 2009 until the last meter read date, May, 2011.

The ACES agreement provides for NJSBA to adopt a resolution for renewal for no more than a (5) consecutive year term. CEG will recommend against such a renewal and believes that a 5 – year term may not be allowed under local government law.

Natural Gas:

This facility is serviced by South Jersey Gas Company (SJG) on its firm delivery rate, General Service Gas (GSG) from the utility and BGSS (Basic Generation Supply Service) when not being served by a Third Party Supplier (TPS). Currently The BOE is procuring natural gas from a Third Party Supplier (TPS), PEPCO Energy Services. This Delivery Rate has the following charges: Customer Charge, Delivery Charge, BSC Volume Charge and Commodity Charge under this rate structure. The BGSS Supply rates are designed to recover SJG's cost of gas applicable to customers who purchase gas from SJG. The company earns no profit from BGSS. BGSS consists of two (2) pricing mechanisms: Residential and Commercial customers that use less than 5,000 Therms annually and Commercial and Industrial customers that consume at least 5,000 therms annually.

Imbalances occur when Third Party Suppliers (TPS) are used to supply natural gas and full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. Note: It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used otherwise, imbalances can occur, jeopardizing economics and scheduling. If the supplier does not deliver they can be placed on a very costly rate. A customer can automatically be put on an alternative supply rate by the utility.

A "firm account" refers to the type of interstate pipeline service that the utility has subscribed for and delivered on behalf of the customer. Much like the telecom industry, the pipeline space (capacity) has been deregulated. The pipeline capacity is broken down into reliability of service. "Firm service" is the highest level of reliability and is the last, in pecking order, for interruption.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the scope of this project. Therefore, CEG recommends aggregating all energy loads. CEG's observations are seen in both the electric and natural gas costs. The average "price to compare" per kWh (kilowatt hour) for all buildings is $.1058/ kWh (kWh is the common unit of electric measure). The average "price to compare" per decatherm for natural gas is $10.90 /dth (dth is the common unit of measure). These Weighted Average Prices are as supplied via Third Party Suppliers (TPS) for electricity (South Jersey Energy Company) and for natural gas (PEPCO Energy services), as administered through the ACES (Alliance for Competitive Energy Services) and the lead agency, The New Jersey School Boards Association, with administration from Gable Associates.

Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The BOE could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (January – December 2009) and current electric rates, the BOE could see an improvement of up to 15 % or up to $150,000 in its electric costs annually. (Note: Savings were calculated using an Average Annual Consumption of 9,776,921 kWh and an Average fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the

most optimal energy costs. CEG recommends that the BOE seek an energy advisor to maximize energy savings and to apply a "managed approach" to procuring energy.

CEG's secondary recommendation coincides with the BOE's natural gas costs. Based on the current market, (which is very competitive), the BOE could see a savings of over 20% or up to $90,000 annually in its natural gas expenditures. Again, CEG recommends the use of any energy advisor to review alternative energy sourcing strategies and to install a "managed approach" to energy procurement.

CEG also recommends that The BOE not renew its energy supply contract with the ACES aggregation and PEPCO Energy Services, and the ACES agreement with South Jersey Energy and its fixed price contract. The fixed priced contract does not accomplish the needs of the BOE. The BOE needs budget protection and CEG has shown that these energy prices are not competitive to the market. The ACES agreement has demonstrated that the price is much above market and the BOE has no way of adjusting the price should prices fall.

CEG further recommends that the BOE create an energy program through a "managed approach." The "managed approach" will take into account creating an "energy budget" that is in line with the BOE's budget year and risk tolerance. Risk tolerance is the appetite that a customer has for risk. Based on the reduced state and local government budgets and the general aversion for risk, the local government is required to manage this risk.

CEG recommends the BOE schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), they will learn more about the competitive supply process. They can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu, and should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention given to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, the BOE should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

Finally, if the BOE frequently changes its supplier for energy, CEG recommends it closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

i. *Energy Savings Improvement Program (ESIP)* – Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

ii. *Municipal Bonds* – Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for contracts commonly known as "power purchase agreements." These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party's work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

iv. *Pay For Performance – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings with average demand loads above 200 KW. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.*

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project

Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. *Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)*

2. *Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.*

3. *Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and $0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.*

CEG recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Confirm that outside air economizers on the rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Millville Board of Education - Rieck Avenue School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Gymnasium Lighting Replacement w/ Day-Light Dimming Controls	$11,200	$11,200	$2,400	$20,000	$2,095	$0	$2,095	15	$31,425	$0	57.1%	9.5	6.26%	$5,009.97
ECM #2	Lighting Controls	$10,670	$5,330	$2,000	$14,000	$2,675	$0	$2,675	15	$40,125	$0	186.6%	5.2	17.38%	$17,933.98
ECM #3	Premium Efficient Motor Replacement	$1,000	$1,000	$108	$1,892	$173	$0	$173	15	$2,595	$0	37.2%	10.9	4.24%	$173.26
ECM #4	Air Handling Unit Replacement	$25,000	$25,000	$1,242	$48,758	$10,098	$0	$10,098	20	$201,960	$0	314.2%	4.8	20.19%	$101,474.74
ECM #5	Roof Top Unit Replacement	$5,500	$2,750	$260	$7,990	$345	$0	$345	15	$5,175	$0	-35.2%	23.2	-5.00%	($3,871.41)
ECM #6	UV Replamcement - Air to Air Heat Pumps	$81,900	$12,000	$1,365	$92,535	$1,670	$0	$1,670	20	$33,400	$0	-63.9%	55.4	-8.21%	($67,689.62)
ECM #7	UV Replacement - Geothermal Water to Water Heat Pumps	$643,700	$321,840	$9,720	$955,820	$10,530	$0	$10,530	20	$210,600	$0	-78.0%	90.8	-11.46%	($799,160.19)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Photovoltaic Panel Installation	$546,480	$546,480	$0	$1,092,960	$17,759	$55,998	$73,757	15	$1,106,355	$839,970	1.2%	14.8	0.15%	($212,453.72)

Notes: 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

Concord Engineering Group, Inc.

520 BURNT MILL ROAD
VOORHEES, NEW JERSEY 08043
PHONE: (856) 427-0200
FAX: (856) 427-6508

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of January, 2009:

Electric Chillers

Water-Cooled Chillers	$12 - $170 per ton
Air-Cooled Chillers	$8 - $52 per ton

Gas Cooling

Gas Absorption Chillers	$185 - $400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250

Ground Source Heat Pumps

Closed Loop & Open Loop	$370 per ton

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per hp
Compressors	$5,250 to $12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters >50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH

Premium Motors

Three-Phase Motors	$45 - $700 per motor

Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 - $30 per fixture, (depending on quantity)
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture

Lighting Controls – Occupancy Sensors

Wall Mounted	$20 per control
Remote Mounted	$35 per control
Daylight Dimmers	$25 per fixture
Occupancy Controlled hi-low Fluorescent Controls	$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive

STATEMENT OF ENERGY PERFORMANCE
Rieck Avenue School

Building ID: 1874997
For 12-month Period Ending: May 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 18, 2009

Facility
Rieck Avenue School
339 Rieck Ave.
Millville, NJ 08332

Facility Owner
Millville Board of Education
110 N. Third Street
Millville, NJ 08332

Primary Contact for this Facility
Toni Basich
110 N. Third Street
Millville, NJ 08332

Year Built: 1969
Gross Floor Area (ft²): 102,000

Energy Performance Rating[2] (1-100) 20

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	4,165,871
Natural Gas (kBtu)[4]	2,263,400
Total Energy (kBtu)	6,429,271

Energy Intensity[5]

Site (kBtu/ft²/yr)	63
Source (kBtu/ft²/yr)	160

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	755

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	48
National Average Source EUI	121
% Difference from National Average Source EUI	32%
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
Raymond Johnson
520 South Burnt Mill Rd.
Voorhees, NJ 08332

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	Rieck Avenue School	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	339 Rieck Ave., Millville, NJ 08332	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		☐
Rieck Ave School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	102,000 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.		☐
Open Weekends?	No	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	152	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	50 %	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	N/A(Optional)	Is this school in operation for at least 8 months of the year?		☐

High School?	No	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: Pepco - Atlantic City Electric Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
05/01/2009	05/31/2009	64,551.00
04/01/2009	04/30/2009	96,173.00
03/01/2009	03/31/2009	139,959.00
02/01/2009	02/28/2009	183,745.00
01/01/2009	01/31/2009	194,450.00
12/01/2008	12/31/2008	162,803.00
11/01/2008	11/30/2008	111,869.00
10/01/2008	10/31/2008	70,843.00
09/01/2008	09/30/2008	59,595.00
08/01/2008	08/31/2008	34,934.00
07/01/2008	07/31/2008	41,489.00
06/01/2008	06/30/2008	60,536.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**1,220,947.00**
Electric Meter Consumption (kBtu (thousand Btu))		**4,165,871.16**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**4,165,871.16**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Natural Gas Meter (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
05/01/2009	05/31/2009	383.00
04/01/2009	04/30/2009	2,423.00
03/01/2009	03/31/2009	2,609.00
02/01/2009	02/28/2009	4,300.00
01/01/2009	01/31/2009	5,063.00
12/01/2008	12/31/2008	3,385.00
11/01/2008	11/30/2008	2,707.00
10/01/2008	10/31/2008	1,072.00
09/01/2008	09/30/2008	224.00
08/01/2008	08/31/2008	159.00

07/01/2008	07/31/2008	138.00
06/01/2008	06/30/2008	171.00
Natural Gas Meter Consumption (therms)		**22,634.00**
Natural Gas Meter Consumption (kBtu (thousand Btu))		**2,263,400.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,263,400.00**
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
Rieck Avenue School
339 Rieck Ave.
Millville, NJ 08332

Facility Owner
Millville Board of Education
110 N. Third Street
Millville, NJ 08332

Primary Contact for this Facility
Toni Basich
110 N. Third Street
Millville, NJ 08332

General Information

Rieck Avenue School	
Gross Floor Area Excluding Parking: (ft^2)	102,000
Year Built	1969
For 12-month Evaluation Period Ending Date:	May 31, 2009

Facility Space Use Summary

Rieck Ave School	
Space Type	K-12 School
Gross Floor Area(ft^2)	102,000
Open Weekends?	No
Number of PCs	152
Number of walk-in refrigeration/freezer units	1
Presence of cooking facilities	Yes
Percent Cooled	50
Percent Heated	100
Months[o]	N/A
High School?	No
School District[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2009)	**Baseline** (Ending Date 05/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	20	20	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	63	63	37	N/A	48
Source (kBtu/ft^2)	160	160	95	N/A	121
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	755	755	448	N/A	573
$kgCO_2e/ft^2$/year	7	7	4	N/A	5

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.

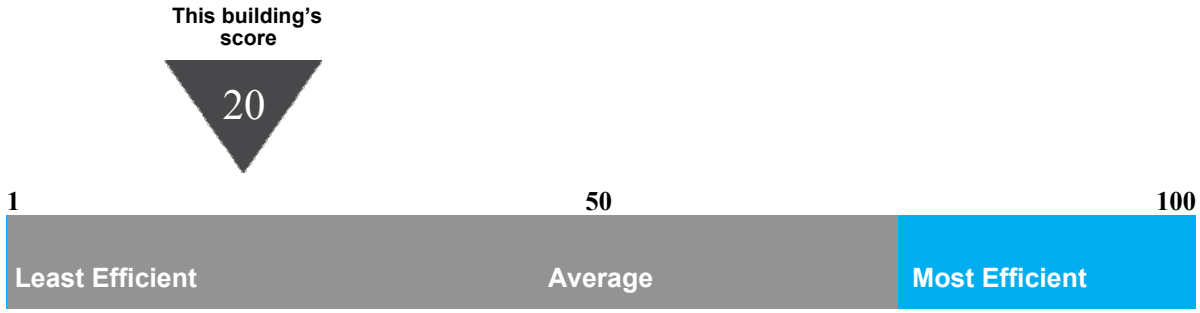
Statement of Energy Performance

2009

Rieck Avenue School
339 Rieck Ave.
Millville, NJ 08332

Portfolio Manager Building ID: 1874997

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 160 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending May 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: 12/18/2009

MAJOR EQUIPMENT LIST

Concord Engineering Group

"Millville B.O.E. - Rieck Avenue School"

Boiler

Location	Area Served	Manufacturer	Qty.	Equipment Tag	Model #	Serial #	Input (MBh)	Output (MBh)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	D-Wing	Weil McLain	1	B-1	BGL-886w/f	-	1974	1600	81%	Nat. Gas	28	35	7

Boiler - Burner

Location	Area Served	Manufacturer	Qty.	Equipment Tag	Model #	Serial #	Input (MBh)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	B-1	Peabody Gordon-Platt	1	-	WR8.3-GO-15	-	1974	Nat. Gas	28		-28

Boiler - Pumps

Location	Area Served	Manufacturer	Qty.	Equipment Tag	Model #	Serial #	HP	RPM	GPM	Ft. Hd	Motor Eff	Frame Size	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Boiler Room	D-Wing	Thrush Products	1	CP-D01	1 1/2x2x7PF2G	PF	3	1725	100	45	82.50%	184	208-230/460	3	60	28	20	-8
Boiler Room	D-Wing	Thrush Products	1	CP-D02	1 1/2x2x7PF2G	PF	3	1725	100	45	78.50%	184	208-230/460	3	60	28	20	-8

Domestic Hot Water Heater

Location	Area Served	Manufacturer	Qty	Equipment Tag	Model #	Serial #	Input (MBh)	Recovery (gal/h)	Capacity (gal)	Efficiency (%)	Fuel	Approx. Age	ASHRAE Service Life	Remaining Life	Notes
Boiler Room	Entire School	Bradford White	1	-	D65T3703NA	XH5091309	370	358.8	65	80%	Nat. Gas	8	12	4	Qty. 2 1/6 HP Circulator Pumps
Boiler Room	Entire School	Bradford White	1	-	D65T3703NA	XH5100220	370	358.8	65	80%	Nat. Gas	8	12	4	

Air Handling Units

Location	Area Served	Manufacturer	Qty	Equipment Tag	Model #	Serial #	Heating Type	Input	Output	Heating Eff. (%)	Fuel	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Faculty Dinning Room	Library	AAF	1	AH-C01	V-9-LPACFYA	472868-01	Electric	57.6 kW	-	1.0 COP	Electric	460	3	60	40	20	-20
Faculty Dinning Room	Dinning Room	AAF	1	AH-C02	V-9-LPACFYA	472868-02	Electric	72.0 kW	-	1.0 COP	Electric	460	3	60	40	20	-20
Boiler Room	D-Wing	Trane	1	-	TVD809AM0B5CL004	KB122481	HW	200 MBh	-	-	-	460	3	60	28	20	-8

AC Condensers

Location	Area Served	Manufacturer	Qty.	Equipment Tag	Model #	Serial #	Cooling Capacity	Eff.	Refrigerant	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Roof	-	Arcoaire	1	AC-C01	AG036GB1	L962162571	3 Ton	12 SEER	R-22	208-230	1	60	1	20	19
Roof	-	Mitsubishi	3	-	-	-	3 Ton	15 SEER	R-410A	208-230	1	60	0	20	20

PTAC - Units

Location	Area Served	Manufacturer	Qty.	Equipment Tag	Model #	Serial #	Cooling Capacity	Heating Capacity	EER	COP	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Principal Office	Principal Office	Trane	1	-	-	-	14200 Btu/h	14000 Btu/h	10.0	3	208-230	1	60	15	20	5
Vice Principal Office	Vice Principal Office	Trane	1	-	PTHE1502UAA	F06C00382E	14,300 Btu	13,000 Btu	10.0	3	265	1	60	3	20	17
Social Worker Off.	Social Worker Off.	Friedrich	1	-	YT09A64A	AJ6386	9,300 Btu	12,900 Btu	8 9/10	2.56	239-265	1	60	40	20	-20

Roof Top Units

Location	Area Served	Manufacturer	Qty	Equipment Tag	Model #	Serial #	Cooling Coil	Cooling Eff. (EER)	Cooling Capacity	Fuel	Volts	Phase	Hz	Approx. Age	ASHRAE Service Life	Remaining Life
Roof	Front Office	York	1	RTU-C01	P48FH-6A	W0-011463	DX	8.4 EER	4 Ton	Electric	208-230	1	60	20	15	-5
Roof	D-Wing	Trane	1	RTU-D01	TCD360A40U1A6002C	C07D04397	DX R-22	10.3 EER	30 Ton	Electric	406	3	60	2	15	13

INVESTMENT GRADE LIGHTING AUDIT

CEG Job #: 9C09072
Project: Millville B.O.E.
Address: 339 Rieck Ave.
Millville, NJ 08332
Building SF: 102,000

"Millville - Rieck Avenue School"

KWH COST: $0.111

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
Line #	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
1	Cafeteria	3750	20	2	2' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	No Change Required (NCR)	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
2	Dish Washing	3750	2	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
3	Dish Washing	3750	1	4	2' x 4', 4-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	109	0.11	408.8	$45.37	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
4	Kitchen Serving	3750	8	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.46	1,740.0	$193.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
5	Kitchen Cooking Area	3750	27	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	1.57	5,872.5	$651.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
6	Kitchen Office	3750	1	4	2' x 4', 4-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	109	0.11	408.8	$45.37	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
7	Dish Washing	3750	1	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
8	Kitchen Staff	3750	2	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
9	Library Storage	3750	8	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.46	1,740.0	$193.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
10	Faculty Serving	3750	5	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.29	1,087.5	$120.71	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
11	Faculty Eating Area	3750	8	2	2' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.46	1,740.0	$193.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
12	Electric Heating Room	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Direct/Indirect Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
13	Roof access Heat/Air Room	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Direct/Indirect Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57

14	Small Office	3750	2	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Prismatic Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
15	Nurse's Room	3750	2	2	2' x 4', 4-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	109	0.22	817.5	$90.74	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
16		3750	1	4	2' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
17	Nurse's Office	3750	2	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
18	Exam Room	3750	6	2	2' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
19	Girls Bathroom	3750	1	2	1' x 4', 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
20	Boys Bathroom	3750	1	2	1' x 4', (1, 2' bulb fixture), 2-Lamp, T8 32W, Electronic Ballast, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
21	Library	3750	23	4	2' x 4', 3 Exit signs, 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	2.51	9,401.3	$1,043.54	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
22	IDF	3750	6	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
23	Storage Room	3750	2	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
24	Back Storage	3750	3	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
25	Hot water Heater Room	3750	5	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.29	1,087.5	$120.71	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
26	Cleaning Supply Room	3750	4	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.23	870.0	$96.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
27	Teachers Work Room	3750	1	4	2' x 4', 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.11	408.8	$45.37	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
28	Electrical Closet	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
29	B-11 Teacher's Prep. Room	3750	6	2	1' x 4', 1 Refrigerator/1 Copier, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

30	B-12 Classroom	3750	6	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
31	B101 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
32	B102 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
33	B103 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
34	B104 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
35	B105 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
36	B106 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
37	B107 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
38	B108 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
39	B13 Classroom	3750	8	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.46	1,740.0	$193.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
40	B109 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
41	B110 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
42	Girls Bathroom	3750	4	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.23	870.0	$96.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
43	Faculty Bathroom	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
44	Custodian	3750	1	1	1 Lamp 60 W incandescent	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
45	Faculty Bathroom	3750	1	2	2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
46	Boys Bathroom	3750	3	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
47		3750	2	1	4" x 4', 1-Lamp, T8 32W, Surface Mount, Prismatic Lens	28	0.06	210.0	$23.31	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
48	B14 Office	3750	9	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.52	1,957.5	$217.28	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
49	A Block Electrical Panel	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
50	A11 Book Room	3750	6	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

51	A103 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
52	A104 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
53	A105 Classroom	3750	20	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
54	A106 Classroom	3750	20	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
55	A107 Classroom	3750	22	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
56	A108 Classroom	3750	22	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
57	A109 Classroom	3750	20	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
58	A110 Classroom	3750	20	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
59	A13/14 Conference Room	3750	10	2	1' x 4' occupancy sensors, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.58	2,175.0	$241.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
60	A/B Stairwell 1st Floor	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
61	A101 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
62	A102 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
63	A Girls Bathroom	3750	4	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.23	870.0	$96.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
64	A Faculty Bathroom	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
65	A Custodian	3750	1	1	1' x 4', 1-Lamp, Surface Mount, Direct/Indirect Lens	28	0.03	105.0	$11.66	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
66	A Faculty	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
67	Boys Bathroom	3750	2	4	2' x 4', 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	0.22	817.5	$90.74	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
68		3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
69	A12 Art Room Storage	3750	3	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

70	A 2nd Floor Stairwell	3750	2	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
71	A24/23 Small Classroom	3750	9	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.52	1,957.5	$217.28	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
72	A201 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
73	A202 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
74	A22 Classroom	3750	6	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
75	A21 Storage	3750	6	4	1' x 4', 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.65	2,452.5	$272.23	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
76	A Stairwell	3750	2	4	1' x 4', 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.22	817.5	$90.74	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
77	A Electrical Panel	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
78	A203 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
79	A204 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
80	A205 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
81	A206 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
82	A207 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
83	A208 Classroom	3750	22	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.28	4,785.0	$531.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
84	A209 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
85	A210 Classroom	3750	20	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
86	A Girls Bathroom	3750	3	4	1' x 4', 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.33	1,226.3	$136.11	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
87		3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
88	A Faculty	3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
89	A Custodian	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Direct/Indirect Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
90	A Faculty	3750	1	1	4" x 4', 1-Lamp, T8 32W, Surface Mount, Prismatic Lens	28	0.03	105.0	$11.66	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

91	A Boys Bathroom	3750	2	4	2' x 4', 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.22	817.5	$90.74	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
92		3750	1	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
93	A Corridor	3750	20	2	1' x 4', 4 Exit signs, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.16	4,350.0	$482.85	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
94	Bridge from A to D	3750	5	2	2' x 2', 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.37	1,368.8	$151.93	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
95	D204 Girls Bathroom	3750	3	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
96		3750	2	1	3" x 4', 1-Lamp, T8 32W, Surface Mount, Prismatic Lens	28	0.06	210.0	$23.31	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
97	D231 Storage/Office	3750	1	2	1' x 2', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
98	D205 Boys Bathroom	3750	3	2	1' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
99		3750	2	1	3" x 4', 1-Lamp, T8 32W, Surface Mount, Prismatic Lens	28	0.06	210.0	$23.31	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
100	D202 Classroom	3750	14	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.81	3,045.0	$338.00	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
101	D203 Storage	3750	2	2	1' x 4', 2-Lamp, T12 34W, Recessed Mount, Prismatic Lens	80	0.16	600.0	$66.60	2	2	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	58	0.12	435	$48.29	$125.00	$250.00	0.04	165	$18.32	13.65
102	D203 Bathroom	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
103	D202 Teacher Prep.	3750	5	4	2' x 4', Washer/Dryer/Oven Range/Copier/Refrigerator/Microwave, 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	0.55	2,043.8	$226.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
104	D200 Classroom	3750	11	4	2' x 4' (1 2' x 2' T8 U Lamp 2 bulbs), 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	73	0.80	3,011.3	$334.25	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
105	D201 Toilet	3750	1	1	2" x 3', 1-Lamp, T8 32W, Surface Mount, Prismatic Lens	28	0.03	105.0	$11.66	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
106	D P.T.D. Storage	3750	5	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.29	1,087.5	$120.71	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
107	D212 Storage	3750	11	4	2' x 4', 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	1.20	4,496.3	$499.08	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
108	D212 Bathroom	3750	1	2	2' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

109	D Janitor's Closet	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
110	D217 Classroom	3750	11	4	2' x 4', 1 Exit sign, 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	1.20	4,496.3	$499.08	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
111		3750	1	2	2' x 2', 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.07	273.8	$30.39	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
112	D217 Bathroom	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
113	D218 Classroom	3750	15	4	2' x 4', 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	1.64	6,131.3	$680.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
114		3750	2	4	2' x 4', 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	0.22	817.5	$90.74	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
115		3750	1	2	2' x 2', 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
116	D218 Bathroom	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
117	D218 Electrical Room	3750	4	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.23	870.0	$96.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
118	D226 Storage	3750	2	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
119	D227 Boiler/Mechanical Room	3750	6	2	3" x 4', 2-Lamp, T8 32W, Pendant Mount, Direct/Indirect Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
120	D219 Band Room	3750	14	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.81	3,045.0	$338.00	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
121	D219 Bathroom	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
122	D222 Music Room	3750	10	4	2' x 4', 1 Exit sign, 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	1.09	4,087.5	$453.71	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
123		3750	1	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
124	D222 Music Storage	3750	2	2	2' x 2', U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.15	547.5	$60.77	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
125	D222 Music Storage	3750	2	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
126	D222 2nd Floor Stairwell to Gym	3750	3	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
127	D222 Corridor	3750	26	2	2' x 2', 5 Exit signs, 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	1.90	7,117.5	$790.04	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

128	D to C Corridor	3750	6	2	2' x 2', 2-Lamp, U Lamp, T8 32W, Recessed Mount, Prismatic Lens	73	0.44	1,642.5	$182.32	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
129	D2 Stairwell	3750	2	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
130	D2 Bottom Stairs	3750	1	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
131	D Elevator	3750	1	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
132	D Gym Lobby	3750	8	2	2' x 2', 3 Exit signs, 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.58	2,190.0	$243.09	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
133	D128 Mechanical	3750	2	2	3" x 4', 2-Lamp, T8 32W, Pendant Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
134	D114 Girls Bathroom	3750	3	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
135		3750	2	2	4" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
136	D115 Boys Bathroom	3750	3	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
137		3750	2	2	4' x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
138	D106 Health Room	3750	25	2	4' x 4', 2 Exit signs, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.45	5,437.5	$603.56	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
139		3750	1	2	2' x 2', 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.07	273.8	$30.39	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
140		3750	1	4	2' x 4', 4-Lamp, T8 32W, Recessed Mount, Prismatic Lens	109	0.11	408.8	$45.37	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
141	D106 Storage	3750	8	1	3 in Circle Lights, 1-Lamp, Incandescent 60W, Recessed Mount, Prismatic Lens	60	0.48	1,800.0	$199.80	8	1	18 W CFL Lamp	18	0.14	540	$59.94	$10.00	$80.00	0.34	1260	$139.86	0.57
142	D109 Storage	3750	1	2	2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
143	D107 Office	3750	2	2	2' x 2', 2-Lamp, U Lamp T8 32W, Surface Mount, Prismatic Lens	73	0.15	547.5	$60.77	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
144		3750	1	2	4" x 3', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
145	D106 Storage	3750	3	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
146		3750	2	2	4" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

INVESTMENT GRADE LIGHTING AUDIT

147	D111 Janitor's Storage	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
148	D107/106 Small Corridor area	3750	2	2	1' x 4', 1 Exit sign, 2-Lamp, T12 34W, Recessed Mount, Prismatic Lens	80	0.16	600.0	$66.60	2	2	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	58	0.12	435	$48.29	$125.00	$250.00	0.04	165	$18.32	13.65
149	Gym	3750	32	1	1-Lamp, Metal Halides 250W, Surface Mount, Prismatic Lens	295	9.44	35,400.0	$3,929.40	32	3	3-Lamp T-5 HO Cooper F-Bay	182	5.82	21840	$2,424.24	$300.00	$9,600.00	3.62	13560	$1,505.16	6.38
150	D-1 Stairs	3750	2	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
151	D104 Storage	3750	2	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
152	D103 Storage	3750	2	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
153	D101 Storage	3750	6	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
154	Corridor	3750	5	2	2' x 2', 2 Exit signs, 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.37	1,368.8	$151.93	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
155	Gym Area	3750	5	2	2' x 2', 2-Lamp, U Lamp T8 32W, Recessed Mount, Prismatic Lens	73	0.37	1,368.8	$151.93	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
156	D120 Office	3750	2	2	2' x 2', 2-Lamp, U Lamp T8 32W, Surface Mount, Prismatic Lens	73	0.15	547.5	$60.77	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
157	D120 Bathroom	3750	1	1	3" x 3', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
158	D118 Boys Locker Room	3750	18	1	4" x 4', 4 Exit signs, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.04	3,915.0	$434.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
159	D118 Boys Locker Room	3750	6	3	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
160		3750	2	2	2' x 2', 2-Lamp, U Lamp T12 34W, Surface Mount, Prismatic Lens	58	0.12	435.0	$48.29	2	2	4' - 2-Lamp 32W T-8 Industrial Strip w/ Elect Ballast; Metalux M/N SNF232	58	0.12	435	$48.29	$125.00	$250.00	0.00	0	$0.00	0.00
161	D118 Storage	3750	1	1	3" Circle Light, 1-Lamp, Incandescent 60W, Surface Mount, Prismatic Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
162	D122 Storage	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
163	D Storage	3750	2	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
164		3750		2	4" x 4', 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.00	0.0	$0.00	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
165	D Custodial Room	3750	1	2	3" x 4', 2-Lamp, T8 32W, Surface Mount, Direct/Indirect Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

166	C Corridor	3750	6	2	1' x 4', 2 Exit signs, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
167	C101 Guidance Office	3750	21	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.22	4,567.5	$506.99	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
168	C101 Bathroom	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Direct/Indirect Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
169	C100 Classroom	3750	21	2	1' x 4', 1 Exit sign, 2-Lamp, T8 32W, Surface Mount, Prismatic Lens	58	1.22	4,567.5	$506.99	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
170	C100 Bathroom	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Direct/Indirect Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
171	Main Office	3750	18	2	1' x 4', 3 Exit signs, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	1.04	3,915.0	$434.57	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
172	Secretaries Lounge	3750	1	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
173	Bathroom	3750	1	1	18 in T12, 1-Lamp, T12 34W, Surface Mount, Prismatic Lens	50	0.05	187.5	$20.81	1	1	2' 1-Lamp T-8 17W wall Mtd. Metalux BC117	20	0.02	75	$8.33	$150.00	$150.00	0.03	112.5	$12.49	12.01
174	Attendance Office	3750	2	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
175	Storage Closet	3750	1	1	1-Lamp, Incandescent 60W, Surface Mount, Prismatic Lens	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
176	Copy Room	3750	6	2	1' x 4', 1 Copier/1 Mini Refrigerator/1 Microwave Owen, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.35	1,305.0	$144.86	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
177	Principal's Office	3750	2	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
178	Principal's Bathroom	3750	1	1	18" Wall Mount T12, 1-Lamp, T12 34W, Surface Mount, Prismatic Lens	50	0.05	187.5	$20.81	1	1	2' 1-Lamp T-8 17W wall Mtd. Metalux BC117	20	0.02	75	$8.33	$150.00	$150.00	0.03	112.5	$12.49	12.01
179	Vice Principal's Office	3750	2	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
180		3750	1	2	1' x 4', 1 Monitor for 2nd camera, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.06	217.5	$24.14	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
181	Office	3750	3	2	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.17	652.5	$72.43	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
182	Main Office/Back Office	3750	2	4	2' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.12	435.0	$48.29	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
183	Kitchen Area	3750	1	1	1-Lamp, Incandescent 60W	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57

INVESTMENT GRADE LIGHTING AUDIT

184	Kitchen Area Storage	3750	5	2	1' x 4', 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	0.29	1,087.5	$120.71	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
185	Kitchen 3 Walk-Ins	3750	1	1	1-Lamp, Incandescent 60W	60	0.06	225.0	$24.98	1	1	18 W CFL Lamp	18	0.02	67.5	$7.49	$10.00	$10.00	0.04	157.5	$17.48	0.57
186	Corridor along Main Office & Kitchen	3750	7	4	2' x 4', 3 Exit signs, 4-Lamp, T8 32W, Surface Mount, Prismatic Lens	109	0.76	2,861.3	$317.60	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
187	C to B Corridor	3750	25	2	1' x 4', 4 Exit signs, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	1.45	5,437.5	$603.56	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
188	Corridor from B to A	3750	25	2	1' x 4', 6 Exit signs, 2-Lamp, T8 32W, Recessed Mount, Prismatic Lens	58	1.45	5,437.5	$603.56	0	0	NCR	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		1381	395			93.99	352,443.8	$39,121.26	58	22			6.536	24510	$2,720.61		$10,830.00	4.52	16950.0	$1,881.45	5.76

Lighting Control Applicable

Project Name: **Millville BOE - Rieck Avenue School**
Location: **Millville, NJ 08332**
Description: **Photovoltaic System - Direct Purchase**

Simple Payback Analysis

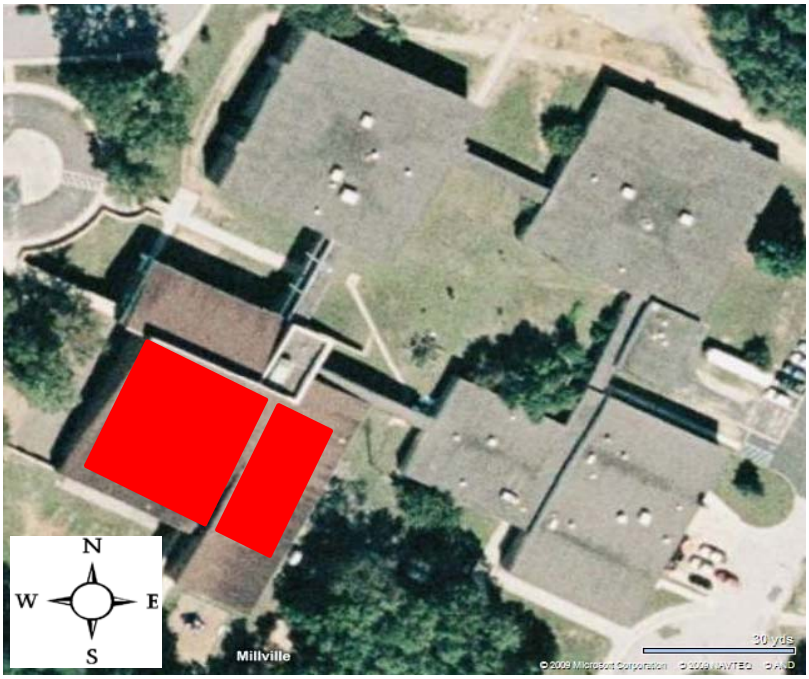
	Photovoltaic System - Direct Purchase
Total Construction Cost	$1,092,960
Annual kWh Production	159,994
Annual Energy Cost Reduction	$17,759
Annual SREC Revenue	$55,998
First Cost Premium	**$1,092,960**
Simple Payback:	**14.8** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.111**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/kWh)	$0.350

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	$1,092,960	0	0	0	$0	(1,092,960)	0
1	$0	159,994	$17,759	$0	$55,998	$73,757	($1,019,203)
2	$0	159,194	$18,292	$0	$55,718	$74,010	($945,193)
3	$0	158,398	$18,841	$0	$55,439	$74,280	($870,913)
4	$0	157,606	$19,406	$0	$55,162	$74,568	($796,344)
5	$0	156,818	$19,988	$1,615	$54,886	$73,259	($723,085)
6	$0	156,034	$20,588	$1,607	$54,612	$73,593	($649,492)
7	$0	155,254	$21,206	$1,599	$54,339	$73,945	($575,547)
8	$0	154,478	$21,842	$1,591	$54,067	$74,318	($501,229)
9	$0	153,705	$22,497	$1,583	$53,797	$74,711	($426,519)
10	$0	152,937	$23,172	$1,575	$53,528	$75,124	($351,394)
11	$0	152,172	$23,867	$1,567	$53,260	$75,560	($275,834)
12	$0	151,411	$24,583	$1,560	$52,994	$76,017	($199,817)
13	$0	150,654	$25,321	$1,552	$52,729	$76,498	($123,319)
14	$0	149,901	$26,080	$1,544	$52,465	$77,001	($46,318)
15	$0	149,151	$26,863	$1,536	$52,203	$77,529	$31,212
16	$0	148,405	$27,668	$1,529	$51,942	$78,082	$109,293
17	$0	147,663	$28,499	$1,521	$51,682	$78,660	$187,953
18	$0	146,925	$29,353	$1,513	$51,424	$79,264	$267,217
19	$0	146,190	$30,234	$1,506	$51,167	$79,895	$347,112
20	$0	145,460	$31,141	$1,498	$50,911	$80,554	$427,666
21	$1	144,732	$32,075	$1,491	$50,656	$81,241	$508,907
22	$2	144,009	$33,038	$1,483	$50,403	$81,957	$590,864
23	$3	143,289	$34,029	$1,476	$50,151	$82,704	$673,568
24	$4	142,572	$35,050	$1,468	$49,900	$83,481	$757,049
25	$5	141,859	$36,101	$1,461	$49,651	$84,291	$841,340
	Totals:	3,052,350	$477,200	$24,897	$1,068,323	$1,934,300	$1,520,626
				Net Present Value (NPV)		**$841,365**	
				Internal Rate of Return (IRR)		**4.8%**	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Rieck Ave. School	8625	Sunpower SPR230	528	14.7	7,764	121.4	159,994	17,424	15.64



Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	121.4 kW
DC to AC Derate Factor:	0.810
AC Rating:	98.4 kW
Array Type:	Fixed Tilt
Array Tilt:	39.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	11.1 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.61	11447	1270.62
2	4.20	11917	1322.79
3	4.78	14378	1595.96
4	5.23	14767	1639.14
5	5.44	15501	1720.61
6	5.48	14509	1610.50
7	5.55	15001	1665.11
8	5.41	14780	1640.58
9	5.23	14146	1570.21
10	4.60	13229	1468.42
11	3.59	10509	1166.50
12	3.17	9811	1089.02
Year	4.69	159994	17759.33

.= Proposed PV Layout

Notes:

1. Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

Day-Light Dimming Calculation

Concord Engineering Group

Millville Board of Education - Rieck Avenue School

Existing Fixtures

Existing Fixture	Quantity	Input Watts	Annual Operation Hrs	% Load	Annual Usage (kWh)	Demand (KW)	Operating Cost
400 Watt Metal Halide, High Bay, Pendant Mount, No Lens	32	295	3750	100%	**35400**	9.44	$4,991

Proposed Retrofit

Proposed Retrofit	Quantity	# Lamps	Input Watts	Total Input Watts	Material Cost	Labor Cost	Total Lighting Installation Cost
4-Lamp T-5 HO Cooper F-Bay	32	3	54W/lamp	182	$350	$350	**$22,400**

Daylight Dimming Utility Savings

Quantity	Input Watts	Daily Operation Hrs	% Load	Annual Days of Operation	Annual Usage (kWh)	Demand (KW)
32	182	9	100%	227	11898.4	4.4
32	182	3	67%	227	2645.4	
32	182	4.5	33%	227	1981.1	
Total hrs of Operation		**16.5**		Total Usage	**16524.9**	

Annual Savings

kWh Savings	kW Savings
18875	**5.0**

Total Utility Savings	**$2,095**
Smart Start Incentives	
Lighting Control $25/fixture	$800
Lighting Fixture $50/fixture	$1,600
Total Incentive	**($2,400)**
Total Project Cost	**$20,000**
Simple Payback (years)	**9.5**