



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: SALEM CITY BOARD OF EDUCATION

**SALEM MIDDLE SCHOOL
51 NEW MARKET STREET
SALEM, NJ 08079**

**ATTN: MR. WILL ROYSTER
DIRECTOR OF BUILDINGS AND GROUNDS**

PREPARED BY: CONCORD ENGINEERING GROUP



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I. EXECUTIVE SUMMARY

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

Salem City Board of Education
Middle School Building
51 New Market Street
Salem, NJ 08079

Municipal Contact Person: Deborah A. Piccirillo, Business Administrator
Facility Contact Person: Will A. Royster, Director of Buildings and Grounds

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	\$ 78,930
Natural Gas	\$ 59,712
Total	\$138,642

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's 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 $\pm 20\%$. 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	Premium Motor Upgrade	\$8,999	\$344	26.2	-42.7%
ECM #2	Window AC Replacement	\$3,703	\$289	12.8	-22.0%
ECM #3	Window AC Upgrade	\$8,956	\$534	16.8	-10.6%
ECM #4	H&V Unit Demand Control Ventilation	\$64,950	\$4,208	15.4	-2.8%
ECM #5	Split System Upgrade	\$9,724	\$295	32.9	-54.4%
ECM #6	Water Heater Upgrade	\$10,602	\$684	15.5	-3.2%
ECM #7	Domestic HW Pipe Insulation	\$3,800	\$422	9.0	66.6%
ECM #8	Lighting Upgrade	\$21,562	\$6,441	3.3	348.1%
ECM #9	Lighting Controls	\$10,065	\$2,326	4.3	246.6%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	Solar PV 45.08 kW DC System	\$405,720	\$28,905	14.0	78.1%

Notes: A. Cost takes into consideration applicable NJ Smart Start™ 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	Premium Motor Upgrade	0.8	2,489	0
ECM #2	Window AC Replacement	1.2	2,092	0
ECM #3	Window AC Upgrade	2.2	3,866	0
ECM #4	H&V Unit Demand Control Ventilation	0.0	0	2,882
ECM #5	Split System Upgrade	1.2	2,141	0
ECM #6	Water Heater Upgrade	0	0	469
ECM #7	Domestic HW Pipe Insulation	0.0	0	289
ECM #8	Lighting Upgrade	15.8	46,677	0
ECM #9	Lighting Controls	0.0	16,853	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Solar PV 45.08 kW DC System	36.5	59,232.0	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 #7:** Domestic HW Pipe Insulation
- **ECM #8:** Lighting Upgrade
- **ECM #9:** Lighting Controls

Although ECM #2 does not provide a payback less than 10 years, it is recommended to proceed with the installation of an efficient window air conditioning unit as suggested in ECM #2 (or equal) since the existing window air conditioning units are past their expected lifespan.

ECM #4 does not provide a payback less than 10 years, it is recommended to proceed with the installation of heating and ventilation unit Control Demand Ventilation as suggested in ECM #4 (or equal) since the existing Heating and Ventilation units are over ventilating and have a significant potential energy savings.

ECM #6 does not provide a payback less than 10 years, it is recommended to proceed with the installation of an efficient domestic water heater as suggested in ECM #6 (or equal) since the existing water heater is past its expected lifespan.

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.
5. Turn off or put to "sleep" all computers and ancillary desk plug in loads when not in use. Do not allow computers to sit idle in screen saver mode when not in use as this does not save energy.

Renewable Energy Measures (REMs) were also reviewed for implementation at the Salem City Middle School. CEG utilized a roof mounted solar array to house a PV system. The recommended 45.08 kWdc PV system will produce approximately 59,232 kWh of electricity annually and will reduce the schools electrical consumption from the grid by 10.37%. The

system's calculated simple payback of 14.04 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options before deciding to not implement this renewable energy measure.

Other Recommendations:

The NJ Clean Energy Program provides assistance to public entities with incentive programs to help fund energy conservation measures. Salem BOE should utilize all applicable programs as outlined in the Funding Options section of this report. In addition, NJ law provides financing options for public entity's to utilize when implementing energy efficiency projects. The Energy Savings Improvement Program (ESIP) provides a flexible method for public entities to finance energy efficiency projects where the savings pays for the project costs over a 15 year period. This provides a great way to fund much needed capital improvements within a facility. Since the savings funds the project, there is no added debt to the BOE and typically the financing is cash flow positive on day one. Salem should strongly consider this route along with the other NJ Clean Energy Programs to facilitate the implementation of the energy efficiency recommendations.

Overall, the Salem City Middle School appears to be operating at a higher efficiency level compared to other schools in the region. With the implementation of the above recommended measures the Salem City BOE will realize further energy savings at the Middle School.

II. INTRODUCTION

The comprehensive energy audit covers the 101,800 square foot *Building*, which includes the following spaces: classrooms, computer room, offices, cafeteria, kitchen, storage areas, gymnasium Auditorium and mechanical rooms.

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/ft²/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:

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

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

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

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

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

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

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. The facility receives electric distribution service through Atlantic City Electric on rate schedule Annual General Service rate structure. The Middle School has contracted South Jersey Energy, a **Third Party Supplier** (TPS), to provide electric commodity supply (generation) service. 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 Gas provides natural gas to the facility under the Basic Gas Service Supply, BGSS-Firm Transportation rate structure. The Middle School has contracted Woodruff Energy, a **Third Party Supplier** (TPS), to provide gas commodity supply (generation) service. 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.

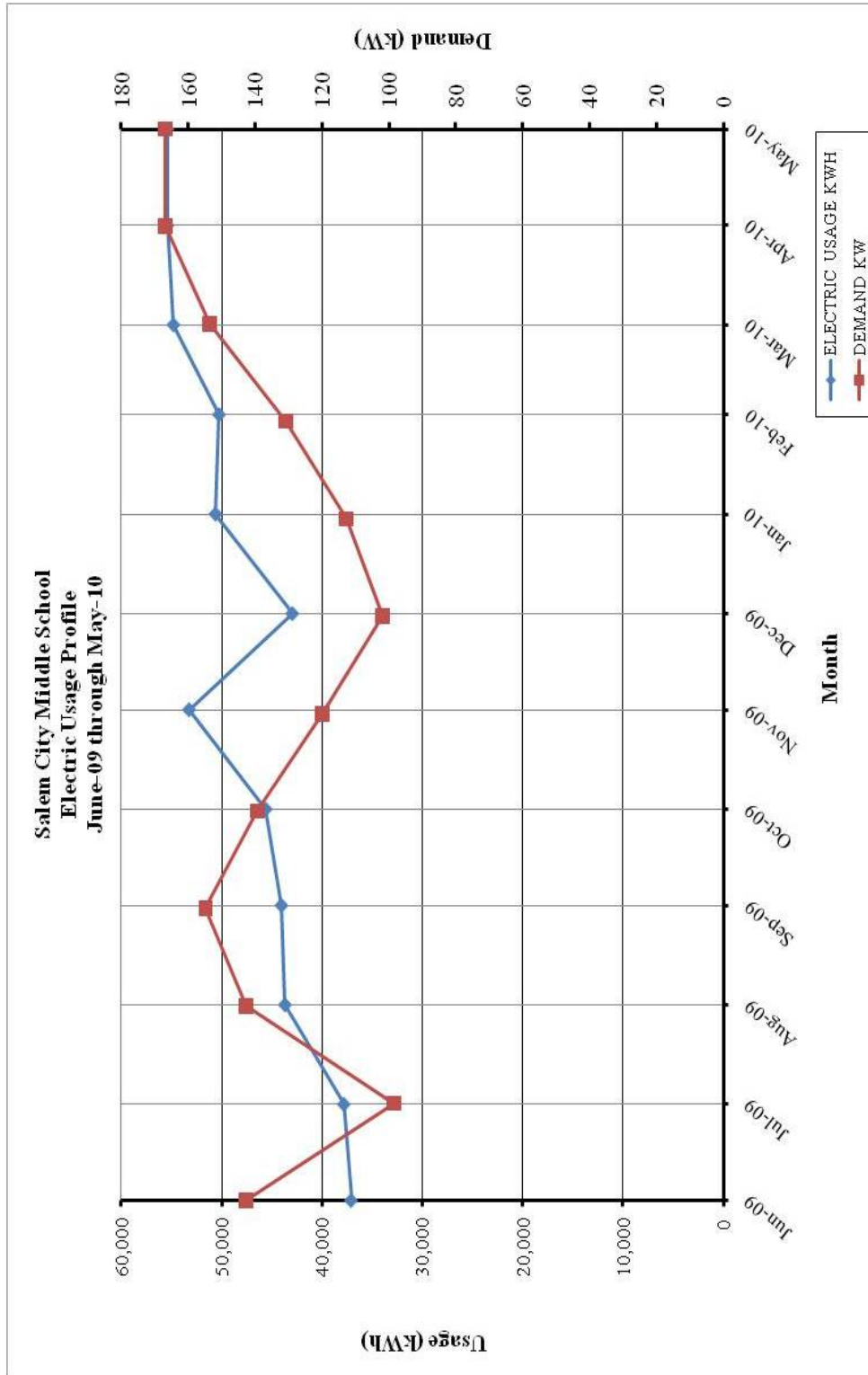
The overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

<u>Description</u>	<u>Average</u>
Electricity	13.8¢ / kWh
Natural Gas	\$1.46 / Therm

**Table 3
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric			
Rate: Annual General Service			
Meter No: 46069018			
Customer ID No: 0071 8169 9997			
Third Party Utility S.J. Energy Co			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION	DEMAND	TOTAL BILL
Jun-09	37,080	142.8	\$5,347
Jul-09	37,800	98.4	\$5,338
Aug-09	43,680	142.8	\$6,117
Sep-09	44,040	154.8	\$6,213
Oct-09	45,600	139.2	\$6,331
Nov-09	53,280	120.0	\$7,141
Dec-09	42,960	102.0	\$5,985
Jan-10	50,640	112.8	\$6,810
Feb-10	50,280	130.8	\$6,802
Mar-10	54,840	153.6	\$7,498
Apr-10	55,440	166.8	\$7,674
May-10	55,440	166.8	\$7,674
Totals	571,080	166.8 Max	\$78,930
AVERAGE DEMAND		135.9 KW average	
AVERAGE RATE		\$0.138 \$/kWh	
May 2010 is estimated based on April 2010			

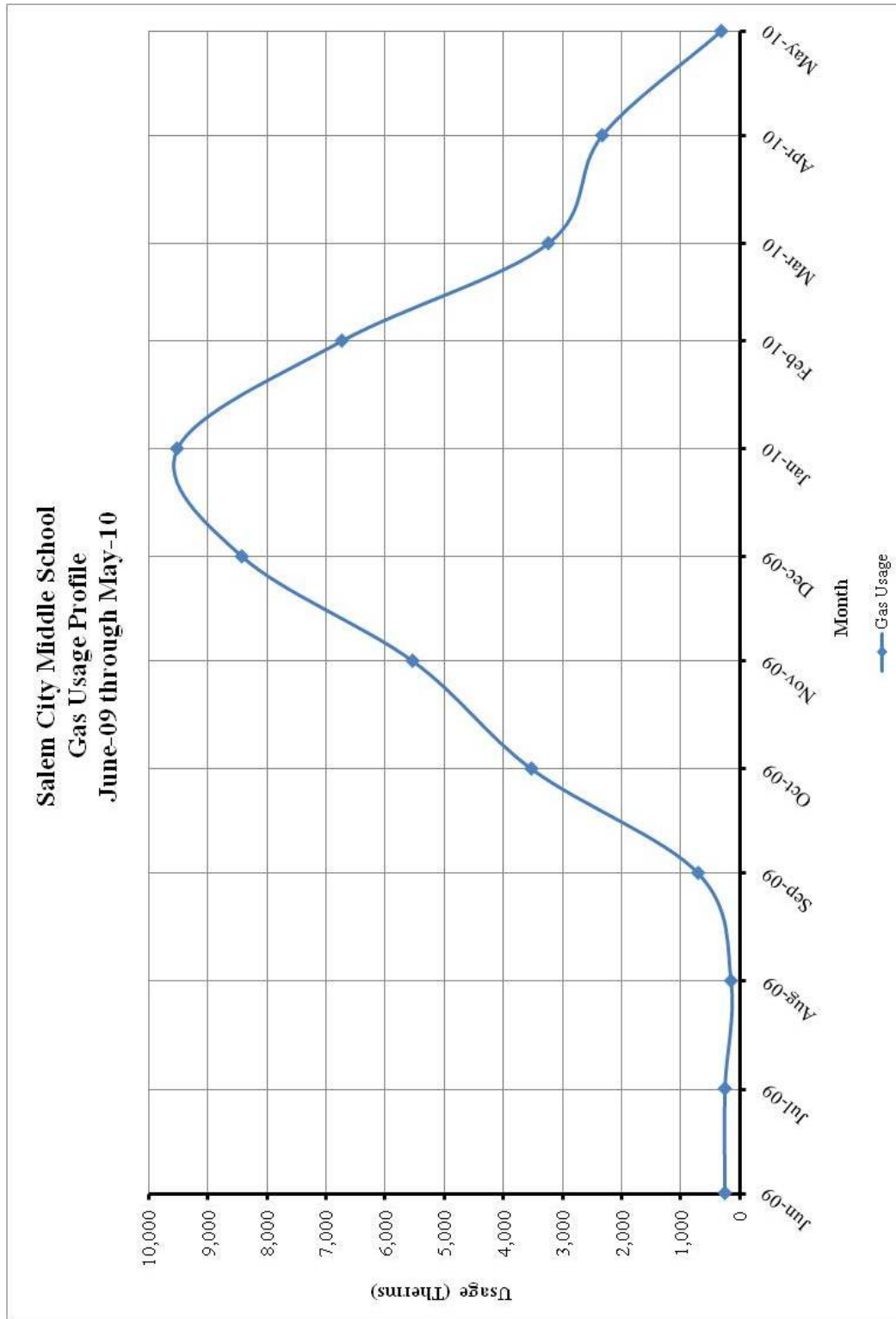
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: Firm Transportation		
Meter No: 0431117		
Account No.: 2 13 33 0015 0 7		
Third Party Utility Provider: Woodruff Energy		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Jun-09	258.75	\$444.66
Jul-09	258.00	\$443.78
Aug-09	153.75	\$271.88
Sep-09	706.56	\$1,188.79
Oct-09	3,526.00	\$5,831.86
Nov-09	5,535.53	\$9,148.69
Dec-09	8,421.40	\$11,627.03
Jan-10	9,516.13	\$13,199.14
Feb-10	6,730.56	\$9,339.44
Mar-10	3,242.16	\$4,508.90
Apr-10	2,331.29	\$3,248.02
May-10	318.68	\$460.07
TOTALS	40,998.81	\$59,712.26
AVERAGE RATE:	\$1.46	\$/THERM

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:

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

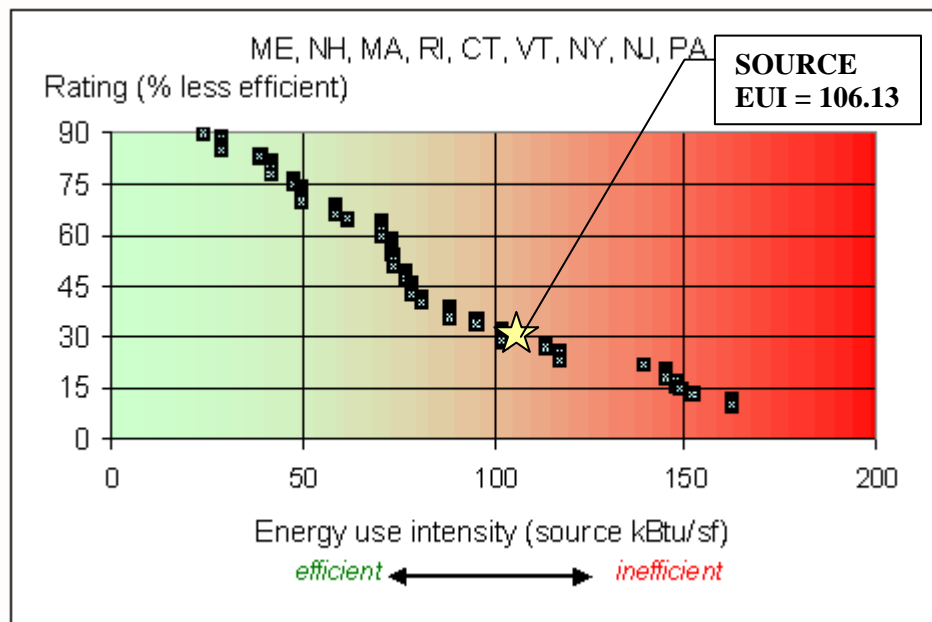
$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Gas Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY kBtu	SITE-SOURCE RATIO	SOURCE ENERGY kBtu
	kWh	Therms	Gallons			
ELECTRIC	571,080.0			1,949,667	3.340	6,511,888
NATURAL GAS		40,998.8		4,099,881	1.047	4,292,575
FUEL OIL			0.0	0	1.010	0
PROPANE			0.0	0	1.010	0
TOTAL				6,049,548		10,804,464
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA	101,800 SQUARE FEET					
BUILDING SITE EUI	59.43 kBtu/SF/YR					
BUILDING SOURCE EUI	106.13 kBtu/SF/YR					

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

Figure 3
Source Energy Use Intensity Distributions: Elementary School Buildings



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: salemboe
 Password: lgeaceg2010
 Security Question: What city were you born in?
 Security Answer: "salem"

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
Salem City Middle School	55	50

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

V. FACILITY DESCRIPTION

The 101,800 SF Salem City Middle School Building is a three story facility (Basement, First Floor and Second Floor) comprised of classrooms, computer room, offices, cafeteria, kitchen, storage areas, gymnasium, auditorium and mechanical rooms.

The building is open Monday through Friday from 6:30 am to 10:00 pm and is occupied by the maintenance staff. The typical hours of full occupancy and operation for this facility are Monday through Friday between 8:00 am and 3:00 pm. The school is occupied with 444 school children grades 3 through 8, 42 faculty and 3 maintenance staff. Occupancy drops to approximately 40% of faculty and children from 3:30 pm to 5:30 pm with after school activity.

Exterior walls are block and brick construction with minimum insulation typical of the time period. The 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, 1/4" clear glass with aluminum frames. Roll down shades are utilized through the facility per occupant comfort. The shades are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The majority of the roof is pitched, shingled roof system. A small portion of the roof is constructed of an EPDM roof system. The amount of insulation below the roofing is unknown. The Gym has a barrel roof. The building was built in 1912 with additions in 1928 and 1931.

HVAC Systems

The building is heated by three (3) Weil McLain model # 788, with each having 2,049 MBH natural gas input. They are thirteen years old, in good condition. Each boiler has a Power Flame model WJ50A-15 natural gas burner and is in good to fair condition. Each boiler has an in-line Taco series 0012 circulator pump that was installed this year. There are two (2) PACO, 5 hp in-line hot water loop pumps. These pumps are past their ASHRAE expected service life and can be replaced with new, higher efficiency pump motor. There are four (4) TACO model 1636C3N3 6.4 in-line hot water zone pumps with 1 1/2 hp motors. Although these motors have six (6) years of ASHRAE expected useful service life remaining and are in good condition, these motors are 84% efficient and could be replaced with a higher efficiency motor. The pump rating capacities and pressures were not determined.

The zone hot water pumps distribute hot water throughout the building to unit ventilators and perimeter fin tube radiation. The unit ventilators have fractional horsepower motors and should be maintained or replaced as needed.

The basement Cafeteria is conditioned by a Trane Climate Changer series, size 10. This heating only unit heats and ventilates the cafeteria. The unit has approximately 214 MBH hot water heating input. The unit is twenty-nine years old and is in fair condition and is past its ASHRAE expected useful service life.

A Trane 3 nominal Tons cooling split system serves the Teachers room. The blower with cooling coil is located in a second floor storage room. There is a 6 kW electric duct heating coil with this

system. The system is forty-one (41) years old, is in poor condition and is past its ASHRAE expected useful service life. The condensing unit is located on the Auditorium roof.

There is three (3) MSZ-D36NA Mitsubishi split system heat pumps serving the Library with capacities of 3 tons nominal cooling and 22.8 MBH heating. The units are ten (10) years old and in good condition.

There is a Mitsubishi split system with one (1) model MUY-A24NA condensing unit and one (1) model MSY-A24NA air handling unit serving the Book Storage room with capacities of 2 tons nominal cooling. The unit is six (6) years old and in good condition.

There are Trane ceiling mounted horizontal unit ventilators with hot water heating coil. There are two (2) in the Library and one (1) in the Art room. The units are believed to be size 1250 and are at least thirty years old and are past their ASHRAE expected useful service life. The units have an outside air connection, motorized damper and a fractional horsepower fan motor. The library units do not work but the Mitsubishi units provide adequate heating capacity. Since there would not be any significant energy savings, these unit ventilators can be maintained/replaced as needed.

There are two (2) Trane Climate Changer series, size 06 that heat and ventilate the basement computer room and storage room. The units have approximately 182.6 MBH hot water heating input. There is a fractional horse power hot water circulation pump at each unit. The unit is twenty-nine years old and is in fair condition and is past its ASHRAE expected useful service life.

There is a York split system with 6.5 Ton nominal cooling capacity serving the basement computer room. The system has a York model KEU090 air handling unit with a York H1RA076 condensing unit. The system is five (5) years old and is in good condition.

There are two (2) Trane Climate Changer series, size 08 (estimated) that heat and ventilate the Gymnasium. The units have approximately 214 MBH hot water heating input. There is a fractional horse power hot water circulation pump at each unit. The unit is approximately twenty-nine years old and is in fair condition and is past its ASHRAE expected useful service life.

There are four (4) propeller exhaust fans serving the Gymnasium. The fans are assumed to have fractional horsepower fan motors. They appear to be in fair condition. Equipment with fractional horsepower motors would have an insignificant energy efficiency savings and should be maintained/replaced as needed as a maintenance project.

There are two (2) Carrier model 38ARZ008 split systems with a capacity of 7.5 nominal Tons cooling. The air handling units are Carrier model 40RM that has a two row 170.98 MBH capacity hot water heating coil and a 7.5 ton cooling coil. The systems serve the auditorium, are one (1) year old and in good condition. The units are controlled by a Carrier digital set back thermostat.

Window air conditioners are used throughout most of the building to provide local cooling. There are sixty-two (62) units serving offices, classrooms, cafeteria, auxiliary cafeteria, art room, music and computer room. The units range in capacity from 5150 BTU/HR to 18,000 BTU/HR. The units are two (2) to nineteen (19) years old and are in good to poor condition.

Exhaust System

Air is exhausted from the toilet rooms through small fans mounted in window panels. The toilet room exhaust fan is operated through the lighting circuit which has an occupancy sensor.

HVAC System Controls

The boilers are controlled with a Johnson Metasys system. The Heating and Ventilation units are controlled by local thermostat.

The Library ductless split systems are controlled by local thermostat. The window air conditioners are controlled by integral thermostat.

Domestic Hot Water

Domestic hot water for the building is provided by an 80 gallon State Turbo Sandblaster water heater with 199,990 BTUH natural gas input capacity. The water heater has a natural draft vent and is 80% thermal efficient. An additional insulated storage tank is in the system. It is 8 feet long x 4 feet in diameter, providing approximately 750 gallons of storage. The domestic hot water is circulated throughout the building by a hot water re-circulation pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping did not appear to have approximately 80% of the insulation. Approximately 20% of the insulation had been removed during maintenance projects over the years and was not replaced. To comply with building and energy codes, this must be repaired.

Lighting

The majority of the lighting at the middle school is 32 watt T-8 bulbs with electronic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. There are a few locations with incandescent lighting. The Gym utilizes 175 watt pendant mounted metal halide (MH) fixtures.

VI. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of 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: Install NEMA Premium® Efficiency Motors

Description:

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 continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

Some of the existing electric motors driving the primary hot water pumps and the supply air fans in some of the air handling units are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing electric motors over 1 HP or more with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
HWP-1	Loop Hot Water Pump #1	5	2,190	85.5%	90.2%
HWP-2	Loop Hot Water Pump #2	5	2,190	85.5%	90.2%
HWP-3	Zone Water Pump	1.5	4,380	84.0%	88.5%
HWP-4	Zone Water Pump	1.5	4,380	84.0%	88.5%
HWP-5	Zone Water Pump	1.5	4,380	84.0%	88.5%
H&V-1	Heat & Vent - Bsmt A-23	2	4,380	85.5%	86.5%
H&V-2	Heat & Vent - Bsmt A-2	1.5	4,380	85.5%	88.5%
H&V-3	Heat & Vent - Bsmt A-1	1.5	4,380	85.5%	88.5%
H&V-4	Heat & Vent - Gym	1.5	4,380	85.5%	88.5%
H&V-5	Heat & Vent - Gym	1.5	4,380	85.5%	88.5%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor

Motor Efficiency = Motor Nameplate Efficiency

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate} \left(\frac{\$}{\text{kWh}} \right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWh	COST SAVINGS
HWP-1	5	90%	85.5%	90.2%	0.20	450	\$62
HWP-2	5	90%	85.5%	90.2%	0.20	450	\$62
HWP-3	1.5	90%	84.0%	88.5%	0.06	268	\$37
HWP-4	1.5	90%	84.0%	88.5%	0.06	268	\$37
HWP-5	1.5	90%	84.0%	88.5%	0.06	268	\$37
H&V-1	2	90%	85.5%	86.5%	0.02	80	\$11
H&V-2	1.5	90%	85.5%	88.5%	0.04	176	\$24
H&V-3	1.5	90%	85.5%	88.5%	0.04	176	\$24
H&V-4	1.5	90%	85.5%	88.5%	0.04	176	\$24
H&V-5	1.5	90%	85.5%	88.5%	0.04	176	\$24
TOTAL					0.8	2,489	\$246

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	\$50
1.5	\$50
2	\$60
3	\$60
5	\$60
7.5	\$90
10	\$100
15	\$115

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP-1	5	\$1,543	\$60	\$1,483	\$62	23.9
HWP-2	5	\$1,543	\$60	\$1,483	\$62	23.9
HWP-3	1.5	\$795	\$50	\$745	\$37	20.1
HWP-4	1.5	\$795	\$50	\$745	\$37	20.1
HWP-5	1.5	\$795	\$50	\$745	\$37	20.1
H&V-1	2	\$878	\$60	\$818	\$11	74.1
H&V-2	1.5	\$795	\$50	\$745	\$24	30.7
H&V-3	1.5	\$795	\$50	\$745	\$24	30.7
H&V-4	1.5	\$795	\$50	\$745	\$24	30.7
H&V-5	1.5	\$795	\$50	\$745	\$24	30.7
TOTAL	Totals:	\$9,529	\$530	\$8,999	\$344	26.2

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$9,529
NJ Smart Start Equipment Incentive (\$):	\$530
Net Installation Cost (\$):	\$8,999
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$344
Total Yearly Savings (\$/Yr):	\$344
Estimated ECM Lifetime (Yr):	15
Simple Payback	26.2
Simple Lifetime ROI	-42.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$5,153
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	(\$4,897.60)

ECM #2: Thru-the-Wall A/C Unit Replacement

Description:

Air-conditioning is provided to the 1st floor and 2nd floor via residential-style window air-conditioning units. The existing window air-conditioning units are inefficient with an estimated seasonal energy efficiency ratio (SEER) of 8.8. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 10.6 SEER for units of this type. The existing window air-conditioning units appears to be approximately 15-plus years of age and is past their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a window air-conditioning unit is 10 years.

This energy conservation measure would replace the window-air conditioning units past their service life. There are two (2) serving the first floor and two (2) serving the 2nd floor. The existing units will be replaced with high energy efficient, window air-conditioning units with cooling capacities typical of the existing units; approximately 12,000 Btu/h for one unit on the 1st floor and 18,000 Btu/h for one unit on the 1st floor and two (2) units on the 2nd floor. The EER of the new 1 Ton equipment will be 11.8 EER and the 1.5 Ton equipment will be 10.8 EER Basis of Design: 1 Ton Model SS12L10 or equivalent, 1.5 Ton model SM18L30A or equivalent.

Energy Savings Calculations:

$$\text{EnergySavings} = \frac{[\text{CoolingTons} \times 12,000 \text{ Btu / ton}]}{[1000 \text{ W / kW}]} \times \left(\frac{1}{\text{EER}_{\text{OLD}}} - \frac{1}{\text{EER}_{\text{NEW}}} \right) \times \text{Avg. Load Factor} \times \text{Hrs. of Cooling}$$

Existing Air Conditioning Units

Rated Capacity = 3 units at 1.5 Cooling Tons = 4.5 Cooling Tons at 8.8 EER

Rated Capacity = 1 unit at 1.0 Cooling Tons at 9.0 EER

Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity = \$0.138 / kWh

Proposed High-Efficiency Air Conditioning Units

Rated Capacity = 4.5 Cooling Tons at 10.8 EER

$$\text{EnergySavings} = \frac{[4.5 \text{ tons} \times 12,000 \text{ Btu / ton}]}{[1000 \text{ W / kW}]} \times \left(\frac{1}{8.8} - \frac{1}{10.8} \right) \times 0.80 \times 1800 \text{ hrs} = 1,636.4 \text{ kWh / yr}$$

$$\text{EnergySavings} = \frac{[1 \text{ tons} \times 12,000 \text{ Btu / ton}]}{[1000 \text{ W / kW}]} \times \left(\frac{1}{9.0} - \frac{1}{11.8} \right) \times 0.80 \times 1800 \text{ hrs} = 455.6 \text{ kWh / yr}$$

Energy Cost Savings = $(1,636.4 + 455.6) \text{ kWh} * \$0.138 / \text{kWh} = \underline{\$289}$ per year

Estimated Demand Savings = $\text{kWh Saved} / \text{Hrs of Operation} = 2,092 \text{ kWh} / 1,800 \text{ hrs} = \underline{1.16 \text{ kW}}$

There are currently no applicable equipment incentives for equipment of this capacity. Furthermore, maintenance savings could not be calculated due to the fact that there are no adequate data to baseline the existing expenditures.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,703
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$3,703
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$289
Total Yearly Savings (\$/Yr):	\$289
Estimated ECM Lifetime (Yr):	10
Simple Payback	12.8
Simple Lifetime ROI	-22.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$2,890
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$1,237.77)

ECM #3: Window A/C Upgrade

Description:

Air-conditioning is provided to the first floor and 2nd floor office via residential-style window air-conditioning units. The existing window air-conditioning units are inefficient with an estimated seasonal energy efficiency ratio (SEER) of 8.8. The NJ State Energy Code (ASHRAE 90.1-2004) mandates a minimum energy efficiency of 10.6 SEER for units of this type. The existing window air-conditioning units appears to be approximately 15-plus years of age and is past their service life as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. The estimated service life for a window air-conditioning unit is 10 years.

This energy conservation measure would replace the window-air conditioning units past their service life. There are two (2) serving the first floor and two (2) serving the 2nd floor. The existing units will be replaced with high energy efficient, window air-conditioning units with cooling capacities typical of the existing units; approximately 12,000 Btu/h for one unit on the 1st floor and 18,000 Btu/h for one unit on the 1st floor and two (2) units on the 2nd floor. The SEER of the new 1 Ton equipment will be 17 SEER and the 1.5 Ton equipment will be 20 SEER Basis of Design: 1 Ton Sanyo Model 12KS71 or equivalent, 1.5 Ton Sanyo model 18KS72 or equivalent.

Energy Savings Calculations:

$$EnergySavings = \frac{[CoolingTons \times 12,000 Btu / ton]}{[1000W / kW]} \times \left(\frac{1}{SEER_{OLD}} - \frac{1}{SEER_{NEW}} \right) \times Avg.LoadFactor \times Hrs.ofCooling$$

Existing Air Conditioning Units

Rated Capacity = 3 units at 1.5 Cooling Tons = 4.5 Cooling Tons at 10.8 SEER

Rated Capacity = 1 unit at 1.0 Cooling Tons at 11.0 SEER

Cooling Season Hrs. of Operation = 1,800 hrs/yr.

Average Cost of Electricity = \$0.138 / kWh

Proposed High-Efficiency Air Conditioning Units

Rated Capacity = 4.5 Cooling Tons at 20 EER

$$EnergySavings = \frac{[4.5 tons \times 12,000 Btu / ton]}{[1000W / kW]} \times \left(\frac{1}{10.8} - \frac{1}{20} \right) \times 0.80 \times 1800 hrs = 3,312 kWh / yr$$

Rated Capacity = 1.0 Cooling Tons at 17 EER

$$\text{Energy Savings} = \frac{[1 \text{ tons} \times 12,000 \text{ Btu} / \text{ton}]}{[1000 \text{ W} / \text{kW}]} \times \left(\frac{1}{11.0} - \frac{1}{17} \right) \times 0.80 \times 1800 \text{ hrs} = 554.4 \text{ kWh} / \text{yr}$$

$$\text{Energy Cost Savings} = (3,312 + 554.4) \text{ kWh} * \$0.138 / \text{kWh} = \underline{\$533.6} \text{ per year}$$

$$\text{Estimated Demand Savings} = \text{kWh Saved} / \text{Hrs of Operation} = 3,866.4 \text{ kWh} / 1,800 \text{ hrs} = \underline{2.15} \text{ kW}$$

There are currently no applicable equipment incentives for equipment of this capacity. Furthermore, maintenance savings could not be calculated due to the fact that there are no adequate data to baseline the existing expenditures.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$9,370
NJ Smart Start Equipment Incentive (\$):	\$414
Net Installation Cost (\$):	\$8,956
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$534
Total Yearly Savings (\$/Yr):	\$534
Estimated ECM Lifetime (Yr):	15
Simple Payback	16.8
Simple Lifetime ROI	-10.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$8,004
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	(\$2,585.92)

ECM #4: Heat & Ventilation Unit Upgrade

Demand Controlled Ventilation

Demand Controlled Ventilation (DCV) is a means to provide active, zone level control of ventilation for spaces within a facility. The basic premise behind DCV is monitoring indoor CO₂ levels versus outdoor CO₂ levels in order to provide proper ventilation to the spaces within the facility as well as saving costly dollars treating unconditioned ventilation air. Carbon dioxide ventilation control or demand controlled ventilation (DCV) allows for the measurement and control of outside air ventilation levels to a target cfm/person ventilation rate in the space (i.e., 15 cfm/person) based on the number of people in the space. It is a direct measure of ventilation effectiveness and is a method whereby buildings can regain active and automatic zone level ventilation control, without having to open windows. The fixed ventilation approach depends on a set-it-and-forget-it methodology that is completely unresponsive to changes in the way spaces are utilized/occupied or how equipment is maintained. A DCV system utilizes various control algorithms to maintain a base ventilation rate. The system monitors space CO₂ levels and the algorithm automatically adjusts the outdoor and return air dampers to provide the quantity of outdoor air to maintain the required CO₂ level in the space. System designs are normally designed for maximum occupancy and the ventilation rates are designed for this (maximum) occupancy. In areas where occupancy swings are prevalent there is ample opportunity to reduce outdoor air quantity to satisfy the needs of the actual number of occupants present. By installing the DCV controls, energy savings are realized by the reduced quantities of outdoor air that do not require heating and cooling energy from the steam and chilled water plants.

Heating and ventilation units H&V-1, 2, 3, 4, and 5 provide heating and ventilation to the cafeteria, Basement A2, Basement A1 and Gym respectively. When operating, these units provide minimum amount of outside air to the space. The outside air volume is typically based on the maximum occupancy of the space conditioned. When a given space is not fully occupied the outside air quantity delivered to the space is greater than the amount needed for adequate ventilation.

This ECM includes the installation of CO₂ sensors integrated into a demand control ventilation system, for the units mentioned above. This system allows the air handling unit to respond to changes in occupancy and therefore reduce the amount of outside air that has to be conditioned. Outside air accounts for a large portion of the energy consumption in the HVAC system, especially in high occupancy spaces. The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the “Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways,” document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Demand Control Ventilation - 10% - 15%.

Energy savings achieved through “Demand Control Ventilation” average 10%-15%. Savings resulting from the implementation of this ECM for energy management controls are estimated to be 15% of the total HVAC energy cost for this system.

The components required for the demand control ventilation system installation include damper actuators, CO₂ sensors, wiring, Energy Management System equipment expansion and programming. Each occupied zone would require minimum one CO₂ sensor installed to monitor occupancy levels.

IMPLEMENTATION SUMMARY					
INPUTS	Service	Min # of CO2 SENSORS	HVAC Unit	Cooling Capaity, Tons	Heating Capacity, MBH
DCV-1	H&V 1	1	H&V 1	0	396
DCV-2	H&V 2	1	H&V 2	0	198
DCV-3	H&V 3	1	H&V 3	0	198
DCV-4	Gym	2	H&V 4	0	396
	Gym		H&V 5	0	396
Total				0	1,584

** Heating capacity of the units are estimated*

Energy Savings Calculations:

$$\text{Heating Energy (Therms)} = \frac{\text{Heating Capacity} \left(\frac{\text{Btu}}{\text{Hr.}} \right) \times \text{HDD}(\text{Day } ^\circ\text{F}) \times 24 \left(\frac{\text{Hr.}}{\text{Day}} \right) \times (0.60)}{65(^{\circ}\text{F}) \times \text{Fuel Heat Value} \left(\frac{\text{Btu}}{\text{Therms}} \right) \times \text{Heating Efficiency} (\%)}$$

$$\text{Heating Cost} = \text{Heating Energy}(\text{Therms}) \times \text{Ave Fuel Cost} \left(\frac{\$}{\text{Therms}} \right)$$

$$\text{Energy Savings} = \text{Heating Energy}(\text{Therms}) \times 15\%$$

DEMAND CONTROLLED VENTILATION	
ECM INPUTS	DCV
Equipment	H&V 1, 2, 3, 4 and 5
Total Heating Capacity, MBh	1584
Heating Efficiency (Gas)	80%
Heating Degree Days (65°F)	4380
Energy Savings	15.0%
Elec Cost (\$/kWh)	\$0.138
Natural Gas Cost (\$/Therm)	\$1.46
ENERGY SAVINGS	
ECM RESULTS	DCV
Heating Energy (Therms)	19,213
Heating Energy Savings (Therms)	2,882
Total Gas Cost Savings (\$)	\$4,208
Total Cost Savings (\$)	\$4,208
COMMENTS:	

Motor Efficiency Upgrade Savings:

Five (5) indoor air handling units with hot water heating coils have surpassed their expected service life of fifteen (15) years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. These units appear to be 1981 vintage, and are excellent candidates for replacement. Due to escalating owning and maintenance costs, these units should be replaced. Each of these units contains a hot water heating section and savings can be yielded from year round operation. The units range from 3000 CFM (cubic feet per minute) to 6,000 cfm capacity.

This energy conservation measure would replace air handling units with fan motors equal to or greater than 1 HP with new air handling units having NEMA Premium® Efficient Motors. NEMA Premium® is the most efficient motor designation in the marketplace today. The Trane CSAA-series or equivalents were utilized as a basis of design. Because many units operate 40-80 hours per week, even small increases in efficiency can yield substantial energy and dollar savings.

Energy Savings Calculations:

Existing: **Size 08 H&V unit** (H&V 1, 4 and 5), has a fan motor with the following characteristics:

Existing Motor Efficiency = 80.8%
 Existing motor HP = 2 HP
 Annual Hours of Operations = 4,380
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = \$0.138 / kWh

Existing H&V Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 2 \times 0.75 \times 4,380 \times 0.138] \div 0.808 = \$837 / \text{Year}$

New H&V with 3hp NEMA Premium Motor Efficiency = 89.5% A 3 hp motor is required based on an equipment selection by Trane for a model CSAA12 at 6000CFM and 0.25 ESP.

New H&V with NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 3 \times 0.75 \times 4,380 \times 0.138\} \div 0.895 = \$1134 / \text{Year}$

Savings = \$837 - \$1134 = -\$297 / Year (this is an increase in cost for each Size 08 unit)

Existing: **Size 06 H&V unit** (H&V 2 and 3), has a fan motor with the following characteristics:

Existing Motor Efficiency = 79.1%
 Existing motor HP = 1 1/2 HP
 Annual Hours of Operations = 4,380
 1 HP = 0.746 Watt
 Load Factor = 75%
 Cost of electricity = \$0.138 / kWh

Existing H&V Motor Operating Cost =
 $\{0.746 \text{ Watt/HP} \times \text{Motor HP} \times \text{Load Factor} \times \text{Hours of Operation} \times \text{Cost of Electricity}\} \div \text{Motor Efficiency}$
 $= [0.746 \times 1 \frac{1}{2} \times 0.75 \times 4,380 \times 0.138] \div 0.791 = \$641 / \text{Year}$

New H&V with 1 1/2hp NEMA Premium Motor Efficiency = 89.5% A 1 1/2 hp motor is required based on an equipment selection by Trane for a model CSAA06 at 3000CFM and 0.5 ESP.

New H&V with NEMA Premium Efficiency Motor Operating Cost =
 $\{0.746 \times 1 \frac{1}{2} \times 0.75 \times 4,380 \times 0.138\} \div 0.865 = \underline{\$586} / \text{Year}$

Savings = \$641 - \$586 = \$55 / Year (This is a decrease in cost for each Size 06 unit.)

Total motor efficiency Savings = $3 \times (-\$297) + 2 \times \$55 = \underline{-\$781 / \text{Year}}$ (This is an increase in cost.)

Cost and Incentives:

Estimated installed cost for the five H&V units with demand controlled ventilation is \$152,200. Estimated cost includes CO2 sensors, control wiring, electrical wiring, control system equipment expansion and programming. There are currently no Smart Start ® incentives available for a Demand Control Ventilation System. The SmartStart Building® incentive for premium efficiency motors is:

The SmartStart Building® incentive of 2hp x \$60/motor is \$60

The SmartStart Building® incentive of 3hp x \$60/motor is \$60

Total incentive = $\$60 \times 5 = \300 .

Simple Payback = $(\$152,200 - \$300) / (\$4,208 + \$-781) = 44.2$

kWh saved = $\$-781 / \$0.138/\text{kWh} = -5,659.4 \text{ kWh}$

kW saved = $-5659.4 \text{ kWh} / 4,380 \text{ hrs./yr.} = -1.29 \text{ kW}$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$152,123
NJ Smart Start Equipment Incentive (\$):	\$300
Net Installation Cost (\$):	\$151,823
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,427
Total Yearly Savings (\$/Yr):	\$3,427
Estimated ECM Lifetime (Yr):	15
Simple Payback	44.3
Simple Lifetime ROI	-66.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$51,405
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	(\$110,912.03)

ECM #5: Replace 3-Ton Split AC Unit

The split air conditioning system serving the teachers room is old and in poor condition. The system consists of a remote condensing unit and an indoor air handling unit with 600W electric duct heater. The unit is inefficient compared to today's high efficiency standards. The efficiency of the unit is estimated to be 10 SEER in cooling operation based on the age of the equipment. It is recommended to replace this system with a new 3-Ton split heat pump unit.

This ECM includes installation of a new split heat pump system to replace the existing 3-Ton system. The basis for the new high efficiency condensing unit and the air handling unit is Rheem model# RHLL 3-Ton split system with cooling efficiency of 15 SEER.

Energy Savings Calculations:

$$\text{Energy Usage} = \frac{\text{Cooling(Tons)} \times 12,000 \left(\frac{\text{Btu}}{\text{Ton hr}} \right) \times \text{Seasonal Cooling Hrs.}}{1000 \left(\frac{\text{Wh}}{\text{kWh}} \right) \times \text{SEER} \left(\frac{\text{Btu}}{\text{Wh}} \right)}$$

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

$$\text{Cooling Cost} = \text{Energy Usage(kWh)} \times \text{Ave Electric Cost} \left(\frac{\$}{\text{kWh}} \right)$$

$$\text{Electric Resistance Heating Energy (kWh)} = \frac{\text{Heating Capacity (kW)} \times \text{HDD}(\text{Day } ^\circ\text{F}) \times 24 \left(\frac{\text{Hr.}}{\text{Day}} \right)}{65(^{\circ}\text{F}) \times \text{Heating Efficiency}(\%)}$$

$$\text{Heat Pump Heating Energy (kWh)} = \frac{\text{Heating Capacity (kW)} \times \text{HDD}(\text{Day } ^\circ\text{F}) \times 24 \left(\frac{\text{Hr.}}{\text{Day}} \right)}{65(^{\circ}\text{F}) \times \text{Heating COP}}$$

$$\text{Heating Cost} = \text{Heating Energy(kWh)} \times \text{Ave Fuel Cost} \left(\frac{\$}{\text{kWh}} \right)$$

SPLIT A/C UNIT REPLACEMENT CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Unit with Electric Heat	High Efficiency Heat Pump Unit	
Cooling Capacity, Tons	3	3	
Efficiency (SEER)	10	15	
Heating Capacity, kW	0.6	0.6	
Heating System Efficiency	100%	-	
Heat Pump Efficiency (COP)	-	3.0	
Seasonal Cooling Hours	1200	1200	
Heating Degree Days (65°F)	4743	4743	
Annual Cooling Hours	1200	1200	
Elec Cost (\$/kWh)	\$0.138	\$0.138	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Cooling Energy Consumption, kWh	4320	2880	1,440
Cooling Demand, kW	3.6	2.4	1.2
Heating Energy Consumption, kWh	1051	350	701
Total Electric Energy (kWh)	5,371	3,230	2,141
Total Electric Demand (KW)	3.6	2.4	1.2
Electric Energy Cost (\$)	\$741	\$446	\$295
COMMENTS:	HDD based on KILG Airport, Wilmington, DE		

Installed cost for the new split unit is estimated to be \$10,000.

From the NJ Smart Start[®] Program appendix, the packaged unit's replacement falls under the category "Unitary HVAC and Split System" and warrants an incentive based on efficiency (SEER) at or above 14.0. The incentives are as follows:

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = (\text{AC Unit Tonnage} \times \$ 92/\text{Ton}) = (3 \times \$92) = \$276$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$10,000
NJ Smart Start Equipment Incentive (\$):	\$276
Net Installation Cost (\$):	\$9,724
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$295
Total Yearly Savings (\$/Yr):	\$295
Estimated ECM Lifetime (Yr):	15
Simple Payback	32.9
Simple Lifetime ROI	-54.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$4,431
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	(\$6,197.66)

ECM #6: Condensing Domestic Water Heater

Description:

The primary source for domestic hot water for the building is provided by one 80 gallon State natural gas water heater with a total 199.9 MBH natural gas input. The heater provides hot water for the restrooms, utility sinks and the kitchen. This water heater is past its useful service life and is less efficient than other available water heaters. Condensing water heaters provide substantially improved operating costs over standard efficiency water heaters. The thermal efficiency of condensing hot water heaters is approximately 95%.

This ECM includes installation of one condensing water heater to replace the existing water heater.

The basis for this ECM is the AO Smith condensing hot water heater model number BTH 150 to replace both of the existing tank style hot water heaters.

Energy Savings Calculations:

$$\text{Dom. HW Heat Consumption} = \left(\frac{\text{Gal}}{\text{Min}} \right) \times 8.33 \left(\frac{\text{lb}}{\text{Gal}} \right) \times \Delta T (^{\circ}\text{F}) \times \text{Time (Min)} \times \dots$$

$$(\# \text{ People}) \times \left(\frac{\text{Use}}{\text{Day/Person}} \right) \times 365 \left(\frac{\text{Days}}{\text{Yr}} \right)$$

$$\text{Dom. HW Gas Usage} = \frac{\text{Dom HW Heat Cons. (Btu)}}{\text{Heating Eff. (\%)} \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)}$$

$$\text{Gas Energy Cost} = \text{Heating Gas Usage (Therms)} \times \text{Ave Fuel Cost} \left(\frac{\$}{\text{Therm}} \right)$$

HIGH EFFICIENCY WATER HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Gas Fired Hot Water Heater	High Efficiency Condensing HW	-
Water Heater Efficiency (%)	80%	95%	15%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Annual Gas usage for DHW	2,968	-	
Annual DHW Production, kBTU	237,403	237,403	
Gas Cost (\$/Therm)	1.46	1.46	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	2,968	2,499	469
Energy Cost (\$)	\$4,333	\$3,649	\$684
COMMENTS:			

Cost, Rebates and Incentives

Typical installed cost for a condensing hot water heater is estimated to be \$11,000.

From the NJ Smart Start[®] Program appendix, the hot water heater installation falls under the category “Gas Water Heating” and warrants an incentive as follows:

Smart Start[®] Incentive: **\$2/MBH × Unit Capacity, MBH**
(Water Heaters > 50 Gallons, up to 300 MBH)

199 MBH x \$2/MBH = \$398

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$11,000
NJ Smart Start Equipment Incentive (\$):	\$398
Net Installation Cost (\$):	\$10,602
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$684
Total Yearly Savings (\$/Yr):	\$684
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.5
Simple Lifetime ROI	-3.2%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$10,261
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	(\$2,435.31)

ECM #7: Domestic HW Pipe Insulation

Description:

The insulation for the domestic water heater circulation line is partly damaged or missing. Exposed and un-insulated pipe pose potential hazard to the building occupants. In addition, un-insulated pipes lose energy and violate energy code. This ECM will help reduce the energy loss, provide energy code compliance and eliminate the potential hazard to the occupants.

Energy Savings Calculations:

The existing pipe size and lengths were estimated for this ECM and actual lengths and pipe size will need to be field verified before proceeding with this ECM. Bare copper pipe loss is based on ASHRAE 2009 – Table 16. Heat loss calculations results are listed in the table below.

PIPE INSULATION CALCULATIONS										
Nominal Pipe Size, In.	Length Feet	Heat Loss for 120°F Fluid Temp	% Uninsulated	Heat Loss, BTU/HR	Insulation ID, In.	1.5 thick Insulation OD, In.	Outer Surface Area, FT ²	Total Surface Area, FT ²	Insulated Heat Loss, BTU/H	Saved BTU/H
1	380	20.7	25%	1,967	1	4	0.09	8	1,378	589
1-1/2	40	28.5	25%	285	1.5	4.5	0.10	1	137	148
2	340	36.1	25%	3,069	2	5	0.11	9	1,166	1,903
TOTAL				5,320					2,681	2,639

Summary of calculations and impact on building energy consumption can be found in the table below.

PIPE INSULATION CALCULATIONS			
ECM INPUT	EXISTING	PROPOSED	SAVINGS
Total Heat Loss (BTU/Hr)	5,320	2,681	2,639
Water Heater Efficiency	80%	80%	
Hours of Operation	8760	8760	
Gas Cost (\$/Therm)	\$1.460	\$1.460	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Total Energy Loss, kBTU	46,603	23,484	23,119
Total Gas Consumption, Therms	583	294	289
Total Gas Cost, \$	\$851	\$429	\$422

The installation cost of the pipe insulation is \$3800.

There is no Smart Start® incentive for pipe insulation.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,800
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$3,800
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$422
Total Yearly Savings (\$/Yr):	\$422
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.0
Simple Lifetime ROI	66.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$6,330
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	\$1,237.81

ECM #8: Lighting Upgrade

Description:

The majority of the lighting at the middle school is 32 watt T-8 bulbs with electronic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. There are a few locations with incandescent lighting. The Gym utilizes 175 watt pendant mounted metal halide (MH) fixtures.

This ECM includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of the existing MH fixtures within the Gym to high output T-5 fixtures with electronic ballasts. High bay T-5 fixtures provide several advantages over the existing MH fixtures including; low lumen output loss, fast warm-up, and no color shifting with age. Since the lumen output remains constant over the life of the bulb, the T-5 fixtures can be designed with less input wattage than the existing metal halide fixtures further improving the overall efficiency of the light.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1,000 burn-hours.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the hours of operation, proposed retrofits, costs, savings, and payback periods for each set of fixtures in the each building.

From the **NJ Smart Start Incentive Appendix**, the replacement of a HID fixture to a T-5 or T-8 fixture warrants the following incentive: 175W HID to T-5, T-8 = \$43 per fixture

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\# \text{ of fixtures} \times \$ 43)$$

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (16 \text{ fixtures} \times \$ 43) = \$466$$

There is no Maintenance Savings for this ECM.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$22,028
NJ Smart Start Equipment Incentive (\$):	\$466
Net Installation Cost (\$):	\$21,562
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$6,441
Total Yearly Savings (\$/Yr):	\$6,441
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.3
Simple Lifetime ROI	348.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$96,615
Internal Rate of Return (IRR)	29%
Net Present Value (NPV)	\$55,330.24

ECM #9: 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 off when a room is left or on when a room is first occupied. This is common in 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 expected to be 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.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the “Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways,” document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control 20% - 28% energy savings.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors. The savings is estimated to be lower than the reference above because of the continuously occupied nature of a school setting.

This ECM includes replacement of standard wall switches with sensors wall switches for the offices, classrooms, cafeteria, etc. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$\text{Energy Savings} = (\% \text{ Savings} \times \text{Occupancy Sensored Light Energy (kWh/Yr)})$$

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

From the **NJ Smart Start[®] Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Occupancy Sensor Wall Mounted (existing facility only) = \$20 per sensor.

Occupancy Sensor Remote Mounted (existing facility only) = \$35 per sensor

$$\begin{aligned} \text{Smart Start}^{\circledast} \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (5 \times \$20) + (69 \times \$35) = \$2515 \end{aligned}$$

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$12,580
NJ Smart Start Equipment Incentive (\$):	\$2,515
Net Installation Cost (\$):	\$10,065
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,326
Total Yearly Savings (\$/Yr):	\$2,326
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.3
Simple Lifetime ROI	246.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$34,890
Internal Rate of Return (IRR)	22%
Net Present Value (NPV)	\$17,702.64

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 measures (REM) for the municipality utilizing renewable technologies and concluded that there is potential for solar energy generation. The solar photovoltaic system calculation summary will be concluded as **REM#1** within this report.

Solar Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are 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). 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 existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. A roof area of 3,200 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 45.08 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 59,232 KWh annually, reducing the overall utility bill by approximately 10.37% percent. A detailed financial analysis can be found in the **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.

The array system capacity was sized on available roof space on the existing facility. 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 Middle School 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:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	SIMPLE PAYBACK	SIMPLE ROI	INTERNAL RATE OF RETURN
Direct Purchase	14.04 Years	7.1%	5.5%

*The solar energy measure is shown for reference in the executive summary Renewable Energy Measure (REM) table

Given the large amount of capital required by the Middle School to invest in a solar system through a Direct Purchase CEG does not recommend the Middle School pursue this route. It

would be more advantageous for the Middle School 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 Middle School at a reduced rate compared to their existing electric rate.

Wind Generation

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.

Based on CEG's review of the applicability of wind energy for the facility, it was determined that the average wind speed is not adequate, proximity to residential neighborhoods, and limited site space make the Middle School Building a poor candidate for wind energy production. Additionally, the kilowatt demand for the middle school building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

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:

The electricity usage profile demonstrates both a winter heating and summer cooling load profile. Historical usage is relatively steady throughout the year with higher consumption in the winter months. The average monthly usage is 47,552kWh with an annual capacity obligation of 106.86kW and a transmission obligation of 104.47kW. Largest consumption months were November, and January through May.

The historical usage profile is very beneficial for competitive energy prices when shopping for alternative suppliers. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the Atlantic City Electric's BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. A base-load shaping (flat) will secure more competitive energy prices when procuring through an alternative energy source.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by similar summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer either a market based rate that is lower than the South Jersey Gas's BGSS rate or a hybrid product structure that allows for a firm, fixed price during the winter months (Nov-Mar) and market based rate for the summer months (April-Oct) are recommended.

Tariff Analysis:

Electricity:

The Middle School receives electric distribution service through Atlantic City Electric (AECO) on rate schedule's AGS (Annual General Service). The school is currently contracted with a Third Party Supplier (TPS) to provide electric commodity service. For electric supply (generation) service, the client has a choice to either use AECO's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The current BGS-FP average price to compare for AECO's AGS rate schedule is \$0.1161/kWh. Based upon the current third party supplier electric rate with South Jersey Energy, June 2009 – April 2010, the school is currently experiencing savings over the BGS-FP default rate with Atlantic City Electric

The utility, AECO will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity from. AECO's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, Market Transition, Transition Bond Charge, Non Utility Generation Charge, Societal Benefits Charge (SBC), Infrastructure Investment Charge, System Control Charge, Regulatory Assets Recovery Charge, and Regional Greenhouse Gas Initiative Charge.

Natural Gas:

The Middle School currently receives natural gas distribution service through South Jersey Gas (SJG) on rate schedule GSG (General Service Gas) and has contracted with Woodruff Energy, a Third Party Supplier (TPS) to provide firm natural gas commodity service. For natural gas supply service, the client has a choice to either use SJG's default service rate BGSS or contract with a Third Party Supplier (TPS) to supply natural gas.

SJG provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of monthly natural gas BGSS charges from SJG.

<http://www.southjerseygas.com/108/tariff/bgssrates.pdf>

The BGSS average price to compare for the same time period of bills received and analyzed fluctuated between \$0.4752/therm and \$.7791/therm. Based upon the current third party supplier's natural gas rate billed (\$1.205/therm & \$0.928/therm) by TPS Woodruff Energy, the facility accounts did not experience a savings over the BGSS default rate with SJG.

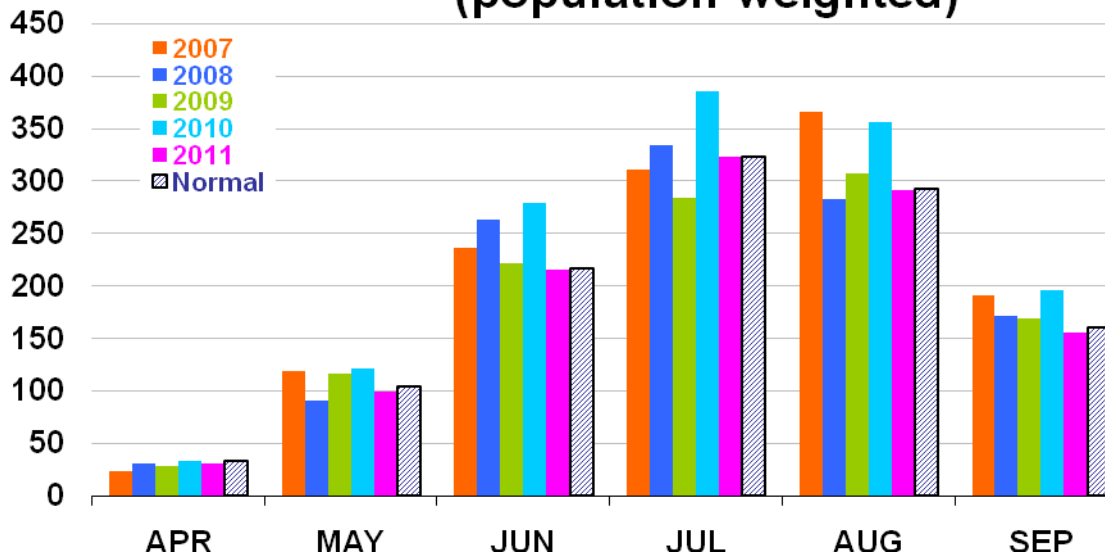
The utility, SJG is responsible for maintaining the existing network of underground pipes that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their natural gas from. SJG's delivery service rates includes the following charges: Customer Service Charge, Delivery Charge, Line Loss, and Applicable Riders that include: Societal Benefits Charge (SBC), Balancing Service Clause, Temperature Adjustment Clause, Conservation Incentive Program and Energy Efficient Tracker.

Electric and Natural Gas Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2010, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technicals and trader sentiment. This market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.

U.S. Summer Cooling Degree-Days (population-weighted)



Short Term Energy Outlook - US Energy Information Administration (12/07/2010):

U.S. Natural Gas Prices The Henry Hub spot price averaged \$3.71 per million Btu (MMBtu) during November, an increase of about 28 cents from October's price of \$3.43 per MMBtu). Over the winter heating season, the projected monthly average spot price peaks at \$4.29 per MMBtu in January 2011, before dropping back down to close to \$4.00 per MMBtu in June 2011. This month's Outlook slightly raises the average 2011 Henry Hub spot price to \$4.33 per MMBtu from last month's forecast of \$4.31 per MMBtu.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for February 2011 delivery (for the 5-day period ending December 2) averaged \$4.29 per MMBtu, and the average implied volatility over the same period was 45 percent. This produced lower and upper bounds for the 95-percent confidence interval for February 2011 contracts of \$3.06 per MMBtu and \$6.03 per MMBtu, respectively. At this time last year, the natural gas February 2010 futures contract averaged \$4.84 per MMBtu and implied volatility averaged 57 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$3.20 per MMBtu and \$7.34 per MMBtu

U.S. Electricity Consumption. EIA expects U.S. electricity consumption will rise slightly by 4.7 percent in 2010. Retail sales of electricity to the industrial sector from January through September 2010 were up by nearly 7 percent compared with the same period last year, about the same as the increase in the U.S. manufacturing production index. EIA's assumption of 3.6

percent growth in manufacturing output during 2011 translates to an expected growth in electricity sales to the industrial sector of about 1.7 percent. Improved economic conditions should also spur growth of 1.1 percent in retail electricity sales to the commercial sector.

However, EIA expects residential electricity sales to fall by 2.1 percent next year as summer temperatures return to normal levels after the hot summer of 2010. Overall, growth in total U.S. consumption of electricity remains nearly flat during 2011.

***U.S. Electricity Retail Prices.** The average U.S. retail price for electricity distributed to the residential sector during the first three quarters of 2010 was about the same as the retail price during the same period last year. However, residential electricity prices during the fourth quarter 2010 are expected to be 1.2 percent higher than last year. EIA expects the U.S. residential price to continue growing by 0.9 percent during 2011 as utilities pass through the higher fuel costs they incurred this past year to their retail customers.*

Recommendations:

1. CEG recommends an aggregated approach for 3rd party commodity supply procurement strategies for both electric and natural gas supply service. By aggregating the Middle School's facility with other schools in the County, the Middle School would continue to see a reduction in energy supply costs. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. Current market pricing is extremely low. Contracts due to expire in the near term would yield more favorable pricing than previously realized. It is important to aggregate usage where available and take advantage of these current market prices quickly, before energy increases.

The below recommendations presented by CEG are based on current information provided by the county for its utility usage, any savings presented with these recommendations are estimates only based on that information. It is recommended that further analysis and review of more recent utility data and any current 3rd party supply contracts be performed prior to performing any of the presented recommendations.

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the Middle School, in conjunction with the High School and Fenwick School utilize the advisement of 3rd party unbiased Energy Consulting Firm experienced in the aggregation of facilities and procurement of retail electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

- Budgets that reflect sound market intelligence
- An understanding of historical prices and trends
- Awareness of seasonal opportunities (e.g. shoulder months)
- Negotiation of fair contractual terms
- An aggressive, market based price

2. CEG recommends that the Middle School consider utilizing a third party utility billing-auditing service to further analyze historical utility invoices such as water, sewer, natural gas and electric for incorrect billings and rate tariff optimization services. This service could provide refunds on potential incorrect billings that may have been passed through by the utilities and paid by the school.

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 pay 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 that were audited as part of the NJ Clean Energy’s Local Government Energy Audit Program. 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 show 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%.
- v. *Direct Install Program* – The New Jersey Clean Energy’s Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 100 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 60% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures. Moreover, the program currently has a 100 kW maximum demand limit for applicability. This demand limit is capable of being waived if the School District is able to receive a portion of their respective Township Local Government’s American Recovery and Reinvestment Act (ARRA) funding towards energy efficiency improvements. Therefore, for facilities over the 100 kW maximum demand limit, such as Salem Middle School, the School District

will need to coordinate Direct Install efforts with the Township's Local Government.

- vi. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to \$50,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - <http://njcleanenergy.com/commercial-industrial/programs/eecbg-eligible-entities>. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

This incentive is provided in addition to the other NJ Clean Energy program funding. This program's incentive is considered the entity's capital and therefore can be applied to the LGEA program's requirements to implement the recommended energy conservation measures totaling at least 25% of the energy audit cost. Additional requirements of this program are as follows:

1. The entity must utilize additional funding through one or more of the NJ Clean Energy programs such as Smart Start, Direct Install, and Pay for Performance.
2. The EECBG funding in combination with other NJ Clean Energy programs may not exceed the total cost of the energy conservation measures being implemented.
3. Envelope measures are applicable only if recommended by the LGEA energy audit and if the energy audit was completed within the past 12 months.
4. New construction and previously installed measures are not eligible for the EECBG rebate.
5. Energy conservation measures eligible for the EECBG must fall within the list of approved energy conservation measures. The complete list of eligible measures and other program requirements are included in the "EECBG Complete Application Package." The application package is available on the NJ Clean Energy website - <http://njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants>.

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. Turn off or put to “sleep” all computers and ancillary desk plug in loads when not in use. Do not allow computers to sit idle in screen saver mode when not in use as this does not save energy.

XII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

- A. Cost Estimates noted within this report are based on industry accepted costing data such as RS MeansTM Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
- B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
- C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
 - a. operating hours
 - b. equipment type
 - c. control strategies
 - d. scheduling
- D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
- E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
- F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
- G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Salem City Middle School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * 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)	(\$)	(\$)
ECM #1	Premium Motor Upgrade	\$6,857	\$2,672	\$530	\$8,999	\$344	\$0	\$344	15	\$5,153	\$0	-42.7%	26.2	-6.28%	(\$4,897.60)
ECM #2	Window AC Replacement	\$3,703	\$0	\$0	\$3,703	\$289	\$0	\$289	10	\$2,890	\$0	-22.0%	12.8	-4.27%	(\$1,237.77)
ECM #3	Window AC Upgrade	\$5,530	\$3,840	\$414	\$8,956	\$534	\$0	\$534	15	\$8,004	\$0	-10.6%	16.8	-1.37%	(\$2,585.92)
ECM #4	H&V Unit Demand Control Ventilation	\$19,750	\$45,200	\$0	\$64,950	\$4,208	\$0	\$4,208	15	\$63,120	\$0	-2.8%	15.4	-0.36%	(\$14,715.17)
ECM #5	Split System Upgrade	\$10,000	\$0	\$276	\$9,724	\$295	\$0	\$295	15	\$4,431	\$0	-54.4%	32.9	-8.53%	(\$6,197.66)
ECM #6	Water Heater Upgrade	\$11,000	\$0	\$398	\$10,602	\$684	\$0	\$684	15	\$10,261	\$0	-3.2%	15.5	-0.41%	(\$2,435.31)
ECM #7	Domestic HW Pipe Insulation	\$1,900	\$1,900	\$0	\$3,800	\$422	\$0	\$422	15	\$6,330	\$0	66.6%	9.0	7.18%	\$1,237.81
ECM #8	Lighting Upgrade	\$22,028	\$0	\$466	\$21,562	\$6,441	\$0	\$6,441	15	\$96,615	\$0	348.1%	3.3	29.23%	\$55,330.24
ECM #9	Lighting Controls	\$12,580	\$0	\$2,515	\$10,065	\$2,326	\$0	\$2,326	15	\$34,890	\$0	246.6%	4.3	21.93%	\$17,702.64
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar PV 45.08 kW DC System	\$405,720	\$0	\$0	\$405,720	\$8,174	\$20,731	\$28,905	25	\$722,625	\$518,275	78.1%	14.0	5.04%	\$97,607.03

- Notes: 1) The variable C_n 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 C_n 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 February, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

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
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	\$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

Closed Loop & Open Loop	\$450 per ton, EER ≥ 16
	\$600 per ton, EER ≥ 18
	\$750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2004

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, AFUE ≥ 92%

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
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
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
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

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
Daylight Dimming - office	\$50 per fixture controlled

Premium Motors

Three-Phase Motors	\$45 - \$700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	\$40 per electronic communicated motor

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
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%



STATEMENT OF ENERGY PERFORMANCE

Salem City Middle School

Building ID: 2520602
For 12-month Period Ending: May 31, 2010¹
Date SEP becomes ineligible: N/A

Date SEP Generated: December 02, 2010

Facility
Salem City Middle School
51 New Market Street
Salem, NJ 08079

Facility Owner
Salem Board of Education
205 Walnut Street
Salem, NJ 08079

Primary Contact for this Facility
Will Royster
205 Walnut Street
Salem, NJ 08079

Year Built: 1912
Gross Floor Area (ft²): 101,800

Energy Performance Rating² (1-100) 55

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	1,948,525
Natural Gas (kBtu) ⁴	4,099,881
Total Energy (kBtu)	6,048,406

Energy Intensity⁵

Site (kBtu/ft ² /yr)	59
Source (kBtu/ft ² /yr)	106

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	515
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Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	62
National Average Source EUI	111
% Difference from National Average Source EUI	-5%
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 Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
520 S. Burnt Mill Rd.
Voorhees, NJ 08043

Notes:

- 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.
- 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.
- Values represent energy consumption, annualized to a 12-month period.
- 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.
- Values represent energy intensity, annualized to a 12-month period.
- 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) or a Registered Architect (RA) 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 or RA 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	<input checked="" type="checkbox"/>
Building Name	Salem City Middle School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	K-12 School	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	51 New Market Street, Salem, NJ 08079	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Middle School (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	101,800 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.		<input type="checkbox"/>
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.		<input type="checkbox"/>
Number of PCs	178 (Default)	Is this the number of personal computers in the K12 School?		<input type="checkbox"/>
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		<input type="checkbox"/>
Presence of cooking facilities	No	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".		<input type="checkbox"/>
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		<input type="checkbox"/>

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'.	Page 3 of 7 <input type="checkbox"/>
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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 (kWh (thousand Watt-hours)) Space(s): Middle School Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
05/01/2010	05/31/2010	55,440.00
04/01/2010	04/30/2010	55,440.00
03/01/2010	03/31/2010	54,840.00
02/01/2010	02/28/2010	50,280.00
01/01/2010	01/31/2010	50,640.00
12/01/2009	12/31/2009	42,960.00
11/01/2009	11/30/2009	53,280.00
10/01/2009	10/31/2009	45,600.00
09/01/2009	09/30/2009	44,040.00
08/01/2009	08/31/2009	43,680.00
07/01/2009	07/31/2009	37,800.00
06/01/2009	06/30/2009	37,080.00
Electric Consumption (kWh (thousand Watt-hours))		571,080.00
Electric Consumption (kBtu (thousand Btu))		1,948,524.96
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		1,948,524.96
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Natural Gas (therms) Space(s): Middle School		
Start Date	End Date	Energy Use (therms)
05/01/2010	05/31/2010	318.68
04/01/2010	04/30/2010	2,331.29
03/01/2010	03/31/2010	3,242.16
02/01/2010	02/28/2010	6,730.56
01/01/2010	01/31/2010	9,516.13
12/01/2009	12/31/2009	8,421.40
11/01/2009	11/30/2009	5,535.53
10/01/2009	10/31/2009	3,526.00
09/01/2009	09/30/2009	706.56
08/01/2009	08/31/2009	153.75

07/01/2009	07/31/2009	258.00
06/01/2009	06/30/2009	258.75
Natural Gas Consumption (therms)		40,998.81
Natural Gas Consumption (kBtu (thousand Btu))		4,099,881.00
Total Natural Gas Consumption (kBtu (thousand Btu))		4,099,881.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>

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 PE or RA 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. Page 6 of 7

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
Salem City Middle School
51 New Market Street
Salem, NJ 08079

Facility Owner
Salem Board of Education
205 Walnut Street
Salem, NJ 08079

Primary Contact for this Facility
Will Royster
205 Walnut Street
Salem, NJ 08079

General Information

Salem City Middle School	
Gross Floor Area Excluding Parking: (ft ²)	101,800
Year Built	1912
For 12-month Evaluation Period Ending Date:	May 31, 2010

Facility Space Use Summary

Middle School	
Space Type	K-12 School
Gross Floor Area(ft ²)	101,800
Open Weekends?	No
Number of PCs ^d	178
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	90
Percent Heated	100
Months ^o	12
High School?	No
School District ^o	Salem City

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 05/31/2010)	Baseline (Ending Date 05/31/2010)	Rating of 75	Target	National Average
Energy Performance Rating	55	55	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	59	59	49	N/A	62
Source (kBtu/ft ²)	106	106	87	N/A	111
Energy Cost					
\$/year	\$ 138,642.26	\$ 138,642.26	\$ 113,602.18	N/A	\$ 145,269.83
\$/ft ² /year	\$ 1.36	\$ 1.36	\$ 1.11	N/A	\$ 1.43
Greenhouse Gas Emissions					
MtCO ₂ e/year	515	515	422	N/A	540
kgCO ₂ e/ft ² /year	5	5	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.

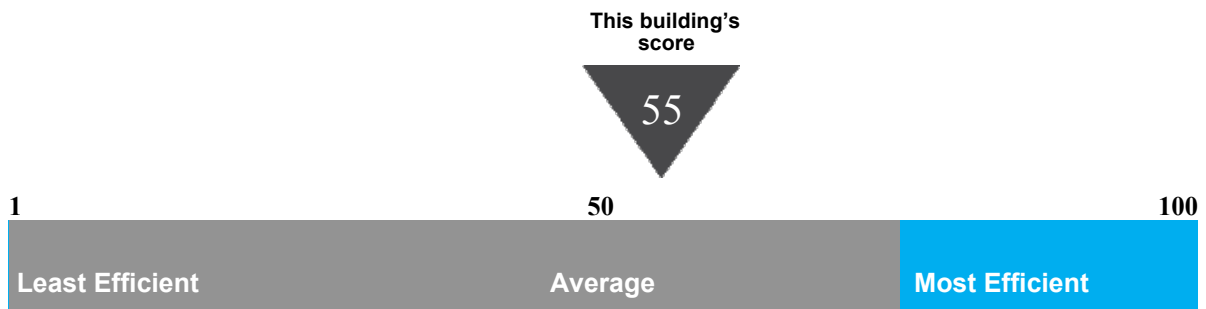
Statement of Energy Performance

2010

Salem City Middle School
51 New Market Street
Salem, NJ 08079

Portfolio Manager Building ID: 2520602

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 106 kBtu per square foot per year.*

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

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

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

Date of certification



MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - Middle School

Rooftop / AC Units

Tag	H&V-1	BC-	-
Unit Type	Indoor	Indoor	-
Qty	1	1	-
Location	Bsmt A-23	Storage	-
Area Served	Cafeteria	Teachers Rm	-
Manufacturer	Trane	Trane	-
Model #	CC08108L08VB	BHSC3B	-
Serial #	K81821825	169-0458-2A	-
Cooling Type	-	-	-
Cooling Capacity (Tons)	-	3	-
Cooling Efficiency (SEER/EER)	-	10 SEER	-
Heating Type	HW	Electric Duct Heater	-
Heating Input (MBH)	214.69 (180°F/140°F at 21.44 GPM) est.	600 W	-
Efficiency	-	-	-
Fuel	230/3/60	Electric Duct Heater	-
Approx Age	29	41	-
ASHRAE Service Life	15	15	-
Remaining Life	(14)	(26)	-
Comments	6000 cfm, 2 hp	BRASCH 208/1 Electric duct heater	-

Rooftop / AC Units

Tag	HP	HP	HP
Unit Type	Ductless Split Heat Pump - Indoor AHU	Ductless Split Heat Pump - Indoor AHU	Ductless Split Heat Pump - Indoor AHU
Qty	1	1	1
Location	Library (west)	Library (middle)	Library (east)
Area Served	Library	Library	Library
Manufacturer	Mitsubishi	Mitsubishi	Mitsubishi
Model #	MSY-A24NA	MSZ-D36NA	MSZ-D36NA
Serial #	7001976 T	8000312 T	8000323 T
Cooling Type	DX, R-410A	DX, R-410A	DX, R-410A
Cooling Capacity (Tons)	2	3	3
Cooling Efficiency (SEER/EER)	14.5 SEER	14.5 SEER	14.5 SEER
Heating Type	Heat pump	Heat pump	Heat pump
Heating Input (MBH)	15.2	22.8	22.8
Efficiency (HSPF)	8.2 HSPF	8.2 HSPF	8.2 HSPF
Fuel	Electric	Electric	Electric
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	HP/AHU mismatched.	Library has (2) clg. Mtd. UVs with hw and OA that don't work. Room is adequately heated. OA dampers are closed.	

Rooftop / AC Units

Tag	HP	HP	HP
Unit Type	Ductless Split Heat Pump - Outdoor HP	Ductless Split Heat Pump - Outdoor HP	Ductless Split Heat Pump - Outdoor HP
Qty	1	1	1
Location	Library (east)	Library (middle)	Library (west)
Area Served	Library	Library	Library
Manufacturer	Mitsubishi	Mitsubishi	Mitsubishi
Model #	MUZ-D36NA	MUZ-D36NA	MUZ-D36NA
Serial #	8001783 T	8001779 T	8001789 T
Cooling Type	DX, R-410A	DX, R-410A	DX, R-410A
Cooling Capacity (Tons)	2	3	3
Cooling Efficiency (SEER/EER)	14.5 SEER	14.5 SEER	14.5 SEER
Heating Type	Heat pump	Heat pump	Heat pump
Heating Input (MBH)	15.2	22.8	22.8
Efficiency	8.2 HSPF	8.2 HSPF	8.2 HSPF
Fuel	Electric 208/230/1/60	Electric 208/230/1/60	Electric 208/230/1/60
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	UV	AHU	CU
Unit Type	Clg Mtd Horizontal	Split System Air Handling Unit	Split system Condensing Unit
Qty	2	1	1
Location	Bsmt. Library	AHU in Bsmt South Storage, CU adj. to Gym entrance	AHU in Bsmt South Storage, CU adj. to Gym entrance
Area Served	Library	Basement	Grade Adj. to Gym Entrance
Manufacturer	Trane	York	York
Model #	Horiz Unit Ventilator	KEU090A33A	H1RA076S25H
Serial #	-	N0D7677924	WOC7547429
Cooling Type	N/A	DX, R-22	DX, R-22
Cooling Capacity (Tons)	N/A	7.5	6.5
Cooling Efficiency (SEER/EER)	N/A	-	10 SEER
Heating Type	HW	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	208/230/460-3-60	208/230/460-3-60
Approx Age	15 +	5	5
ASHRAE Service Life	15	15	15
Remaining Life	0	10	10
Comments	Library has (2) clg. Mtd. UVs with hw and OA that don't work. Room is adequately heated. OA dampers are closed.	1 1/2 hp fan mtr.	

Rooftop / AC Units

Tag	H&V -2	H&V 3	-
Unit Type	Indoor	Indoor	-
Qty	1	1	-
Location	Bsmt near rm A-2	Bsmt A-1	-
Area Served	Basement	Basement	-
Manufacturer	Trane	Trane	-
Model #	CCDB06AT0A	CCDB06AT0A	-
Serial #	K81A19013	K81A19012	-
Cooling Type	-	-	-
Cooling Capacity (Tons)	-	-	-
Cooling Efficiency (SEER/EER)	-	-	-
Heating Type	HW	HW	-
Heating Input (MBH)	182.62 (180°F/140°F at 18.24 GPM)	182.62 (180°F/140°F at 18.24 GPM)	-
Efficiency	-	-	-
Fuel	230/3/60	230/3/60	-
Approx Age	29	29	-
ASHRAE Service Life	15	15	-
Remaining Life	(14)	(14)	-
Comments	1 1/2 HP FAN MTR, 3000 cfm	1 1/2 HP FAN MTR, 3000 cfm	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	BSMT A4	Bsmt Office (A-1)	Bsmt A-7
Area Served	BSMT A4	Office adj to A-1	Bsmt A-7
Manufacturer	Electrolux	-	-
Model #	FAM186R2A	-	-
Serial #	KK84966370	-	-
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5		-
Cooling Efficiency (SEER/EER)	10.7 EER	-	-
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	-	-
Approx Age	2		
ASHRAE Service Life	10	10	10
Remaining Life	8		
Comments		Room Locked	Room Locked

Rooftop / AC Units

Tag	AC	UV	AC
Unit Type	WINDOW	Clg Mtd Horizontal	WINDOW
Qty	1	1	1
Location	Bsmt	Bsmt. A-10	Bsmt.
Area Served	A-8 Art	A-8 Art	Bsmt.
Manufacturer	General Electric	Trane	General Electric
Model #	AGM18DHG1	Horiz Unit Ventilator	AGM18DHG1
Serial #	GH001069	-	GH001419
Cooling Type	DX, R-22	N/A	DX, R-22
Cooling Capacity (Tons)	1.5	N/A	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	N/A	10.7 EER
Heating Type	-	HW	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	-	230/208-1-60
Approx Age	5	15	5
ASHRAE Service Life	10	10	10
Remaining Life	5	(5)	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Bsmt.	Bsmt.	Bsmt.
Area Served	Bsmt.	Bsmt.	Bsmt.
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGV05LJG1	AGM18DHG1
Serial #	GH001472	AL240039	GH001151
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	0.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	9.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	115/1/60	230/208-1-60
Approx Age	5	4	5
ASHRAE Service Life	10	10	10
Remaining Life	5	6	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Bsmt.	Bsmt.	Bsmt.
Area Served	Bsmt.	Bsmt.	Bsmt.
Manufacturer	General Electric	General Electric	General Electric
Model #	AGV18DHG1	AGV18DHG1	AGM18DHG1
Serial #	MH001340	FH000599	GH001073
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	3	5	5
ASHRAE Service Life	10	10	10
Remaining Life	7	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Bsmt.	Bsmt.	First Floor
Area Served	Bsmt.	Bsmt.	First Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGV18DHG1	AGV18DHG1	AGV18DHG1
Serial #	MH001324	MH001379	MH001330
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	3	5	5
ASHRAE Service Life	10	10	10
Remaining Life	7	5	5
Comments			

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor B-22
Manufacturer	General Electric	General Electric	Whirlpool
Model #	AGV18DAD1	AGV18DEG1	AGV18DHG1
Serial #	DT001755	DF020583	-
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	8.8 EER	9.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	2	5	5
ASHRAE Service Life	10	10	10
Remaining Life	8	5	10
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor B-18	First Floor
Manufacturer	General Electric	FRIGIDAIRE	General Electric
Model #	AGM18DHG1	-	-
Serial #	GH001667	-	GH001089
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	9.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	3	5	5
ASHRAE Service Life	10	10	10
Remaining Life	7	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor
Manufacturer	General Electric	General Electric	-
Model #	AGM18DHG1	AGM18DHG1	-
Serial #	GH001059	GH001099	-
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	10	10	10
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor B-34	First Floor	First Floor
Manufacturer	General Electric	General Electric	-
Model #	AGM18DHG1	AGM18DHG1	-
Serial #	AR417191	GH001422	-
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	10	10	10
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AVS10AAX1	AGM18DHG1	AGM18DHG1
Serial #	FG266624	GH001065	GH001468
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	1.5
Cooling Efficiency (SEER/EER)	9.0 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	115/1/60	230/208-1-60	230/208-1-60
Approx Age	18	5	5
ASHRAE Service Life	10	10	10
Remaining Life	(8)	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor
Manufacturer	Frigidaire	General Electric	Electrolux
Model #	-	AMV18DAM1	-
Serial #	-	ZF707357	-
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	8.8 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	5	19	5
ASHRAE Service Life	10	10	10
Remaining Life	5	(9)	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	ADV12A???	AGV18DDG1	AGV18DDG1
Serial #	AG273170	AD017925	AD018222
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.0	1.5	1.5
Cooling Efficiency (SEER/EER)	8.8 EER	9.7 EER	9.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	6	8	8
ASHRAE Service Life	10	10	10
Remaining Life	4	2	2
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor
Manufacturer	General Electric	Frigidaire	General Electric
Model #	AGM18DHG1	-	AGM18DHG1
Serial #	GH001517	-	GH001076
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.0 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-1-60	230/208-1-60	230/208-1-60
Approx Age	5	8	5
ASHRAE Service Life	10	10	10
Remaining Life	5	2	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	First Floor	First Floor	First Floor
Area Served	First Floor	First Floor	First Floor B-2
Manufacturer	-	General Electric	General Electric
Model #	??18WCL0	AGM18DHG1	AEM18DKG1
Serial #	??0700548	GH001101	FM885092
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	9.7 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230-1-60	230/208-1-60	230/208-1-60
Approx Age	3	5	3
ASHRAE Service Life	10	10	10
Remaining Life	7	5	7
Comments			

Rooftop / AC Units

Tag	H&V-4 & 5	EF	-
Unit Type	Indoor	Propeller Exhaust	-
Qty	2	4	-
Location	Gym	Gym	-
Area Served	Gym	Gym	-
Manufacturer	Trane	-	-
Model #	-	-	-
Serial #	-	-	-
Cooling Type	-	-	-
Cooling Capacity (Tons)	-	-	-
Cooling Efficiency (SEER/EER)	-	-	-
Heating Type	HW	-	-
Heating Input (MBH)	-	-	-
Efficiency		-	-
Fuel		-	-
Approx Age	15+	15 +	-
ASHRAE Service Life	15	15	-
Remaining Life	0	0	-
Comments		Assumed to be fractional horse power.	-

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	2	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	-	General Electric	General Electric
Model #	-	ASV18DKS1	-
Serial #	-	AM405369	AH010429
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	8.8 EER	9.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	19	3	5
ASHRAE Service Life	10	10	10
Remaining Life	(9)	7	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001470	GH001085	GH001103
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	?-1-60	?-1-60
Approx Age	5	5	5
ASHRAE Service Life	10	10	10
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001060	GH001421	GH001471
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	10	10	10
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AEM18DKG1
Serial #	-	GH001478	FM886510
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	5	5	3
ASHRAE Service Life	10	10	10
Remaining Life	5	5	7
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGM18DHG1	AGM18DHG1
Serial #	GH001200	GH001229	GH001209
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	10.7 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	5	5	5
ASHRAE Service Life	10	10	10
Remaining Life	5	5	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	WINDOW
Qty	1	1	1
Location	Second Floor	Second Floor	Second Floor
Area Served	Second Floor	Second Floor	Second Floor
Manufacturer	General Electric	General Electric	General Electric
Model #	AGM18DHG1	AGV18DAD1	AGM18DHG1
Serial #	GH001243	DT001749	GH001224
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	1.5
Cooling Efficiency (SEER/EER)	10.7 EER	8.8 EER	10.7 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	230/208-1-60	230/208-1-60
Approx Age	5	12	5
ASHRAE Service Life	10	10	10
Remaining Life	5	(2)	5
Comments			

Rooftop / AC Units

Tag	AC	AC	AC
Unit Type	WINDOW	WINDOW	Split System Condensing Unit
Qty	1	1	1
Location	Second Floor	Second Floor	Grade
Area Served	Second Floor	Second Floor	-
Manufacturer	General Electric	-	Carrier
Model #	AGV18DJG1	-	38ARZ008---511--
Serial #	AL223658	-	1809G200B2
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	1.5	1.5	7.5
Cooling Efficiency (SEER/EER)	9.7 EER	9.7 EER	10.6 EER
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	-	-	230/208-3-60
Approx Age	4	8	1
ASHRAE Service Life	10	10	15
Remaining Life	6	2	14
Comments			

Rooftop / AC Units

Tag	AC	AC	-
Unit Type	Split System Condensing Unit	Split System Condensing Unit	-
Qty	1	1	-
Location	Grade	Grade	-
Area Served	-	-	-
Manufacturer	Carrier	Mitsubishi	-
Model #	38ARZ008---511--	MUY-A24NA	-
Serial #	1709G30039	7004134T	-
Cooling Type	DX, R-22	DX, R-410A	-
Cooling Capacity (Tons)	7.5	2.0	-
Cooling Efficiency (SEER/EER)	10.6 EER	9.7 EER	-
Heating Type	-	-	-
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Fuel	230/208-3-60	-	-
Approx Age	1	6	-
ASHRAE Service Life	15	15	-
Remaining Life	14	9	-
Comments			-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - Middle School

Boilers

Tag	Boiler-1	Boiler 1 Burner	Boiler-2
Unit Type	Cast Iron Water Boiler	Natural Gas	Cast Iron Water Boiler
Qty	1	1	1
Location	Bsmt Mech Rm	Boiler 1	Bsmt Mech Rm
Area Served	MS Building	Boiler 1	MS Building
Manufacturer	Weil McLain	Power Flame	Weil McLain
Model #	788	WJ50A-15	788
Serial #	NJ9810456H	69619603	NJ9810457H
Input Capacity (MBH)	2,049	2,049	2,049
Rated Output Capacity (MBH)	1,632	1,632	1,632
Approx. Efficiency %	80%	80%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Approx Age	13	13	13
ASHRAE Service Life	30	21	30
Remaining Life	17	8	17
Comments	Taco 0012 circ pump	1/2 hp blower motor	Taco 0012 circ pump

Boilers

Tag	Boiler 2 Burner	Boiler-3	Boiler 3 Burner
Unit Type	Natural Gas	Cast Iron Water Boiler	Natural Gas
Qty	1	1	1
Location	Boiler 1	Bsmt Mech Rm	Boiler 1
Area Served	Boiler 1	MS Building	Boiler 1
Manufacturer	Power Flame	Weil McLain	Power Flame
Model #	WJ50A-15	788	WJ50A-15
Serial #	069619602	NJ9810458H	069619604
Input Capacity (MBH)	2,049	2,049	2,049
Rated Output Capacity (MBH)	1,632	1,632	1,632
Approx. Efficiency %	80%	80%	80%
Fuel	Natural Gas	Natural Gas	Natural Gas
Approx Age	13	13	13
ASHRAE Service Life	21	30	21
Remaining Life	8	17	8
Comments	1/2 hp blower motor	Taco 0012 circ pump	1/2 hp blower motor

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - Middle School

Domestic Water Heaters

Tag	WH-1	-	-
Unit Type	Tank	-	-
Qty	1	-	-
Location	Basement Janitor	-	-
Area Served	Building	-	-
Manufacturer	State	-	-
Model #	Turbo Sandblaster SBD81 154NE	-	-
Serial #	-	-	-
Size (Gallons)	81	-	-
Input Capacity (MBH/KW)	199 MBH	-	-
Recovery (Gal/Hr)	184 GPM @ 100°F	-	-
Efficiency %	80%	-	-
Fuel	Natural Gas	-	-
Approx Age	17	-	-
ASHRAE Service Life	12	-	-
Remaining Life	(5)	-	-
Comments	Fractional HP HW Circ pump	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City - Middle School

Pumps

Tag	HWP 1&2	HWP 3-7	HWP 8-10
Unit Type	IN-LINE LOOP PUMP	IN-LINE ZONE PUMP	Boiler Pump
Qty	2	4	3
Location	Bsmt Mech Rm	Bsmt Mech Rm	Bsmt Mech Rm
Area Served	Buliding	Zone	Boiler
Manufacturer	PACO	TACO	TACO
Model #	3VC184TTDR7356BT L	1636C3N3 6.4	0012-F4-1
Serial #	-	5-96	-
Horse Power	5	1 1/2	fractional
Flow	??? GPM @ ??FT HD	??? GPM @ ??FT HD	-
Motor Info	Marathon M/N 3VC184TTDR7356BT	Emerson m/n P63CJZ- 2739	-
Electrical Power	208-230/460	230/460	115/60/1
RPM	1740	1725	-
Motor Efficiency %	85.5%	84.0%	-
Approx Age	19	4	0.25
ASHRAE Service Life	10	10	10
Remaining Life	(9)	6	9.75
Comments	-	-	-

Investment Grade Lighting Audit

CEG Job #: 9C10083

Project: Salem Middle School

51 New Market St.

Salem NJ 08079

Bldg. Sq. Ft. 101,800

Salem Middle School

KWH COST: \$0.138

ECM #9: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	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
221.31	Classroom C1	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C2	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C3	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C4	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C5	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C6	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom C9	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C10	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C11	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C12	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C13	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C14	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
242.21	Girl's Restroom	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$76.78	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	\$70.32	\$28.00	\$56.00	0.02	46.8	\$6.46	8.67

Investment Grade Lighting Audit

221.31	Classroom C15	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C16	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C17	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.11	Teachers Lounge C18	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.62	1,612.0	\$222.46	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	\$179.40	\$14.00	\$140.00	0.12	312	\$43.06	3.25
242.21		2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$76.78	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	\$70.32	\$28.00	\$56.00	0.02	46.8	\$6.46	8.67
242.21	Boy's Restroom	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	941.6	\$129.94	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	862.4	\$119.01	\$28.00	\$56.00	0.02	79.2	\$10.93	5.12
221.31	Book Room	1200	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	595.2	\$82.14	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	480	\$66.24	\$14.00	\$112.00	0.10	115.2	\$15.90	7.05
221.31	Classroom C24	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C26	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
247.211	Women's Restroom	2600	1	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.07	176.8	\$24.40	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.211	Men's Restroom	2600	1	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.07	176.8	\$24.40	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Classroom C27	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C28	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C29	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C32	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	\$400.42	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	\$322.92	\$14.00	\$252.00	0.22	561.6	\$77.50	3.25
221.31	Classroom C33	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25

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221.31	Classroom C34	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom C35	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
222.21	3rd Floor Corridor	4400	48	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.98	13,094.4	\$1,807.03	48	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.40	10560	\$1,457.28	\$14.00	\$672.00	0.58	2534.4	\$349.75	1.92
222.21	Guidance B25	2600	9	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.56	1,450.8	\$200.21	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	1170	\$161.46	\$14.00	\$126.00	0.11	280.8	\$38.75	3.25
222.21	Auditorium	1300	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	967.2	\$133.47	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	780	\$107.64	\$14.00	\$168.00	0.14	187.2	\$25.83	6.50
736	Gym	3000	16	1	175w MH, Pendant Mnt., Prismatic Lens	210	3.36	10,080.0	\$1,391.04	16	3	1x4, 3 Lamp, 54w T5HO Fixture	176	2.82	8448	\$1,165.82	\$220.00	\$3,520.00	0.54	1632	\$225.22	15.63
625		3000	10	1	Industrial Fixture, 500w A19 Lamp	500	5.00	15,000.0	\$2,070.00	10	3	1x4, 3 Lamp, 54w T5HO Fixture	176	1.76	5280	\$728.64	\$220.00	\$2,200.00	3.24	9720	\$1,341.36	1.64
242.21	Gym Entrance	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$38.39	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	\$35.16	\$28.00	\$28.00	0.01	23.4	\$3.23	8.67
242.21	Men's Restroom	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$38.39	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	\$35.16	\$28.00	\$28.00	0.01	23.4	\$3.23	8.67
221.31	Storage	1200	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.19	223.2	\$30.80	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	180	\$24.84	\$14.00	\$42.00	0.04	43.2	\$5.96	7.05
242.21	Women's Restroom	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	\$38.39	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	\$35.16	\$28.00	\$28.00	0.01	23.4	\$3.23	8.67
651	Technology Office	2600	18	1	"Industrial" Relector, 26w CFL	26	0.47	1,216.8	\$167.92	18	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11		2600	7	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.75	1,947.4	\$268.74	7	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.69	1783.6	\$246.14	\$28.00	\$196.00	0.06	163.8	\$22.60	8.67
242.11	Technology Office	2600	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	\$230.35	6	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.59	1528.8	\$210.97	\$28.00	\$168.00	0.05	140.4	\$19.38	8.67
651	Storage/ Work Shop	2600	21	1	"Industrial" Relector, 26w CFL	26	0.55	1,419.6	\$195.90	21	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Classroom B2	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom B4	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom B5	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25

Investment Grade Lighting Audit

221.31	Classroom B6	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
221.31	Classroom B7	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	\$177.96	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	\$143.52	\$14.00	\$112.00	0.10	249.6	\$34.44	3.25
242.21	Boy's Restroom	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$76.78	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	\$70.32	\$28.00	\$56.00	0.02	46.8	\$6.46	8.67
221.31	Storage	1300	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	967.2	\$133.47	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	780	\$107.64	\$14.00	\$168.00	0.14	187.2	\$25.83	6.50
221.31	Classroom B10	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom B11	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
247.211	Nurse	2600	6	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.41	1,060.8	\$146.39	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Classroom B13	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom B14	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	\$311.44	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	\$251.16	\$14.00	\$196.00	0.17	436.8	\$60.28	3.25
221.31	Classroom B15	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom B16	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1,612.0	\$222.46	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	\$179.40	\$14.00	\$140.00	0.12	312	\$43.06	3.25
221.31	Classroom B17	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1,612.0	\$222.46	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	\$179.40	\$14.00	\$140.00	0.12	312	\$43.06	3.25
242.22	VP Office	2600	8	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	107	0.86	2,225.6	\$307.13	8	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.78	2038.4	\$281.30	\$28.00	\$224.00	0.07	187.2	\$25.83	8.67
221.31	Attendance Office	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Principal's Office	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
221.31	Classroom B28	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25

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221.31	Classroom B29	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	\$400.42	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	\$322.92	\$14.00	\$252.00	0.22	561.6	\$77.50	3.25
221.31	Classroom B31	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	\$400.42	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	\$322.92	\$14.00	\$252.00	0.22	561.6	\$77.50	3.25
221.31	Classroom B33	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
211.11	Classroom B34	2600	12	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.40	1,029.6	\$142.08	12	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.30	780	\$107.64	\$7.00	\$84.00	0.10	249.6	\$34.44	2.44
211.11	Classroom B32	2600	12	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.40	1,029.6	\$142.08	12	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.30	780	\$107.64	\$7.00	\$84.00	0.10	249.6	\$34.44	2.44
222.21	Boy's Restroom	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	\$44.49	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$35.88	\$14.00	\$28.00	0.02	62.4	\$8.61	3.25
222.21	2nd Floor Corridor	4400	52	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	3.22	14,185.6	\$1,957.61	52	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.60	11440	\$1,578.72	\$14.00	\$728.00	0.62	2745.6	\$378.89	1.92
242.21	Office A2	2600	10	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.07	2,782.0	\$383.92	10	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.98	2548	\$351.62	\$28.00	\$280.00	0.09	234	\$32.29	8.67
242.21	Resource Room A4	2600	10	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.07	2,782.0	\$383.92	10	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.98	2548	\$351.62	\$28.00	\$280.00	0.09	234	\$32.29	8.67
327.23	Library A6	2600	52	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	1.61	4,191.2	\$578.39	52	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Health Office A3	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1,612.0	\$222.46	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	\$179.40	\$14.00	\$140.00	0.12	312	\$43.06	3.25
221.31	Operations Room A5	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	\$400.42	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	\$322.92	\$14.00	\$252.00	0.22	561.6	\$77.50	3.25
221.31	Weight Room	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	\$400.42	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	\$322.92	\$14.00	\$252.00	0.22	561.6	\$77.50	3.25
242.21	Art Room A10	2600	14	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.50	3,894.8	\$537.48	14	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.37	3567.2	\$492.27	\$28.00	\$392.00	0.13	327.6	\$45.21	8.67
221.31	Storage	1200	7	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.43	520.8	\$71.87	7	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.35	420	\$57.96	\$14.00	\$98.00	0.08	100.8	\$13.91	7.05
222.21	BSI Office A14	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25

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222.21	Health A18	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	1,934.4	\$266.95	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	\$215.28	\$14.00	\$168.00	0.14	374.4	\$51.67	3.25
222.21	Coaches Office A24	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	967.2	\$133.47	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	\$107.64	\$14.00	\$84.00	0.07	187.2	\$25.83	3.25
222.21	Lunch ISS A26	2600	15	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	2,418.0	\$333.68	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	\$269.10	\$14.00	\$210.00	0.18	468	\$64.58	3.25
221.31	Music A28	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	\$333.68	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	\$269.10	\$14.00	\$210.00	0.18	468	\$64.58	3.25
242.22	Music A30	2600	21	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	107	2.25	5,842.2	\$806.22	21	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	2.06	5350.8	\$738.41	\$28.00	\$588.00	0.19	491.4	\$67.81	8.67
222.21	Cafeteria A40	2600	46	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.85	7,415.2	\$1,023.30	46	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.30	5980	\$825.24	\$14.00	\$644.00	0.55	1435.2	\$198.06	3.25
242.21	Kitchen A50	2600	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.93	5,007.6	\$691.05	18	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.76	4586.4	\$632.92	\$28.00	\$504.00	0.16	421.2	\$58.13	8.67
221.34	Boiler Room	4400	10	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.62	2,728.0	\$376.46	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	2200	\$303.60	\$14.00	\$140.00	0.12	528	\$72.86	1.92
221.34	Electrical Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.12	74.4	\$10.27	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	\$8.28	\$14.00	\$28.00	0.02	14.4	\$1.99	14.09
222.21	Basement Corridor	4400	48	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.98	13,094.4	\$1,807.03	48	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.40	10560	\$1,457.28	\$14.00	\$672.00	0.58	2534.4	\$349.75	1.92
221.11	Stairwells	4400	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.80	7,911.2	\$1,091.75	29	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.45	6380	\$880.44	\$14.00	\$406.00	0.35	1531.2	\$211.31	1.92
735	Exterior	4400	4	1	175w Mercury Vapor Area Light	210	0.84	3,696.0	\$510.05	4	1	150w MH Pulse Start Wallpack	168	0.67	2956.8	\$408.04	\$220.00	\$880.00	0.17	739.2	\$102.01	8.63
725		4400	3	1	150w HPS Wallpack	188	0.56	2,481.6	\$342.46	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
710		4400	2	1	100w HPS Wallpack	125	0.25	1,100.0	\$151.80	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
730		4400	3	1	150w MH Flood	188	0.56	2,481.6	\$342.46	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
725	Gym Entrance - Exterior Center Fixture	4400	1	1	150w HPS Wallpack	188	0.19	827.2	\$114.15	1	0	Remove Fixture - Install Blank	0	0.00	0	\$0.00	\$0.00	\$0.00	0.19	827.2	\$114.15	0.00
Totals			602	215			80.52	234,544	\$32,367	1,147	199		60.1	173,562	\$23,952		\$22,028	15.8	46,677	\$6,441	3.42	

CEG Job #: 9C10083
 Project: Salem Middle School
 Address: 51 New Market St.
 Salem NJ 08079
 Building SF: 101,800

Salem Middle School

KWH COST: \$0.138

ECM #10: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
221.31	Classroom C1	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C2	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C3	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C4	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C5	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C6	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom C9	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C10	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C11	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C12	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C13	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C14	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
242.21	Girl's Restroom	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	556.4	\$76.78	2	0	No Change	107	0.21	0%	556.4	\$76.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Classroom C15	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C16	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99

221.31	Classroom C17	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.11	Teachers Lounge C18	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.62	1612	\$222.46	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	\$200.21	\$160.00	\$160.00	0.06	161.2	\$22.25	7.19
242.21		2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	556.4	\$76.78	2	0	No Change	107	0.21	0%	556.4	\$76.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Boy's Restroom	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	941.6	\$129.94	2	0	No Change	107	0.21	0%	941.6	\$129.94	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Book Room	1200	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	595.2	\$82.14	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	535.68	\$73.92	\$160.00	\$160.00	0.05	59.52	\$8.21	19.48
221.31	Classroom C24	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C26	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
247.211	Women's Restroom	2600	1	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.068	176.8	\$24.40	1	0	No Change	68	0.07	0%	176.8	\$24.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
247.211	Men's Restroom	2600	1	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.068	176.8	\$24.40	1	0	No Change	68	0.07	0%	176.8	\$24.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Classroom C27	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C28	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C29	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C32	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	\$400.42	18	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	1.00	10%	2611.44	\$360.38	\$160.00	\$160.00	0.11	290.16	\$40.04	4.00
221.31	Classroom C33	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C34	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom C35	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
222.21	3rd Floor Corridor	4400	48	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.976	13094.4	\$1,807.03	48	0	No Change	62	2.98	0%	13094.4	\$1,807.03	\$160.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Guidance B25	2600	9	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.558	1450.8	\$200.21	9	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.50	10%	1305.72	\$180.19	\$160.00	\$160.00	0.06	145.08	\$20.02	7.99
222.21	Auditorium	1300	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.744	967.2	\$133.47	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	870.48	\$120.13	\$160.00	\$160.00	0.07	96.72	\$13.35	11.99

736	Gym	3000	16	1	175w MH, Pendant Mnt., Prismatic Lens	210	3.36	10080	\$1,391.04	16	2	Dual Technology Occupancy Sensor - Remote Mnt.	210	3.02	10%	9072	\$1,251.94	\$160.00	\$320.00	0.34	1008	\$139.10	2.30
625		3000	10	1	Industrial Fixture, 500w A19 Lamp	500	5	15000	\$2,070.00	10	2	Dual Technology Occupancy Sensor - Remote Mnt.	500	4.50	10%	13500	\$1,863.00	\$160.00	\$320.00	0.50	1500	\$207.00	1.55
242.21	Gym Entrance	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	278.2	\$38.39	1	0	No Change	107	0.11	0%	278.2	\$38.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Men's Restroom	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	278.2	\$38.39	1	0	No Change	107	0.11	0%	278.2	\$38.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Storage	1200	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.186	223.2	\$30.80	3	0	No Change	62	0.19	0%	223.2	\$30.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Women's Restroom	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	278.2	\$38.39	1	0	No Change	107	0.11	0%	278.2	\$38.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
651	Technology Office	2600	18	1	"Industrial" Relector, 26w CFL	26	0.468	1216.8	\$167.92	18	1	Dual Technology Occupancy Sensor - Remote Mnt.	26	0.42	10%	1095.12	\$151.13	\$160.00	\$160.00	0.05	121.68	\$16.79	9.53
242.11		2600	7	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.749	1947.4	\$268.74	7	1	Dual Technology Occupancy Sensor - Remote Mnt.	107	0.67	10%	1752.66	\$241.87	\$160.00	\$160.00	0.07	194.74	\$26.87	5.95
242.11		2600	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.642	1669.2	\$230.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.58	10%	1502.28	\$207.31	\$75.00	\$75.00	0.06	166.92	\$23.03	3.26
651	Storage/ Work Shop	2600	21	1	"Industrial" Relector, 26w CFL	26	0.546	1419.6	\$195.90	21	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	26	0.49	10%	1277.64	\$176.31	\$225.00	\$225.00	0.05	141.96	\$19.59	11.49
221.31	Classroom B2	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom B4	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom B5	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom B6	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
221.31	Classroom B7	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	\$177.96	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	\$160.17	\$160.00	\$160.00	0.05	128.96	\$17.80	8.99
242.21	Boy's Restroom	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	556.4	\$76.78	2	0	No Change	107	0.21	0%	556.4	\$76.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.31	Storage	1300	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	967.2	\$133.47	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	870.48	\$120.13	\$160.00	\$160.00	0.07	96.72	\$13.35	11.99
221.31	Classroom B10	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom B11	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99

247.211	Nurse	2600	6	4	2x2, 4 Lamp, 17w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	68	0.408	1060.8	\$146.39	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	68	0.37	10%	954.72	\$131.75	\$75.00	\$75.00	0.04	106.08	\$14.64	5.12
221.31	Classroom B13	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom B14	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	\$311.44	14	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.78	10%	2031.12	\$280.29	\$160.00	\$160.00	0.09	225.68	\$31.14	5.14
221.31	Classroom B15	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom B16	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1612	\$222.46	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	\$200.21	\$160.00	\$160.00	0.06	161.2	\$22.25	7.19
221.31	Classroom B17	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1612	\$222.46	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	\$200.21	\$160.00	\$160.00	0.06	161.2	\$22.25	7.19
242.22	VP Office	2600	8	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	107	0.856	2225.6	\$307.13	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.77	10%	2003.04	\$276.42	\$75.00	\$75.00	0.09	222.56	\$30.71	2.44
221.31	Attendance Office	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.67	10%	1740.96	\$240.25	\$75.00	\$75.00	0.07	193.44	\$26.69	2.81
221.31	Principal's Office	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.67	10%	1740.96	\$240.25	\$75.00	\$75.00	0.07	193.44	\$26.69	2.81
221.31	Classroom B28	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
221.31	Classroom B29	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	\$400.42	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	\$360.38	\$225.00	\$225.00	0.11	290.16	\$40.04	5.62
221.31	Classroom B31	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	\$400.42	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	\$360.38	\$225.00	\$225.00	0.11	290.16	\$40.04	5.62
221.31	Classroom B33	2600	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
211.11	Classroom B34	2600	12	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.396	1029.6	\$142.08	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	33	0.36	10%	926.64	\$127.88	\$160.00	\$160.00	0.04	102.96	\$14.21	11.26
211.11	Classroom B32	2600	12	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.396	1029.6	\$142.08	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	33	0.36	10%	926.64	\$127.88	\$160.00	\$160.00	0.04	102.96	\$14.21	11.26
222.21	Boy's Restroom	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	\$44.49	2	0	No Change	62	0.12	0%	322.4	\$44.49	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	2nd Floor Corridor	4400	52	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	3.224	14185.6	\$1,957.61	52	0	No Change	62	3.22	0%	14185.6	\$1,957.61	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21	Office A2	2600	10	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.07	2782	\$383.92	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	107	0.96	10%	2503.8	\$345.52	\$160.00	\$160.00	0.11	278.2	\$38.39	4.17

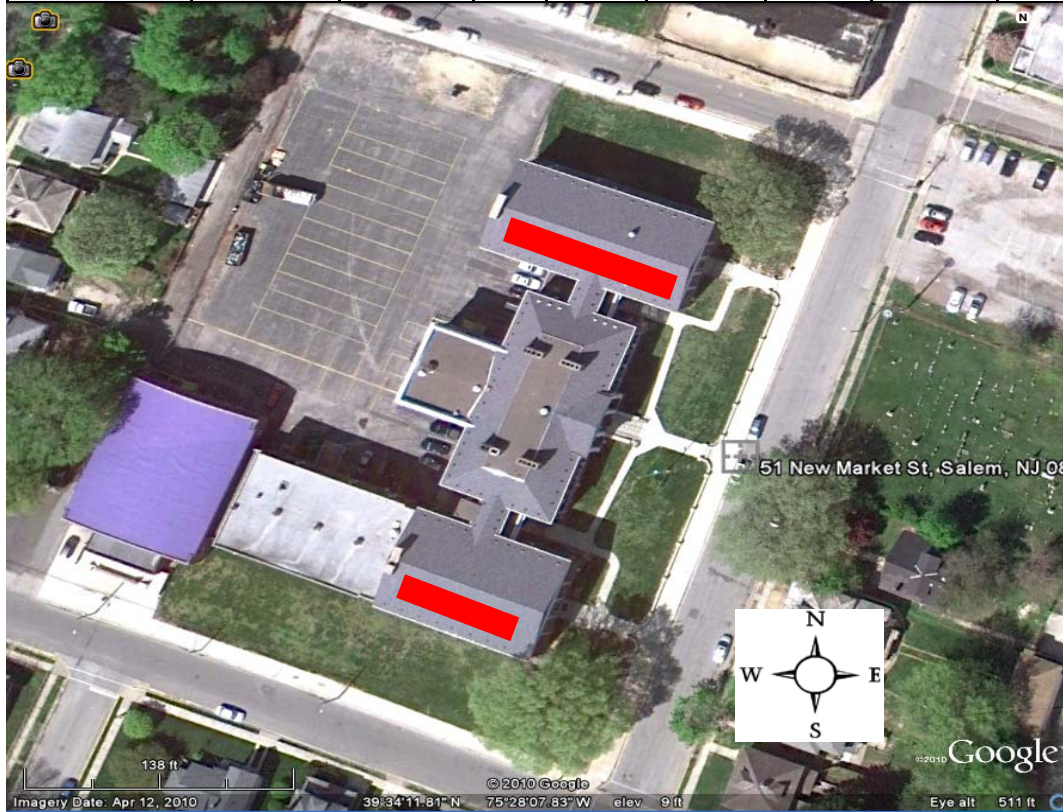
242.21	Resource Room A4	2600	10	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.07	2782	\$383.92	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	107	0.96	10%	2503.8	\$345.52	\$160.00	\$160.00	0.11	278.2	\$38.39	4.17
327.23	Library A6	2600	52	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	1.612	4191.2	\$578.39	52	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	31	1.45	10%	3772.08	\$520.55	\$225.00	\$450.00	0.16	419.12	\$57.84	7.78
221.31	Health Office A3	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1612	\$222.46	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	\$200.21	\$160.00	\$160.00	0.06	161.2	\$22.25	7.19
221.31	Operations Room A5	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	\$400.42	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	\$360.38	\$225.00	\$225.00	0.11	290.16	\$40.04	5.62
221.31	Weight Room	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	\$400.42	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	\$360.38	\$225.00	\$225.00	0.11	290.16	\$40.04	5.62
242.21	Art Room A10	2600	14	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.498	3894.8	\$537.48	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	107	1.35	10%	3505.32	\$483.73	\$225.00	\$225.00	0.15	389.48	\$53.75	4.19
221.31	Storage	1200	7	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.434	520.8	\$71.87	7	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.39	10%	468.72	\$64.68	\$160.00	\$160.00	0.04	52.08	\$7.19	22.26
222.21	BSI Office A14	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
222.21	Health A18	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.744	1934.4	\$266.95	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	\$240.25	\$160.00	\$160.00	0.07	193.44	\$26.69	5.99
222.21	Coaches Office A24	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.372	967.2	\$133.47	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.33	10%	870.48	\$120.13	\$160.00	\$160.00	0.04	96.72	\$13.35	11.99
222.21	Lunch ISS A26	2600	15	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	2418	\$333.68	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	\$300.32	\$225.00	\$225.00	0.09	241.8	\$33.37	6.74
221.31	Music A28	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	\$333.68	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	\$300.32	\$225.00	\$225.00	0.09	241.8	\$33.37	6.74
242.22	Music A30	2600	21	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	107	2.247	5842.2	\$806.22	21	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	107	2.02	10%	5257.98	\$725.60	\$225.00	\$225.00	0.22	584.22	\$80.62	2.79
222.21	Cafeteria A40	2600	46	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.852	7415.2	\$1,023.30	46	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	2.57	10%	6673.68	\$920.97	\$225.00	\$225.00	0.29	741.52	\$102.33	2.20
242.21	Kitchen A50	2600	18	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.926	5007.6	\$691.05	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	107	1.73	10%	4506.84	\$621.94	\$225.00	\$225.00	0.19	500.76	\$69.10	3.26
221.34	Boiler Room	4400	10	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.62	2728	\$376.46	10	0	No Change	62	0.62	0%	2728	\$376.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00

221.34	Electrical Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.124	74.4	\$10.27	2	0	No Change	62	0.12	0%	74.4	\$10.27	\$0.00	\$0.00	0.00	0	\$0.00	0.00
222.21	Basement Corridor	4400	48	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.976	13094.4	\$1,807.03	48	0	No Change	62	2.98	0%	13094.4	\$1,807.03	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.11	Stairwells	4400	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	1.798	7911.2	\$1,091.75	29	0	No Change	62	1.80	0%	7911.2	\$1,091.75	\$0.00	\$0.00	0.00	0	\$0.00	0.00
735	Exterior	4400	4	1	175w Mercury Vapor Area Light	210	0.84	3696	\$510.05	4	0	No Change	210	0.84	0%	3696	\$510.05	\$0.00	\$0.00	0.00	0	\$0.00	0.00
725		4400	3	1	150w HPS Wallpack	188	0.564	2481.6	\$342.46	3	0	No Change	188	0.56	0%	2481.6	\$342.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
710		4400	2	1	100w HPS Wallpack	125	0.25	1100	\$151.80	2	0	No Change	125	0.25	0%	1100	\$151.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
730		4400	3	1	150w MH Flood	188	0.564	2481.6	\$342.46	3	0	No Change	188	0.56	0%	2481.6	\$342.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00
725	Gym Entrance - Exterior Center Fixture	4400	1	1	150w HPS Wallpack	188	0.188	827.2	\$114.15	1	0	No Change	188	0.19	0%	827.2	\$114.15	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			602	215			80.5	234,544.2	\$32,367	1,147	76		7597	74.0		217,691.7	\$30,041.45		\$12,580	6.48	16,853	\$2,326	5.41

Project Name: LGEA Solar PV Project - Salem City Middle School										
Location: Salem, NJ										
Description: Photovoltaic System 95% Financing - 25 year										
Simple Payback Analysis										
		Photovoltaic System 95% Financing - 25 year								
Total Construction Cost	\$405,720									
Annual kWh Production	59,232									
Annual Energy Cost Reduction	\$8,174									
Annual SREC Revenue	\$20,731									
First Cost Premium:		\$405,720								
Simple Payback:		14.04 Years								
Life Cycle Cost Analysis										
Analysis Period (years):	25						Financing %:			95%
Financing Term (mths):	300						Maintenance Escalation Rate:			3.0%
Average Energy Cost (\$/kWh):	\$0.138						Energy Cost Escalation Rate:			3.0%
Financing Rate:	7.00%						SREC Value (\$/kWh):			\$0.350
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow	
0	\$20,286	0	0	0	\$0	0	0	(20,286)	0	
1	\$0	59,232	\$8,174	\$0	\$20,731	\$26,794	\$5,896	(\$3,785)	(\$24,071)	
2	\$0	58,936	\$8,419	\$0	\$20,628	\$26,367	\$6,323	(\$3,643)	(\$27,714)	
3	\$0	58,641	\$8,672	\$0	\$20,524	\$25,910	\$6,780	(\$3,494)	(\$31,208)	
4	\$0	58,348	\$8,932	\$0	\$20,422	\$25,420	\$7,270	(\$3,336)	(\$34,544)	
5	\$0	58,056	\$9,200	\$598	\$20,320	\$24,895	\$7,795	(\$3,768)	(\$38,312)	
6	\$0	57,766	\$9,476	\$595	\$20,218	\$24,331	\$8,359	(\$3,591)	(\$41,903)	
7	\$0	57,477	\$9,760	\$592	\$20,117	\$23,727	\$8,963	(\$3,405)	(\$45,308)	
8	\$0	57,190	\$10,053	\$589	\$20,016	\$23,079	\$9,611	(\$3,210)	(\$48,518)	
9	\$0	56,904	\$10,355	\$586	\$19,916	\$22,384	\$10,306	(\$3,005)	(\$51,523)	
10	\$0	56,619	\$10,665	\$583	\$19,817	\$21,639	\$11,051	(\$2,791)	(\$54,314)	
11	\$0	56,336	\$10,985	\$580	\$19,718	\$20,840	\$11,850	(\$2,567)	(\$56,882)	
12	\$0	56,054	\$11,315	\$577	\$19,619	\$19,984	\$12,706	(\$2,334)	(\$59,215)	
13	\$0	55,774	\$11,654	\$574	\$19,521	\$19,065	\$13,625	(\$2,089)	(\$61,305)	
14	\$0	55,495	\$12,004	\$572	\$19,423	\$18,080	\$14,610	(\$1,834)	(\$63,139)	
15	\$0	55,218	\$12,364	\$569	\$19,326	\$17,024	\$15,666	(\$1,569)	(\$64,708)	
16	\$0	54,942	\$12,735	\$566	\$19,230	\$15,891	\$16,799	(\$1,291)	(\$65,999)	
17	\$0	54,667	\$13,117	\$563	\$19,133	\$14,677	\$18,013	(\$1,003)	(\$67,002)	
18	\$0	54,394	\$13,510	\$560	\$19,038	\$13,375	\$19,315	(\$702)	(\$67,704)	
19	\$0	54,122	\$13,916	\$557	\$18,943	\$11,979	\$20,711	(\$389)	(\$68,093)	
20	\$0	53,851	\$14,333	\$555	\$18,848	\$10,481	\$22,209	(\$64)	(\$68,157)	
21	\$0	53,582	\$14,763	\$552	\$18,754	\$9,549	\$20,417	\$2,999	(\$65,157)	
22	\$0	53,314	\$15,206	\$549	\$18,660	\$7,717	\$16,801	\$8,799	(\$56,358)	
23	\$0	53,047	\$15,662	\$546	\$18,567	\$0	\$0	\$33,682	(\$22,676)	
24	\$0	52,782	\$16,132	\$544	\$18,474	\$0	\$0	\$34,062	\$11,387	
25	\$0	52,518	\$16,616	\$541	\$18,381	\$0	\$0	\$34,457	\$45,843	
Totals:	1,395,266	\$298,019	\$11,949	\$488,343	\$423,208	\$285,076	\$66,129	(\$23,677)	(\$1,126,580)	
Net Present Value (NPV)								2.8%		
Internal Rate of Return (IRR)										

Project Name: LGEA Solar PV Project - Salem City Middle School							
Location: Salem, NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$405,720						
Annual kWh Production	59,232						
Annual Energy Cost Reduction	\$8,174						
Annual SREC Revenue	\$20,731						
First Cost Premium	\$405,720						
Simple Payback:	14.04 Years						
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.138			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	\$405,720	0	0	0	\$0	(405,720)	0
1	\$0	59,232	\$8,174	\$0	\$20,731	\$28,905	(\$376,815)
2	\$0	58,936	\$8,419	\$0	\$20,628	\$29,047	(\$347,768)
3	\$0	58,641	\$8,672	\$0	\$20,524	\$29,196	(\$318,572)
4	\$0	58,348	\$8,932	\$0	\$20,422	\$29,354	(\$289,218)
5	\$0	58,056	\$9,200	\$598	\$20,320	\$28,922	(\$260,296)
6	\$0	57,766	\$9,476	\$595	\$20,218	\$29,099	(\$231,197)
7	\$0	57,477	\$9,760	\$592	\$20,117	\$29,285	(\$201,912)
8	\$0	57,190	\$10,053	\$589	\$20,016	\$29,480	(\$172,432)
9	\$0	56,904	\$10,355	\$586	\$19,916	\$29,685	(\$142,747)
10	\$0	56,619	\$10,665	\$583	\$19,817	\$29,899	(\$112,848)
11	\$0	56,336	\$10,985	\$580	\$19,718	\$30,123	(\$82,726)
12	\$0	56,054	\$11,315	\$577	\$19,619	\$30,356	(\$52,369)
13	\$0	55,774	\$11,654	\$574	\$19,521	\$30,601	(\$21,769)
14	\$0	55,495	\$12,004	\$572	\$19,423	\$30,856	\$9,087
15	\$0	55,218	\$12,364	\$569	\$19,326	\$31,121	\$40,208
16	\$0	54,942	\$12,735	\$566	\$19,230	\$31,399	\$71,607
17	\$0	54,667	\$13,117	\$563	\$19,133	\$31,687	\$103,294
18	\$0	54,394	\$13,510	\$560	\$19,038	\$31,988	\$135,282
19	\$0	54,122	\$13,916	\$557	\$18,943	\$32,301	\$167,583
20	\$0	53,851	\$14,333	\$555	\$18,848	\$32,626	\$200,210
21	\$1	53,582	\$14,763	\$552	\$18,754	\$32,965	\$233,175
22	\$2	53,314	\$15,206	\$549	\$18,660	\$33,317	\$266,491
23	\$3	53,047	\$15,662	\$546	\$18,567	\$33,682	\$300,174
24	\$4	52,782	\$16,132	\$544	\$18,474	\$34,062	\$334,236
25	\$5	52,518	\$16,616	\$541	\$18,381	\$34,457	\$368,693
Totals:	1,395,266	1,395,266	\$298,019	\$11,949	\$488,343	\$774,413	(\$380,629)
Net Present Value (NPV)						\$368,718	
Internal Rate of Return (IRR)						5.5%	

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
Salem City Middle School	3,200	Sunpower SPR230	196	14.7	2,882	45.08	59,232	6,468	15.64



██████████ .= Proposed PV Layout



Station Identification		Results			
City:	Atlantic_City	Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
State:	New_Jersey				
Latitude:	30.45° N	1	3.58	4211	5.81
Longitude:	74.57° W	2	4.17	4375	6.04
Elevation:	20 m	3	4.75	5322	7.34
PV System Specifications		4	5.23	5505	7.60
DC Rating:	45.1 kW	5	5.45	5790	8.00
DC to AC Derate Factor:	0.810	6	5.48	5393	7.44
AC Rating:	36.5 kW	7	5.55	5601	7.73
Array Type:	Fixed Tilt	8	5.30	5400	7.50
Array Tilt:	30.5°	9	5.21	5234	7.22
Array Azimuth:	190.0°	10	4.56	4864	6.71
Energy Specifications		11	3.54	3843	5.30
Cost of Electricity:	0.1 \$/kWh	12	3.14	3500	4.95
		Year	4.67	59232	81.74

Notes:

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