LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR: **SALEM CITY SCHOOL DISTRICT**

SALEM HIGH SCHOOL
219 WALNUT ST,
SALEM, NJ, 07079

ATTN: MR. WILL A. ROYSTER
DIRECTOR OF BUILDINGS & GROUNDS

PREPARED BY: **CONCORD ENGINEERING GROUP**

520 S. BURNT MILL ROAD
VOORHEES, NJ 08043
TELEPHONE: (856) 427-0200
FACSIMILE: (856) 427-6529
WWW.CEG-INC.NET

CEG CONTACT: **ERSIN GERCEK, PE, CEM**
LEAD MECHANICAL ENGINEER
EMAIL: EGERCEK@CEG-INC.NET

REPORT ISSUANCE: **FINAL, JANUARY 12, 2011**

PROJECT NO: **9C10083**

TABLE OF CONTENTS

REPORT DISCLAIMER

The information contained within this report, including any attachment(s), is intended solely for use by the named addressee(s). If you are not the intended recipient, or a person designated as responsible for delivering such messages to the intended recipient, you are not authorized to disclose, copy, distribute or retain this report, in whole or in part, without written authorization from Concord Engineering Group, Inc., 520 S. Burnt Mill Road, Voorhees, NJ 08043.

This report may contain proprietary, confidential or privileged information. If you have received this report in error, please notify the sender immediately. Thank you for your anticipated cooperation.

I. EXECUTIVE SUMMARY

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

Salem City High School
219 Walnut 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	$361,335
Total	$361,335

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 ± 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	Lighting Equipment Upgrade - Retrofits and Relamping	$31,487	$13,546	2.3	545.3%
ECM #2	Lighting Controls Upgrade – Occupancy Sensors	$14,070	$3,217	4.4	243.0%
ECM #3	Replace A-wing RTUs	$137,235	$18,408	7.5	101.2%
ECM #4	Upgrade Unit Ventilators	$364,500	$13,515	27.0	-44.4%
ECM #5	Demand Controlled Ventilation	$70,000	$4,565	15.3	-2.2%
ECM #6	Window Replacement	$192,000	$17,278	11.1	35.0%
ECM #7	Variable Kitchen Exhaust Controls	$29,500	$3,225	9.1	64.0%
ECM #8	Water Conservation Measures	$80,000	$3,544	22.6	-33.5%
ECM #9	Solar Domestic Hot Water Heating	$100,000	$10,129	9.9	51.9%
ECM #10	Geothermal Heat Pump System	$6,190,000	$60,344	102.6	-85.4%
ECM #11	VRF System with Energy Recovery	$5,700,000	$103,571	55.0	-72.7%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Solar PV Installation	$3,802,590	$280,550	13.6	10.7%

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

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

Table 2
Estimated Energy Savings Summary Table

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Equipment Upgrade - Retrofits and Relamping	34.5	87,472	0
ECM #2	Lighting Controls Upgrade – Occupancy Sensors	0	20,893	0
ECM #3	Replace A-wing RTUs	17.5	119,534	0
ECM #4	Upgrade Unit Ventilators	35	87,761	0
ECM #5	Demand Controlled Ventilation	0	29,644	0
ECM #6	Window Replacement	0	112,198	0
ECM #7	Variable Kitchen Exhaust Controls	0	20,941	0
ECM #8	Water Conservation Measures	0	12,955	0
ECM #9	Solar Domestic Hot Water Heating	0	65,774	0
ECM #10	Geothermal Heat Pump System	0	391,842	0
ECM #11	VRF System with Energy Recovery	0	672,536	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 Installation	342.2	556,647	0

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

- **ECM #1:** Lighting Equipment Upgrade - Retrofits and Relamping
- **ECM #2:** Lighting Controls Upgrade – Occupancy Sensors
- **ECM #3:** Replace A-wing RTUs
- **ECM #7:** Variable Kitchen Exhaust Controls
- **ECM #9:** Solar Domestic Hot Water Heating

Although ECM #5 does not provide a payback less than 10 years, it is recommended to take advantage of Demand Controlled Ventilation as suggested in ECM #5 (or equal) for the Cafeteria, Library, Lecture Hall and Auditorium, since the occupancy in these spaces vary drastically throughout the day.

ECM #1 Lighting Equipment Upgrade - Retrofits and Relamping

Some of the classrooms, corridors, cafeteria, kitchen, storage spaces, utility closets and bathrooms in the buildings have a variety of older fixtures with T12 lamps with magnetic ballasts or incandescent lamps. It is recommended to replace all of the T12 fixtures and the incandescent lights in these areas with higher efficiency fluorescent T8 fixtures with electronic ballasts or compact fluorescent lamps. In addition, this ECM includes replacement of the existing T8 lamps with new and more efficient 800 series T8 lamps. This ECM has a simple payback of 2.3 years.

ECM #2 Lighting Controls Upgrade - Occupancy Sensors

Lighting controls provide a simple and effective solution to the problem of lights being unnecessarily left on. Occupancy sensors alone provide fast payback since there is no retrofit needed for the existing lighting. The implementation of this ECM pays back in 4.4 years and therefore is recommended.

ECM #3 Replace A-wing RTUs

Two (2) rooftop units serving the A-wing core areas are over 15 years old and in poor condition. The units are inefficient compared to today's high efficiency standards due to age, outdated parts and controls. The units are equipped with electric resistance heating, which is one of the most expensive ways among space heating technologies. This ECM is based on new high efficiency heat-pump rooftop air conditioning units with total energy recovery wheels, enthalpy based air side economizer and premium efficiency motors. This ECM has a simple payback of 7.5 years.

ECM #7 Variable Kitchen Exhaust Controls

The kitchen in this facility is equipped with a large commercial kitchen exhaust hood, which runs throughout the day at constant speed. Installation of variable speed kitchen exhaust hood controls would significantly reduce the total kitchen exhaust and make-up air quantity. This ECM has a simple payback of 9.1 years and it is recommended for this facility.

ECM #9 Solar Domestic Hot Water Heating

Salem High School operates with a nearly year round demand for hot water production. The hot water is supplied by large electric water heaters. Electricity is one of the most expensive sources of domestic hot water production. Therefore, installation of a solar thermal hot water heating system is an economical option for offsetting the electricity usage and demand for this facility. This ECM has a simple payback of 9.9 years and it is recommended for this facility.

Renewable Energy Analysis

Renewable Energy Measures (REMs) were also reviewed for implementation at the Salem High School. CEG utilized a roof mounted solar array to house a substantial PV system. The recommended 422 kW PV system will produce approximately 556,647 kWh of electricity annually and will reduce the schools electrical consumption from the grid by 23.8%. The system's calculated simple payback of 13.6 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.

Operation and Maintenance Considerations

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. Maintain insulation on the hot water and refrigerant pipes.
6. Confirm that outside air economizers on the rooftop air handling units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

7. Check and confirm occupied and unoccupied temperature settings for each air conditioning unit and remove any overrides.

Retro-commissioning

Based on the survey and the discussions with the School District, the energy audit team strongly recommends Retro-Commissioning of this facility to meet the following objectives:

- Bring existing HVAC equipment to its proper operational state including air distribution systems
- Identify the location of the most comfort problems or trouble spots in the building
- Identify optimal locations for problematic temperature sensors and relocate if necessary
- Verify algorithms and setpoints for the economizer functionality on the air handling units
- Verify the installation and performance of identified system upgrades
- Address overall building energy use and demand and identify areas of highest energy use and demand
- Review current O&M practices
- Reduce energy use and energy costs
- Improve indoor air quality

Through the implementation of a Retro-Commissioning Plan, the School District will be able to continue with their vision of reducing energy usage and operating efficient facilities.

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.

Conclusion

Based on its Energy Star Rating, the Salem High School appears to be operating at a lower efficiency level compared to other schools in the region. With the implementation of the above recommended measures the Salem City BOE will realize significant energy savings at the Salem High School.

II. INTRODUCTION

The comprehensive energy audit covers the 142,841 square foot High School Building, which includes the following spaces: classrooms, offices, library, music room, wood shop, exercise room, gymnasium, bathrooms, storage spaces, mechanical spaces, kitchen and cafeteria.

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

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

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

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

ECM Calculation Equations:

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

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

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

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

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

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

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.

Electricity is the only major energy utility in this facility. The electric usage profile represents the actual electrical usage for the facility. The facilities receive electric distribution service through Atlantic City Electric Company on Monthly General Service rate structure. The 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 overall cost for utilities is calculated by dividing the total cost by the total usage. Based on the utility history provided, the average cost for utilities at this facility is as follows:

Description	Average
Electricity	15.4¢ / kWh

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Monthly General Service
Meter No: 35592478
Customer ID No: 0116 8119 9995
Third Party Utility SJ Energy Company
TPS Meter / Acct No: 011681199995

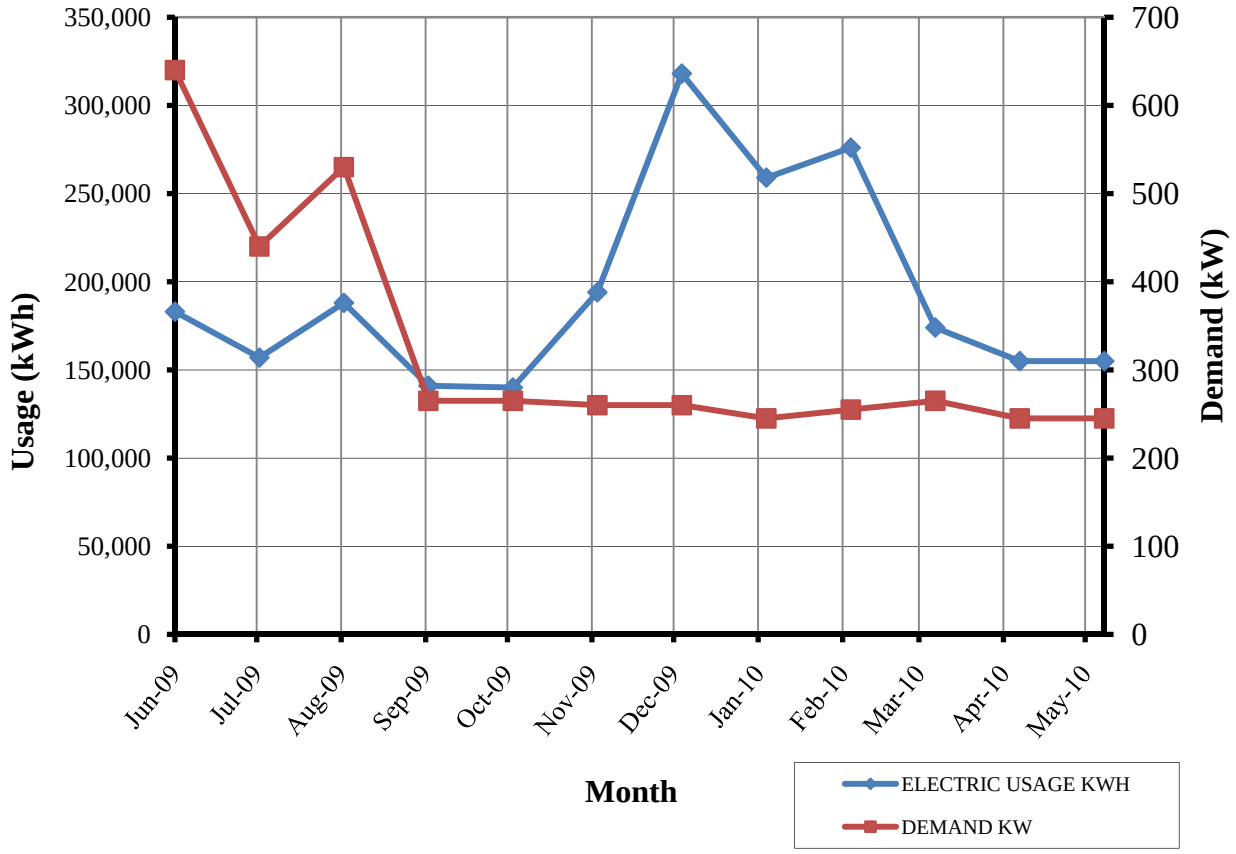
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
6/16	183,000	640	$29,659
7/17	157,000	440	$24,761
8/17	188,000	530	$29,909
9/17	141,000	265	$30,973
10/18	140,000	265	$20,918
11/18	194,000	260	$28,691
12/19	318,000	260	$46,352
1/19	259,000	245	$37,816
2/19	276,000	255	$40,405
3/22	174,000	265	$25,829
4/22	155,000	245	$23,011
5/23	*155,000*	*245*	*$23,011*
Totals	**2,340,000**	**640.0 Max**	**$361,335**

AVERAGE DEMAND **326.3 KW average**

AVERAGE RATE **$0.154** **$/kWh**

May 2010 usage estimated.

Figure 1
Electricity Usage Profile
Salem City High School
Electric Usage Profile
June-09 through May-10



B. Energy Use Index (EUI)

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

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

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

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

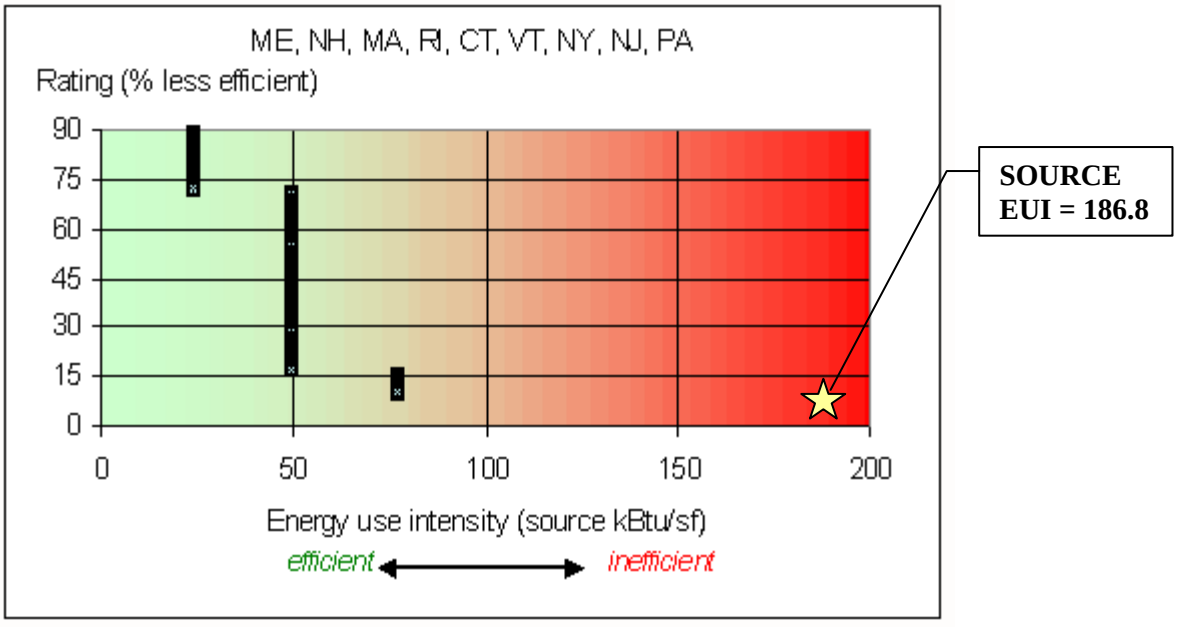
$$Building\ \ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio + Gas\ Usage\ in\ kBtu\ \ X\ \ SS\ \ Ratio)}{Building\ \ Square\ \ Footage}$$

Table 4
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	2,340,000			7,988,760	3.340	26,682,458
NATURAL GAS		0		0	1.047	0
FUEL OIL			0	0	1.010	0
PROPANE			0	0	1.010	0
TOTAL				7,988,760		26,682,458
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		142,841	SQUARE FEET			
BUILDING SITE EUI		*55.9*	kBtu/SF/YR			
BUILDING SOURCE EUI		*186.8*	kBtu/SF/YR			

Figure 2 below depicts a national EUI grading for the source use of High School Buildings.

Figure 2
Source Energy Use Intensity Distributions: High 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 5
ENERGY STAR Performance Rating

ENERGY STAR PERFORMANCE RATING		
FACILITY DESCRIPTION	**ENERGY PERFORMANCE RATING**	**NATIONAL AVERAGE**
Salem High School	29	50

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

V. FACILITY DESCRIPTION

The 142,841 SF High School Building is a single story facility comprised of classrooms, offices, computer rooms, gymnasium, auditorium, cafeteria, kitchen, maintenance areas and storage areas. Built in 1971, the facility forms a triangle with three structures forming the A, B and C wings of the school and a round structure in the middle forming the D wing. D wing connects three structures and housing offices and the auditorium.

Building Profile

The school hours of operation are typical for a school; between 7:30AM and 2:30 PM during the weekdays. This schedule coincides with the occupancy schedule for the building. The gymnasium, auditorium and cafeteria are used after hours and on weekends for sports and other events. The school is used in the summer for summer school, various classes and events. The school student enrollment is approximately 562 students and 50 staff.

Building Envelope

The original building is 12" block construction with minimal insulation and brick façade. The roof is a built up flat roof with estimated 2" rigid foam insulation below the rubber membrane. Rooftop air conditioners and the split air conditioning unit condensers are installed on the roof.

The majority of the windows throughout the facility are original to the building with a combination of fixed pane windows and small operable windows for ventilation. The windows have aluminum frames and single pane clear glass. Overall the windows for the building are in poor condition with significant leaks, cracks and draft issues.

All the entry ways to the high school building are designed with vestibules to reduce draft during operation. The entry ways are recently retrofitted with energy efficient doors and windows with double pane windows and insulated aluminum frames.

The school houses a commercial kitchen for breakfast and lunch service. The kitchen operating hours are between 5:30 AM and 2 PM. It includes electric cooking ranges, ovens and warmers, a commercial dishwasher, reach in refrigerators, a walk-in refrigerator and a walk in freezer. The walk-in units appear to be in good condition. There are six (6) refrigerated vending machines in the building, which operate year round.

HVAC Systems

The Salem High School does not have a central heating or air conditioning system. Since electricity is the only utility, the heating is provided to the building via electric resistance heating coils in the various types of heating, ventilation and air conditioning units.

The classrooms are heated and cooled with a total of approximately 28 unit ventilators made by Nesbitt. The unit ventilators are original to the building. Each unit ventilators is packaged with a 12kW electric heating coils for space heating and a 5-Ton air conditioning system for cooling and dehumidification in the classrooms. The units are equipped with outside air dampers for minimum fresh air requirements. The dampers are designed to shut during unoccupied periods.

The proper operation of the dampers could not be verified. Due to age of the equipment, it is expected that some of the units' dampers do not operate properly and stay open or shut regardless of the unit operation. The unit ventilators are approximately 29 years old, which is beyond the useful service life of this type of equipment.

Cooling for the core areas in the A and C wings are provided with four (4) roof top air conditioning units (RTUs). These units vary in size between 15 to 20 Tons. Two RTU's for the A wing are original equipment to the building made by York. There is minimal information about these units. Two RTU's for the C wing are relatively new units built in 2005 and 2007. All the rooftop units are equipped with 30 to 60 kW electric resistance pre-heat coils.

D wing cooling is provided with five (5) split air conditioning units. The condensers for the split units are located on the roof of the building. The split air handling units provide air conditioning for the auditorium, library, lecture hall area and general offices areas. The air handling units for these spaces are made by Nesbitt and original to the building. Each unit is equipped with electric air reheat coils.

B wing houses the gymnasium, cafeteria, kitchen, mechanical room and storage spaces. Air conditioning for the cafeteria is provided with two (2) 30 Ton split air conditioning systems. The split air handling units are original to the building while the condensing units are replaced approximately three (3) years ago with two (2) Carrier condensing units. The Gymnasium heating and ventilation (HV) is provided with four (4) ceiling hung HV units. Each unit is equipped with electric preheat coils. The capacity of each unit was not able to be verified during the audit. The kitchen is equipped with a make-up air unit with electric heating coil. The size of this unit is unknown.

In addition to the rooftop units, split units and the unit ventilators, there are electric unit heaters in various utility rooms, storage spaces and some of the corridors in the building. These units are equipped with on board thermostats for controls. Cooling for one of the computer server rooms is provided with a 2-Ton Mitsubishi ductless split air conditioner, which runs 24/7.

Exhaust System

Air is exhausted from the classrooms through the roof exhausters. The exhaust for the offices, bathrooms and the corridors in the interior areas in the A, B and C wings are provided with roof exhausters and the rooftop air conditioning units. The gymnasium has a set of dedicated exhaust fans, which are interlocked with the heating and ventilation units. The core building (D) exhaust is provided by the air handling units in the mezzanine such that a portion of the return air is exhausted through the air handling units. The exhaust fans operate based on the facility occupancy schedule.

The kitchen includes two (2) large commercial exhaust hoods, which provides exhaust for the cooking appliances and the dishwasher. The main hood is 8ft x 16ft and 4ft x 14ft and operates at constant speed between 5 AM and 2 PM. The dishwasher exhaust hood is approximately 6ft x 4ft and it only operates when the dishwasher is running. Both hoods are manually controlled with wall switches.

HVAC System Controls

The major HVAC systems in the facility are controlled through a Metasys Building Automation System (BAS) made by Johnson Controls. The system is integrated into the split air conditioning systems for the auditorium, general office areas, lecture room, library, cafeteria and the rooftop air conditioning units on the A and C Wings. The front end controller is designed to monitor and control the schedules and the temperature set points at these spaces. The BAS does not control or monitor the unit ventilators for the classrooms or the heating and ventilation units for the gymnasium.

During the survey, it was observed that the split air conditioning system for the lecture room was running at the cooling mode even though the space temperature was below 64°F. Retro-commissioning of the system is recommended to address possible programming and scheduling issues within the system. In addition, CEG recommends training of the facility staff for optimum operation of the BAS at this facility.

Domestic Hot Water

Domestic hot water for the restrooms, showers, laboratories and the offices are provided by two large, horizontal tank type electric hot water heaters made by Paterson Kelley. The hot water heater tanks are approximately 500 gallons in size. Each heater is equipped originally with a set of two electric heating elements with a total 180 kW electric resistance heating capacity. During the survey, one of the heating elements on the tank heater #1 was blanked off leaving the tank with half heating capacity. The domestic hot water is circulated throughout the building by a hot water circulation pump with fractional horsepower motor. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

Lighting

The majority of the lighting throughout facility has been retrofitted with fluorescent tube lay-in fixtures with modern T-8 lamps and electronic ballasts. Storage rooms, mechanical rooms and closets are lit with a mixture of incandescent lamps, compact fluorescent lamps and T12 fluorescent lamps. The gymnasium is lit with 6-lamp high bay fluorescent fixtures with T5 lamps and fixture-mounted occupancy sensors. The cafeteria lighting is provided with 500W incandescent lamps in globe 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: Lighting Upgrade – Retrofits and Re-lamping

Description:

The majority of the lighting throughout the Salem High School building is fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. CEG recommends, re-lamping all of the fixtures with 28W T8 lamps. In addition, some of the storage areas, locker room and gym areas, offices, auditorium, classrooms, restrooms and kitchen areas have a variety of older fixtures with T12 lamps with magnetic ballasts, incandescent lamps and incandescent exit signs. It is recommended to retrofit or replace all of the T12 fixtures and the incandescent lights in these areas with high efficiency fluorescent T8 fixtures with electronic ballasts or compact fluorescent lamps.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. The ECM also includes retrofit of all T12 fixtures with T8 fixtures with electronic ballasts in the building. The new, energy efficient T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts. This ECM also includes maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need approximately 33% less lamps replaced per year for each one for one fixture replaced.

The ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into existing fixtures, or hardwired into existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. In some locations the bulb replacement will need to be tested to make sure the larger base of the CFL will fit into the existing fixture. The energy usage of an incandescent compared to a compact fluorescent 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 1000 burn-hours.

However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

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.

Rebates and Incentives:

There are incentives available from NJ Smart Start® Program for the retrofits in this ECM. Incentives are calculated as follows:

From the Smart Start Incentive appendix, the retrofit of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamp) = $10 per fixture.

$$\text{SmartStart® Incentive} = (\#\text{ of } 1-4 \text{ lamp fixtures} \times \$10) = 41 \times \$10 = \$410$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacment \$ per lamp} + \text{Labor \$ per lamp})$$
$$\text{Savings} = 1.99 \times (\$2 \text{ per lamp} + \$5 \text{ per lamp}) = \$14$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$31,897
NJ Smart Start Equipment Incentive ($):	$410
Net Installation Cost ($):	$31,487
Maintenance Savings ($/Yr):	$14
Energy Savings ($/Yr):	$13,471
Total Yearly Savings ($/Yr):	$13,485
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.3
Simple Lifetime ROI	542.4%
Simple Lifetime Maintenance Savings	$209
Simple Lifetime Savings	$202,269
Internal Rate of Return (IRR)	43%
Net Present Value (NPV)	$129,491.44

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the school building are 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 and daylight sensors (The majority of the savings is expected to be after school hours when rooms are left with lights on)

This ECM includes installation of wall / ceiling type sensors for individual offices, classrooms, large bathrooms, and libraries. 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:

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

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

Cost and Incentives:

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) are as follows:

Dual Technology Occupancy Sensor - Remote Mount	$160 per installation
Dual Technology Occupancy Sensor - Switch Mount	$75 per installation
2 Pole Power Pack w/Dual Tech. Occupancy Sensor	$225 per installation

Cost includes material and labor.

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

Occupancy Sensor Fixture Mounted (existing facility only) = $20 per sensor
Occupancy Sensor Remote Mounted (existing facility only) = $35 per sensor

$$\text{Smart Start® Incentive} = (\#\text{ of wall mount} \times \$\,20) + (\#\text{of ceiling mount} \times \$35)$$
$$\text{Smart Start® Incentive} = (22\,\text{wall mount} \times \$\,20) + (59\,\text{ceiling mount} \times \$35) = \$2{,}505$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,575
NJ Smart Start Equipment Incentive ($):	$2,505
Net Installation Cost ($):	$14,070
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,217
Total Yearly Savings ($/Yr):	$3,217
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.4
Simple Lifetime ROI	243.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$48,262
Internal Rate of Return (IRR)	22%
Net Present Value (NPV)	$24,340.14

ECM #3: Replace A-wing Rooftop HVAC Units

There are a total of four (4) major rooftop units at the Salem High School. Two (2) of the units are located on the C-wing roof and they are relatively new units installed in 2005 and 2008. These are standard efficiency units with air side economizer functionality and electric resistance heating. Remaining two (2) rooftop air conditioners serving the A-wing are older and inefficient units.

Both of the A-wing rooftop units are over 15 years old and in poor condition. Equipment tags of the units were deteriorated or missing. Therefore the capacities of the units are estimated based on the C-wing units. Estimated cooling capacities of the units are 15 and 20 tons. Each unit is equipped with electric resistance heating coils. Due to age, outdated parts and controls, the units are inefficient compared to today's high efficiency standards. In addition, electric resistance heating is one of the most expensive ways among space heating technologies. There are currently a number of energy efficient alternatives for space heating with electricity as the main driver. This ECM is based on new high efficiency heat-pump rooftop air conditioning units with total energy recovery wheels, enthalpy based air side economizer and premium efficiency motors.

Heat pumps are similar to air conditioners except they can provide heating as well as cooling. Heat pumps can transport heat from lower temperature medium (outside in winter) to a higher temperature medium (interior space) by using a fraction of the energy that is transported. Energy recovery wheels are designed to recover the sensible and latent energy in the exhaust air stream and transfers it to fresh air stream. Air side economizers eliminates mechanical cooling and allow the system to provide 100% outside air into the building when the outside air is cool enough and the spaces call for cooling.

This ECM includes installation of two new heat pump rooftop air conditioning units to replace the existing A-wing rooftop units. The basis for the replacement units are RN-16 and RN-20 series high efficiency rooftop units made by AAON or similar Energy Star compliant premium efficiency rooftop heat pump units. Each unit shall be equipped with a total energy recovery wheel, enthalpy based outside air economizer, premium efficiency motors and high efficiency compressors with R410a refrigerant. Owner should retain a professional engineer to confirm heating and cooling loads prior to pursuing with this ECM.

Energy Savings Calculations:

The energy savings calculations are based on the energy analysis performed on the energy modeling software by Trane (Trace 700 ver. 6.2.6.5). The energy consumption of the baseline is compared to the proposed model to determine energy savings. The savings are applied to the average energy costs based on the facilities actual usage.

ROOFTOP UNIT REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Units RTU #1 & 2	New Air source Heat Pump RTUs	
Total Cooling Capacity (Tons)	35	35	
Total Heating Capacity (kW)	86	86	
Cooling Efficiency (EER)	8	12	
Energy Recovery	None	Enthalpy Wheel	
Air Side Economizer Base	Dry bulb Temperature	Enthalpy	
Facility Elec Usage (KWH)	2,338,117	2,218,583	119,534
Electric Cost ($/KWH)	$0.154	$0.154	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy Cost ($)	$360,070	$341,662	$18,408
Unit Demand (kW)	53	35	18
Total Energy Cost ($)	$360,070	$341,662	$18,408
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700).		

Estimated installed cost for one (1) 16 Ton and one (1) 20 Ton heat pump rooftop air conditioning units with enthalpy economizer, total energy recovery wheel and controls is 140,000.

From the NJ Smart Start® Program appendix, the packaged unit's replacement falls under the category "Unitary HVAC Systems" and warrants an incentive based on efficiency (EER) at or above 11.5 for units with capacity between 11.25 Ton and 20 Tons and efficiency (EER) at or above 10.5 for units with capacity between 20 Ton and 30. The incentives are as follows:

$$\text{SmartStart® Incentive} = (\text{AC Unit Tonnage} \times \$\,79/\text{Ton}) = (35 \times \$79) = \$2{,}765$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$140,000
NJ Smart Start Equipment Incentive ($):	$2,765
Net Installation Cost ($):	$137,235
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$18,408
Total Yearly Savings ($/Yr):	$18,408
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.5
Simple Lifetime ROI	101.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$276,124
Internal Rate of Return (IRR)	10%
Net Present Value (NPV)	$82,521.33

ECM #4: Install New Unit Ventilators

Description:

The heating and air conditioning for the Salem High School classrooms are provided by ITT Nesbitt unit ventilators, which are original to the building. The unit ventilators are well beyond their expected useful service life, which is fifteen (15) years per ASHRAE.

There are a total of 28 unit ventilators in the building. The units are packaged with 4-ton cooling modules and 12 kW electric resistance heating coils. Currently, the units are not controlled or monitored by the building management system and the units provide little controllability as the thermostats are mounted directly to the interior of each unit. This causes the unit's overall controllability and efficiency to be decreased.

Original energy efficiency of the units at cooling mode is 8 EER, which is well below today's standards for cooling. In addition, electric resistance heating is one of the most expensive ways among space heating technologies. There are currently a number of energy efficient alternatives for space heating with electricity as the main driver. This ECM is based on two (2) alternatives.

Alternative #1 – Heat Pump UVs

First alternative is new unit ventilators with air to air heat pumps. Heat pumps are similar to split air conditioners except they can provide heating as well as cooling. Heat pumps can transport heat from lower temperature medium (outside in winter) to a higher temperature medium (interior space) by using a fraction of the energy that is transported. The proposed retrofit is to replace one for one the existing unit ventilators. The new heat-pump unit ventilators will be fitted with electric backup heat, air-side economizer controls and optional CO2 sensors for demand control ventilation.

This alternative includes integration of the units with the building automation system, which will provide better temperature control, more fan speed modulation and accurate equipment scheduling. The basis for this ECM is the AAF Herman Nelson THPB048-M series heat pump unit ventilator, with electric backup heat.

Alternative #2 – Energy Recovery UVs

Second alternative is to install new unit ventilators with direct expansion cooling coils, remote condensing units, electric heating coils and built-in energy recovery wheel. The advantage of this setup is the relatively lower cost and utilization of the energy recovery system to reduce the electric resistance heating.

The alternative #2 also includes integration of the units with the building automation system. This will provide better temperature control, more fan speed modulation and accurate equipment scheduling. The basis for this ECM is Trane VUVE-1500 model unit ventilator with electric backup heat, ERSA0501 model Energy Recovery ventilators and 4-Ton high SEER condensing unit.

Energy Savings Calculations:

The energy savings calculations are based on the energy analysis performed on the energy modeling software by Trane (Trace 700 ver. 6.2.6.5). The energy consumption of the baseline is compared to the proposed model to determine energy savings. The savings are applied to the average energy costs based on the facilities actual usage.

Summary of input and output for the calculations can be found in the table below:

UNIT VENTILATOR CALCULATIONS			
ECM INPUTS	**EXISTING UNITS**	**ALTERNATIVE #1**	**ALTERNATIVE #2**
ECM INPUTS	Existing Unit Ventilators UVs	New Air source Heat Pump UVs	New DX UVs with ERVs
Number of Units	27	27	27
Total Cooling Capacity (Tons)	108	108	108
Total Heating Capacity (kW)	324 kW (est)	324 kW (est)	324 kW (est)
Cooling Efficiency (EER)	8	11	11
Heating COP	-	2	-
Energy Recovery	-	-	Yes (500 CFM)
Air Side Economizer	-	Enthalpy based	Enthalpy based
Facility Elec Usage (KWH)	2,338,117	2,266,289	2,250,356
Electric Cost ($/KWH)	$0.154	$0.154	0.154
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**ALTERNATIVE #1**	**ALTERNATIVE #2**
Total Energy Savings (kWh)	0	71,828	87,761
Total Demand Savings (kW)	130	94	94
Total Cost Savings($)	$0	$11,062	$13,515
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700) ERV: Energy Recovery Ventilation Demand savings based on 80% load		

Project cost, incentives and maintenance savings:

Total installed cost for 27 unit ventilators based on each alternative is summarized below:

COST AND SAVINGS SUMMARY		
ECM INPUTS	**ALTERNATIVE #1**	**ALTERNATIVE #2**
ECM INPUTS	New Air source Heat Pump UVs	New DX UVs with ERVs
Total Installed Cost per Unit	$18,000	$13,500
Total Installed Cost	$486,000	$364,500
Energy Savings	$11,062	$13,515
Pay back term	44	27

The selected equipment does not qualify for any of the NJ Smart Start rebates.

There is no significant maintenance savings associated to this ECM.

Energy Savings Summary:

Energy savings summary is based on Alternative #2 as follows:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$364,500
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$364,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$13,515
Total Yearly Savings ($/Yr):	$13,515
Estimated ECM Lifetime (Yr):	15
Simple Payback	27.0
Simple Lifetime ROI	-44.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$202,728
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	($203,156.49)

ECM #5: 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 save energy associated with treating ventilation air. 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 automate 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. Systems 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.

This ECM includes the installation of CO_2 sensors integrated into a demand control ventilation system, for the units serving the Cafeteria, Learning Center, Library and the Auditorium. 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 components for the DCV include damper actuators (if not exist), Variable Frequency Drives (if not exist), CO2 sensors, wiring, Energy Management System expansion and programming. Each occupied zone would require a minimum one CO_2 sensor installed to monitor occupancy levels.

IMPLEMENTATION SUMMARY				
INPUTS	**Service**	**Min # of CO2 SENSORS**	**HVAC UNIT**	**COOLING CAPACITY. TONS**
DCV-1	Cafeteria	2	HV-11	31
DCV-2	Auditorium	1	HV-7 #1	31
DCV-3	Auditorium	1	HV-7 #2	31
DCV-4	Learning Center	1	HV-9	21
DCV-5	Library	2	HV-10	21
Total				**135**

Energy Savings Calculations:

The energy savings calculations are based on the energy analysis performed on the energy modeling software by Trane (Trace 700 ver. 6.2.4). The baseline energy consumption is compared to the proposed model to determine energy savings. The savings are applied to the average energy costs based on the facilities actual usage.

ECM #5 DEMAND CONTROLLED VENTILATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	NO DCV	DCV	
Facility Total Elec Usage (KWH)	2,338,117	2,308,473	29,644
Electric Cost ($/KWH)	$0.154	$0.154	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy Cost ($)	$360,070	$355,505	$4,565
Total Energy Cost ($)	$360,070	$355,505	$4,565
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700).		

Cost and Incentives:

Estimated installed cost for demand controlled ventilation for the Cafeteria, Learning Center, Library and the Auditorium areas is $70,000. Estimated cost includes CO2 sensors, control wiring, electrical wiring, variable frequency drives, control system equipment expansion and programming. Majority of the units are already equipped with functional dampers.

There are currently no Smart Start ® incentives available for a Demand Control Ventilation System.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$70,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$70,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,565
Total Yearly Savings ($/Yr):	$4,565
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.3
Simple Lifetime ROI	-2.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$68,478
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($15,501.23)

ECM #6: Window Replacement

Description:

The majority of the windows throughout the facility are original to the building with a combination of fixed pane windows and small operable windows for ventilation. The windows have aluminum frames and single pane clear glass. Overall the windows for the building are in poor condition with significant leaks, cracks and draft issues. The windows account for significant energy use through leakage heat loss and conductive heat loss. The age and condition of the windows contribute to the leakage rate of the building. The single pane construction allows higher thermal (conductive) energy loss. These factors lead to increased energy use in the heating season. The heating loss due to single pane glass is combined with heat loss due to poor seals at each operable window.

New double pane windows with low E glazing offer a substantial improvement in thermal performance in the summer months. Since the High School occupancy is significantly reduced during majority of the cooling season, the energy savings due to the improved cooling performance is minimal. Although the energy savings is minimal the occupant comfort will be enhanced.

This ECM includes the replacement of all existing windows in the building with double pane windows and low emissivity glass. The proposed windows include reduced outside air leakage. In addition the double pane structure will significantly increase the insulation value compared to the existing single pane window structure. The basis for this ECM is Anderson Windows at $75 per SF of window installed.

Energy Savings Calculations:

$$\text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min.}}\right)=\frac{\text{Area}\left(\text{Ft}^2\right)\times\text{Ave Height}\left(\text{Ft}\right)\times\text{AirChanges Per Hour}\left(\frac{1}{\text{Hr.}}\right)}{60\left(\frac{\text{Min}}{\text{Hr.}}\right)}$$

$$\text{Heat Load}\left(\frac{\text{Btu}}{\text{Hr.}}\right)=1.1\times\text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min}}\right)\times\text{Design Temperature Difference}\left(^{\circ}\text{F}\right)$$

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

$$\text{Conductive Energy}\,(\text{kWh}) = \frac{\text{U}-\text{Value}\times\text{Area}(\text{Ft}^2)\times\text{HDD}(\text{Day}\,^\circ\text{F})\times 24\left(\frac{\text{Hr.}}{\text{Day}}\right)\times(0.60)}{65(^\circ\text{F})\times\text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{kWh}}\right)\times\text{Heating Efficiency}\,(\%)}$$

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

WINDOW REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Description:	Existing Windows (Single and double)	Double Pane Low-E Windows	
Affected Bldg Area (SF)	65,000	65,000	
Average Ceiling Height (Ft)	10	10	
Window (SF)	2,400	2,400	
U-Value (BTU/HR/SF*°F)	0.8	0.45	0.35
Average Leakage Rate (Air Changes per Hr)	1.0	0.6	0.4
Infiltration (CFM)	10,833	6,500	4,333
Design Day Temp Diff (°F)	65	65	
Infitration Heat Load (Btu/Hr)	774,583	464,750	309,833
Heating System Efficiency (%)	100%	100%	
Heating Degree Days (HDD)	4,743	4,743	
Hrs Per Day (Hrs)	24	24	
Electricity Cost ($/kWh)	0.154	0.15	
Electric Heat Value (BTU/kWh)	3,413	3,413	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Leakage Energy (kWh)	238,470	143,082	95,388
Conductive Energy (kWh)	38,422	21,612	16,810
Total Heating Energy (kWh)	276,892	164,695	112,198
Total Energy Cost ($)	$42,641	$25,363	$17,278
Comments:	1. Proposed window U-value Based on ASHRAE 90.1 - 2007		

Estimated cost for replacing all the windows at the Elementary School building is $192,000.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$192,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$192,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$17,278
Total Yearly Savings ($/Yr):	$17,278
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.1
Simple Lifetime ROI	35.0%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$259,177
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	$14,269.02

ECM #7: Commercial Kitchen Exhaust Hood Controls

Description:

The kitchen in this facility is equipped with a large commercial kitchen exhaust hood providing exhaust for the cooking equipment. The estimated total kitchen exhaust from the hoods is 10,000 CFM powered by 3 HP (total) of exhaust fans. The kitchen make-up air unit and the cafeteria air handling units provide conditioned air to replace all the air exhausted through the exhaust hood. This system operates based on manual switches located in the kitchen. Currently the facility provides 1 meal per day. The installation of kitchen exhaust controls would significantly reduce the total kitchen exhaust and make-up air quantity. The conditioned make up air and exhausted air savings are achieved by monitoring the exhaust hoods temperature and smoke level based on the actual use of the kitchen equipment. Temperature sensors and optical lasers monitor the heat and smoke production at each exhaust hood to reduce the exhaust and make-up airflow based on the need of the kitchen equipment.

This ECM includes installation of kitchen exhaust controls for the main kitchen exhaust hood and VFD's for the constant volume exhaust fans. The hoods would be retrofitted with temperature and laser sensors to monitor the activity of each of all equipment installed below the hoods. The work involves installing a Melink Kitchen Hood Variable Air Volume Controller; variable frequency drive on the kitchen hood exhaust fan; and turn off all the kitchen hood exhaust systems when the kitchen is closed. When the cooking appliances are turned on, the hood exhaust fan speed will increase based on the hood exhaust temperature. During heavy cooking, the kitchen hood exhaust fan increases to 100% speed until the smoke/vapor is removed. Energy savings are also realized when the kitchen equipment is operating at less than full load due to minimal cooking operations. During these times the fan speed decreases, removing only the necessary amount of air, saving exhaust fan energy and make up air conditioning energy.

Energy Calculations Summary:

Detailed calculations for the proposed kitchen hood control system can be found in the **Kitchen Exhaust Calculations Appendix.** It is pertinent to note that the calculation assumes the exhaust fans and make-up air unit are manually turned off for approximately 8 hours per day.

Installed cost of the kitchen hood control system is $29,500. The calculated energy savings equals approximately $3,225 per year. Currently, there are no incentives from the Smart Start program for motors smaller than 5 HP.

A summary of energy savings can be seen in the table below:

KITCHEN EXHAUST CONTROLS CALCULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Manually Controlled Kitchen Exhaust	MELINK Kitchen Exhaust Controls	
Fan Energy Usage (kWh)	4,136	1,554	2,582
Heating Energy Usage (kWh)	48,427	32,930	15,497
Cooling Energy Usage (kWh)	8,946	6,083	2,863
Electric Cost ($/KWH)	0.154	0.154	
SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Total Energy Usage (kWh)	61,509	40,568	20,941
Total Energy Cost ($)	$9,472	$6,247	$3,225
COMMENTS:	*ECM is based on calculations using spreadsheets privded by MELINK Intelli-hood controls manufacturer.		

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$29,500
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$29,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,225
Total Yearly Savings ($/Yr):	$3,225
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.1
Simple Lifetime ROI	64.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$48,373
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$8,998.59

ECM #8: Low Flow WC, Urinals and Faucets

Description:

The majority of the facility utilizes standard plumbing fixtures. The typical water closet and urinal water consumption only meet the minimum federally required standard for water efficiency. New fixtures are available that use less water than today's requirements and can add up to significant water reduction over a long period.

This ECM includes the replacement of the existing sink faucets, water closets and urinals within the bathrooms the facility. The estimated usage of the plumbing fixtures is based on the total population of the facility.

The proposed retrofit includes installation of auto flow sink faucets, low flow aerators, low flow flushometer style water closets that utilize 1.28 gallons per flush and ultra-low flushometer style urinals that utilize 1/8 gallons per flush. For the basis of this calculation the LEED rating system was used to estimate the occupancy usage for students within the school. This ECM does not include private bathrooms for teachers use and is based solely on the large public bathrooms used by the students. When water consumption information was not available, the GPF values were estimated for the existing fixtures.

Energy Savings Calculations:

Urinals and Toilets:

$$\text{Water Consumption} = \text{Occupancy}\left(\frac{\text{Days}}{\text{Yr}}\right) \times \text{Use}\left(\frac{\text{Flush}}{\text{Person per Day}}\right) \times \text{Fixture}\left(\frac{\text{Gal}}{\text{Flush}}\right)$$

Faucets:

$$\text{Water Consumption} = \text{Occupancy}\left(\frac{\text{Days}}{\text{Yr}}\right) \times \text{Use}\left(\frac{\text{Use}}{\text{Person per Day}}\right) \times \text{Use Time}\left(\frac{\text{Sec}}{\text{Use}}\right) \times \text{Fixture}\left(\frac{\text{Gal}}{\text{Min}}\right)$$

$$\text{Water Cost} = \frac{\text{Water Consumption (Gallons)} \times \text{Ave Cost}\left(\frac{\$}{1000\ \text{Gal}}\right)}{1000(\text{Gal})}$$

$$\text{Gas Cost (Therms)} = \text{Faucet Water Consumption (Gallons)} \times \frac{8.34\ \text{BTU}}{\text{Gal}} \times \frac{\text{Therm}}{100{,}000\ \text{BTU}}$$

WATER CONSERVATION CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Fixtures	Low Flow / Auto Flow Fixtures	-
Total Number of Students and Staff	612	612	-
% Male to Female	50%	50%	-
Estimated % Floor Area Served by Older Bathrooms	90%	90%	-
Occupied Days Per Year	210	210	-
Lavatory Uses per Day per Person	3	3	-
Sink flow time per use, sec	15	12	-
Sink Aerator Flow, GPM	1.5	0.5	-
WC Uses per Day per Person	2.0	2.0	-
Urinal Uses per Day per Person	1.0	1.0	-
Total Urinal Flushes Per Day	275	275	-
Total WC Flushes Per Day	551	550.8	-
Urinal Gallons Per Flush (GPF)	1.0	0.125	0.875
WC Gallons Per Flush (GPF)	1.6	1.28	0.32
**** Water Cost ($/1000 Gal)**	$8.00	$8.00	-
Electric Cost ($/kWh)	$0.154	$0.154	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Water Consumption, Urinal and WC (Gal)	242,903	155,284	87,619
Water Consumption, Faucets (Gal)	144,585	38,556	106,029
Total Water Consumption, (Gal)	387,488	193,840	193,648
Water Cost ($)	$3,100	$1,551	$1,549
Electric Consumption (kWh)	17,665	4,711	12,955
Electric Cost ($/Year)	$2,720	$725	$1,995
COMMENTS:	*Savings are based on LEED Reference Guide for Green Building Design and Construction - 2009 Edition for WC and Urinal water usage. ** Cost of Water estimated.		

The cost for installation of 39 water closets, 12 low flow urinals and 25 new auto flow sink faucets throughout the facility is estimated to be $80,000

There are no Smart Start rebates for installation of low flow plumbing fixtures.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$80,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$80,000
Maintenance Savings ($/Yr):	$1,549
Energy Savings ($/Yr):	$1,995
Total Yearly Savings ($/Yr):	$3,544
Estimated ECM Lifetime (Yr):	15
Simple Payback	22.6
Simple Lifetime ROI	-33.5%
Simple Lifetime Maintenance Savings	$23,238
Simple Lifetime Savings	$53,163
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($37,689.68)

ECM #9: Solar Domestic Hot Water System

Description:

Salem High School operates with a nearly year round demand for hot water production. The hot water is supplied by large electric water heaters. Electricity is one of the most expensive sources of domestic hot water production. Therefore, installation of a solar thermal hot water heating system is an economical option for offsetting the electricity usage and demand for this facility.

This ECM includes the installation of a solar thermal system to produce domestic hot water. The system includes solar thermal panels mounted over the roof of the B wing near the existing hot water heaters, piping distribution to the domestic hot water tanks, a pre-heat hot water heat exchanger and pumps for glycol distribution, and controls. The system features a pre-heat tank with the existing tanks still in place as a back-up means for hot water production to ensure no loss of hot water production. The calculations are based on Viesmann Flat Plat collectors model VITOSOL 200F or equivalent. The owner is recommended to retain a professional engineer to confirm equipment sizing and finalize design.

Energy Savings Calculations:

Existing Domestic Hot Water Parameters:

Ave Electricity Cost	= $0.154/kWh
Existing Domestic Water Heating Efficiency	= 100%
Estimated monthly domestic HW usage*	= 7,800 kWh

* Equals to 4% of total energy usage of the facility based on U.S. Energy Information Administration - EIA, Commercial Buildings Energy Consumption Survey, CBECs

Solar Thermal System Parameters:

See the **Solar Domestic Hot Water Heater Appendix** for detailed calculations.

Solar Thermal System Production: 65,774 kWh/Yr

* Assumed 50% of production utilized during July and August.

$$\text{Solar Sys Heat \%} = \frac{\text{Solar Heat}(\text{kWh})}{\text{DHW Load}(\text{kWh})}$$

Calculation results are summarized in the table below.

SOLAR THERMAL SYSTEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	HW Heaters	Solar Thermal Sys w/ HW Heaters	-
Annual DHW Load (kWh)	93,600	93,600	-
Ave Monthly Electricity Usage for DHW (kWh)	7,800	7,800	-
Hot Water Heating Efficiency (%)	100%	100%	-
Solar Thermal Sys. Production (kWh)	0	65,774	65,774
Solar Thermal Sys. Heat % of Baseline	0%	70.3%	70%
Cost of fuel ($/kWh)	$0.154	$0.154	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electricity Usage (kWh)	93,600	27,826	65,774
Energy Cost ($)	$14,414	$4,285	$10,129
COMMENTS:	This ECM is based on solar thermal hot water production from the solar thermal hot water calucation appendix. Average monthly DHW usage estimated based on statistical information (4% of the annual energy usage)		

Installed cost of the solar thermal system including panels, piping, equipment, heat exchanger, pumps, and controls is estimated to be $100,000.

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$100,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$100,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,129
Total Yearly Savings ($/Yr):	$10,129
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.9
Simple Lifetime ROI	51.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$151,939
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	$20,922.42

ECM #10: Geothermal (Ground Source) Heat Pump System Installation

Description:

The existing heating and cooling systems in the Salem High School consist of unitary direct expansion cooling systems with electric resistance heating. There is significant increase in electric usage in the heating season.

A geothermal heat pump system utilizes the ground as a heat sink to extract and reject heat depending on the season. Due to the large thermal mass provided by the ground, the HVAC equipment is able to take advantage of cooler temperatures is the summer and warmer temperatures in the winter compared to the ambient air. The benefits include substantial energy efficiency increase with respect to air source systems. In addition, no electrical resistance heat is required in the heating season also reducing electric usage. A geothermal system sized properly requires no additional heat production equipment (such as a boiler) or heat rejection equipment (such as a cooling tower). All loads are handled by the heat pumps and the geothermal water loop. Due to the poor efficiency of the existing air handling units, unit ventilators and the rooftop units and high cost of electric resistance heating, a geothermal system energy costs become very appealing. The geothermal heat pump system would substantially eliminate the need for electric resistance heating and associated high costs.

This ECM includes the installation of ground source heat pumps installed above the ceilings of each office or classroom, or in a unit ventilator style configuration. This is in place of the existing unit ventilators in the classrooms and offices. Outside air would be provided by a dedicated central outside air heat pump distributed by ductwork above the corridor to each occupied zone. This system would provide ventilation air to replace the outside air openings currently ducted to each unit ventilator. Existing air handling units and rooftop equipment would be replaced with packaged water source heat pump rooftop units or indoor heat pump air handling units. The proposed outside air units would include an energy recovery wheel for additional savings on ventilation air. This ECM also includes installation of new ground loop water pumps with VFD drives. The pumping system is included to pump transfer fluid from the building to the well field and back. The geothermal system would require (not limited to) the following major components:

1. 350-Ton (Heating Dominant) bore field located South West of the building. (120 bores, 450 ft deep each)
2. Loop condenser water pumps.
3. Condenser water piping distribution system from the well field to the roof top units and indoor heat pumps.
4. Installation of high-efficiency geothermal rooftop units to replace the existing units and geothermal indoor heat pumps to replace the classroom conditioning.
5. Removal of the existing rooftop AC units, air handling units and unit ventilators

This ECM is based on Climate Mater Tranquility Series water source heat pumps model TRE for the rooftop units, and model TS or TV for the horizontal / vertical units or equal. **Note:** Sizing

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

Energy Savings Calculations:

The energy savings calculations are based on the energy analysis performed on the energy modeling software by Trane (Trace 700 ver. 6.2.4). The baseline energy consumption is compared to the proposed model to determine energy savings. The savings are applied to the average energy costs based on the facility's actual usage. Note: Heating and cooling is provided for the entire building by the geothermal system model. This ECM represents a significant upgrade to the building's HVAC system.

ECM #10 GEOTHERMAL SYSTEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Unit Ventilators, Rooftop Units and Air Handling Units	New Geothermal Heating and Cooling System	
Elec Usage (KWH)	2,338,117	1,946,275	391,842
Electric Cost ($/KWH)	$0.154	$0.154	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy Cost ($)	$360,070	$299,726	$60,344
Total Energy Cost ($)	$360,070	$299,726	$60,344
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700).		

Estimated cost of the Geothermal System including vertical bore field, indoor equipment, controls and installation is $6,400,000.

From the NJ Smart Start® Program appendix, installation of Geothermal Heat Pump System warrants an incentive based on efficiency (EER) for units at average $600/Ton. The incentives are as follows:

$$\text{Smart Start ® Incentive} = (\text{Capacity (Tonnage)} \times \$600/\text{Ton}) = (350 \times \$600) = \$210{,}000$$

Energy Savings Summary:

ECM #10 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,400,000
NJ Smart Start Equipment Incentive ($):	$210,000
Net Installation Cost ($):	$6,190,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$60,344
Total Yearly Savings ($/Yr):	$60,344
Estimated ECM Lifetime (Yr):	15
Simple Payback	102.6
Simple Lifetime ROI	-85.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$905,155
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	($5,469,621.21)

***Note:** ECM #10 – Geothermal System Installation is an alternative to following ECMs:

- ECM #3 - Replace A-wing RTUs
- ECM #4 - Upgrade Unit Ventilators
- ECM #11 - VRF System with Energy Recovery

ECM #11: VRF (Variable Refrigerant Flow) System Installation

Description:

The existing heating and cooling systems in the Salem High School consist of unitary direct expansion cooling systems with electric resistance heating. There is significant increase in electric usage in the heating season.

An emerging alternative to the forced air systems or hydronic systems is the Variable Refrigerant Flow (VRF) systems. A VRF system includes multiple indoor evaporators, fan coil units and refrigerant management and control systems connected to condensing units with multiple compressors located outside. Major difference between conventional systems and the VRF systems is that the heating or cooling is supplied by circulating refrigerant directly to the heat transfer device within or near the conditioned space. Significant energy savings can be achieved by eliminating air and/or water circulation.

The benefits of the VRF systems include ease of installation especially during retrofits due to modular equipment, improved comfort due to flexibility in zoning and substantial increase in energy efficiency due to elimination of large fans, pumps and providing net heating and net cooling load for the building, instead of peak loads for each zone due to energy recovery between zones similar to water source heat pumps.

This ECM includes the installation of a Variable Refrigerant Flow system for the classrooms, offices, meeting halls and other spaces in the Salem High School. This is in place of the existing unit ventilators in the classrooms, rooftop units and split air conditioning units in the offices and meeting halls and heating only units in the gymnasium, locker rooms and kitchen. Outside air would be provided by dedicated outside air units ducted to each indoor unit. This system would provide ventilation air to replace the outside air openings currently ducted to each unit ventilator.

This ECM is based on Mitsubishi City Multi Series variable refrigerant flow system or equal. **Note:** Sizing indicated within the calculation of this ECM is based on a one for one replacement of the existing equipment. Owner should retain a Professional Engineer verify heating and cooling loads prior to moving forward with this ECM.

Energy Savings Calculations:

The energy savings calculations are based on the energy analysis performed on the energy modeling software by Trane (Trace 700 ver. 6.2.4). The baseline energy consumption is compared to the proposed model to determine energy savings. The savings are applied to the average energy costs based on the facility's actual usage. Note: Heating and cooling is provided for the entire building by the VRF system in the energy model. This ECM represents a significant upgrade to the building's HVAC system.

ECM #11 VRF SYSTEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Unit Ventilators, Rooftop Units and Air Handling Units	New VRF Heating and Cooling System	
Facility Total Elec Usage (KWH)	2,338,117	1,665,581	672,536
Electric Cost ($/KWH)	$0.154	$0.154	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy Cost ($)	$360,070	$256,499	$103,571
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700).		

Estimated cost of the VRF System including equipments, controls and installation is $5,700,000.

Energy Savings Summary:

ECM #11 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,700,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,700,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$103,571
Total Yearly Savings ($/Yr):	$103,571
Estimated ECM Lifetime (Yr):	15
Simple Payback	55.0
Simple Lifetime ROI	-72.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$1,553,558
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	($4,463,581.57)

Note: ECM #11 - VRF System with Energy Recovery is an alternative to following ECMs:

- ECM #3 - Replace A-wing RTUs
- ECM #4 - Upgrade Unit Ventilators
- ECM #10 – Geothermal System Installation

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 30,000 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 422.5 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 556,647 KWh annually, reducing the overall utility bill by approximately 23.8% 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 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**	**INTERNAL RATE OF RETURN**
Direct Purchase	13.6 Years	6.0%

*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 Owner to invest in a solar system through a Direct Purchase CEG does not recommend the Owner pursue this route. It would be more

advantageous for the Owner 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 Owner 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 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:

There are currently six (6) electric accounts that serve the Salem County High School. 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 historical usage profile is beneficial for competitive energy prices when shopping for alternative suppliers due to the steady monthly usage. 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:

There are not any natural gas accounts for Salem County High School.

Tariff Analysis:

Electricity:

The facility receives electric distribution service through Atlantic City Electric (AECO) on rate schedule's MGS (Monthly General Service) for five (5) accounts and SPL (Street & Private Lighting) on one (1) account. The facility is currently contracted with a Third Party Supplier (TPS) to provide electric commodity service for four (4) of the six (6) accounts. Account numbers 0117 0119 9960 and 0117 0119 9978 are currently served bundled electricity service by the utility, Atlantic City Electric. 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).

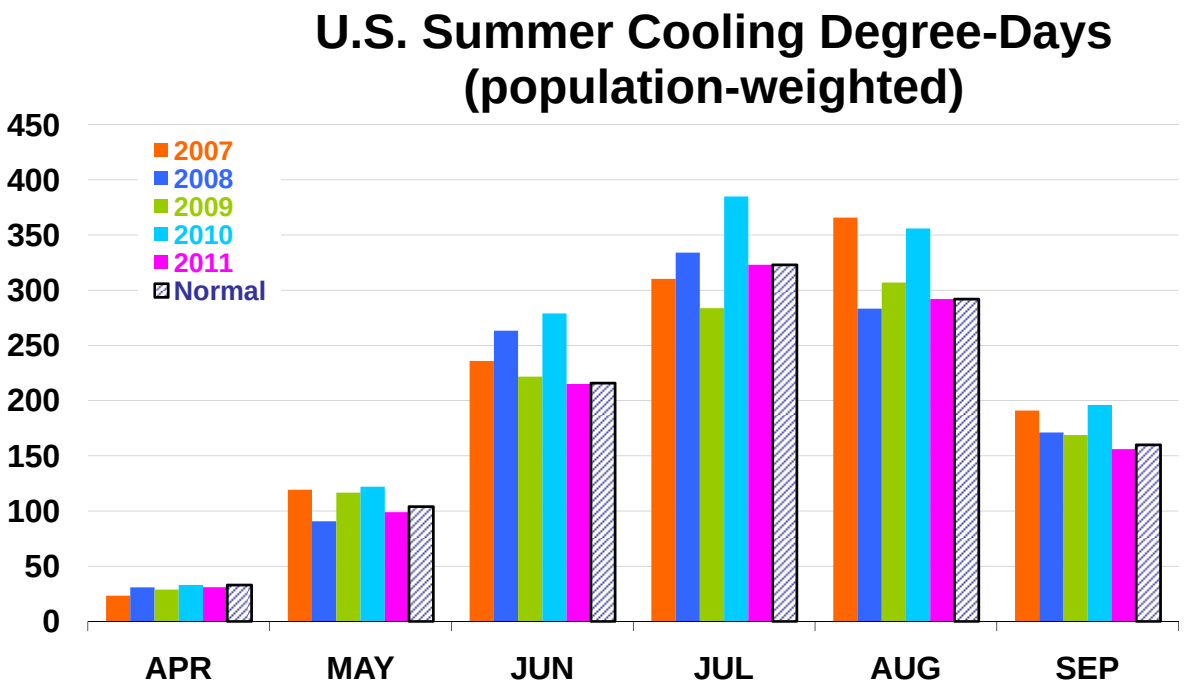
The current BGS-FP average price to compare for AECO's MGS rate schedule effective with planning year June 2010 is $.1153/kWh. This is based upon the historical usage analyzed June 2009 – April 2010. The current BGS-FP average price to compare for AECO's SPL rate schedule effective with planning year June 2010 is $.0959/kWh. This is based upon the historical usage analyzed June 2009 – April 2010. Based upon the current third party supplier electric rate with South Jersey Energy, June 2009 – April 2010, the four (4) accounts under contract are 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.

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.



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 electric supply service. By aggregating all six (6) sites for electricity procurement, the High 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. The High School could realize up to a 30% reduction in electricity supply costs for the two (2) electricity accounts currently not under contract if it were to aggregate usage 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 High School, in conjunction with the Middle 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

CEG recommends that the High 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 par for the costs using the value of energy savings that result from the improvements. The "Energy Savings Improvement Program (ESIP)" law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources.

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

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

iv. *Pay For Performance* – The New Jersey Smart Start Pay for Performance program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings 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 shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

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

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

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

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 200 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.

vi. *Energy Efficiency and Conservation Block Grants* – The EECGB rebate provides supplemental funding up to $20,000 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. Confirm that outside air economizers on the split and rooftop units are functioning properly to take advantage of free cooling and avoid excess outside air during occupied periods.

In addition to the recommendations above, implementing Retro-Commissioning would be beneficial for this facility. Retro-Commissioning is a means to verify your current equipment is operating at its designed efficiency, capacity, airflow, and overall performance. Retro-Commissioning provides valuable insight into systems or components not performing correctly or efficiently. The commissioning process defines the original system design parameters and recommends revisions to the current system operating characteristics.

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 Means™ 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 BOE - High School

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Equipment Upgrade - Retrofits and Relamping	$19,138	$12,759	$410	$31,487	$13,471	$76	$13,546	15	$203,197	$1,137	545.3%	2.3	42.82%	$130,230.16
ECM #2	Lighting Controls Upgrade – Occupancy Sensors	$9,945	$6,630	$2,505	$14,070	$3,217	$0	$3,217	15	$48,262	$0	243.0%	4.4	21.66%	$24,340.14
ECM #3	Replace A-wing RTUs	$140,000	$0	$2,765	$137,235	$18,408	$0	$18,408	15	$276,124	$0	101.2%	7.5	10.35%	$82,521.33
ECM #4	Upgrade Unit Ventilators	$364,500	$0	$0	$364,500	$13,515	$0	$13,515	15	$202,728	$0	-44.4%	27.0	-6.57%	($203,156.49)
ECM #5	Demand Controlled Ventilation	$70,000	$0	$0	$70,000	$4,565	$0	$4,565	15	$68,478	$0	-2.2%	15.3	-0.27%	($15,501.23)
ECM #6	Window Replacement	$192,000	$0	$0	$192,000	$17,278	$0	$17,278	15	$259,177	$0	35.0%	11.1	4.01%	$14,269.02
ECM #7	Variable Kitchen Exhaust Controls	$29,500	$0	$0	$29,500	$3,225	$0	$3,225	15	$48,373	$0	64.0%	9.1	6.93%	$8,998.59
ECM #8	Water Conservation Measures	$80,000	$0	$0	$80,000	$1,995	$1,549	$3,544	15	$53,163	$23,238	-33.5%	22.6	-4.72%	($37,689.68)
ECM #9	Solar Domestic Hot Water Heating	$100,000	$0	$0	$100,000	$10,129	$0	$10,129	15	$151,939	$0	51.9%	9.9	5.75%	$20,922.42
ECM #10	Geothermal Heat Pump System	$6,400,000	$0	$210,000	$6,190,000	$60,344	$0	$60,344	15	$905,155	$0	-85.4%	102.6	-17.94%	($5,469,621.21)
ECM #11	VRF System with Energy Recovery	$5,700,000	$0	$0	$5,700,000	$103,571	$0	$103,571	15	$1,553,558	$0	-72.7%	55.0	-13.09%	($4,463,581.57)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Solar PV Installation	$3,802,590	$0	$0	$3,802,590	$85,724	$194,826	$280,550	15	$4,208,251	$2,922,397	10.7%	13.6	1.29%	($453,401.26)

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

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Salem High School

Building ID: 2515563
For 12-month Period Ending: May 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: December 03, 2010

Facility
Salem High School
219 Walnut 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: 1971
Gross Floor Area (ft²): 142,841

Energy Performance Rating[2] (1-100) 29

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	7,934,850
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	7,934,850

Energy Intensity[5]

Site (kBtu/ft²/yr)	56
Source (kBtu/ft²/yr)	186

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,208

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	46
National Average Source EUI	155
% Difference from National Average Source EUI	20%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) 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	☑
Building Name	Salem High School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	219 Walnut Street, Salem, NJ 08079	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
School Building (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	142,841 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	Yes	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	250 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	2	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	12(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Pepco - Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric Meter #35592478 (kWh (thousand Watt-hours)) **Space(s):** School Building **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
04/22/2010	05/22/2010	155,000.00
03/22/2010	04/21/2010	174,000.00
02/19/2010	03/21/2010	276,000.00
01/19/2010	02/18/2010	259,000.00
12/19/2009	01/18/2010	318,000.00
11/18/2009	12/18/2009	194,000.00
10/18/2009	11/17/2009	140,000.00
09/17/2009	10/17/2009	141,000.00
08/17/2009	09/16/2009	188,000.00
07/17/2009	08/16/2009	157,000.00
06/16/2009	07/16/2009	183,000.00
Electric Meter #35592478 Consumption (kWh (thousand Watt-hours))		**2,185,000.00**
Electric Meter #35592478 Consumption (kBtu (thousand Btu))		**7,455,220.00**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**7,455,220.00**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

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

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

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same 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.

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 High School
219 Walnut 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 High School	
Gross Floor Area Excluding Parking: (ft^2)	142,841
Year Built	1971
For 12-month Evaluation Period Ending Date:	May 31, 2010

Facility Space Use Summary

School Building	
Space Type	K-12 School
Gross Floor Area(ft^2)	142,841
Open Weekends?	Yes
Number of PCs[d]	250
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	100
Months[o]	12
High School?	Yes
School District[o]	Salem County, NJ

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 05/31/2010)	**Baseline**	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	29	N/A	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	56	N/A	36	N/A	46
Source (kBtu/ft^2)	186	N/A	121	N/A	155
Energy Cost					
$/year	$ 345,004.61	N/A	$ 224,889.59	N/A	$ 287,617.70
$/$ft^2$/year	$ 2.42	N/A	$ 1.58	N/A	$ 2.02
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,208	N/A	787	N/A	1,007
$kgCO_2e/ft^2$/year	8	N/A	5	N/A	7

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.

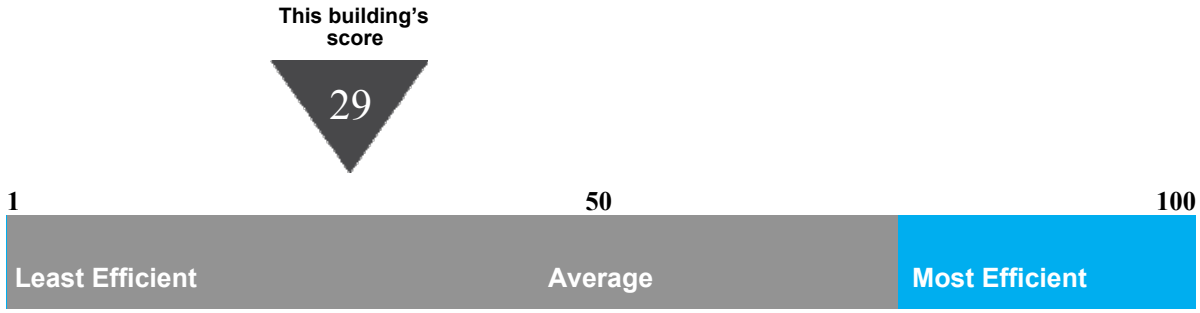
Statement of Energy Performance

2010

Salem High School
219 Walnut Street
Salem, NJ 08079

Portfolio Manager Building ID: 2515563

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 186 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

EPA United States Environmental Protection Agency

Date Generated: 12/03/2010

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Domestic Water Heaters

Tag	HWH-1 & 2		
Unit Type	Tank type hot water heater	-	-
Qty	2	-	-
Location	B Wing Mechanical & Electrical Room	-	-
Area Served	Domestic hot water for the entire facility	-	-
Manufacturer	Patterson Kelley	-	-
Model #	PKW180B-125	-	-
Serial #	PKW180-12B-480-150-CL	-	-
Size (Gallons)	500 (Est)	-	-
Input Capacity (MBH/KW)	180 kW each	-	-
Recovery (Gal/Hr)	-	-	-
Efficiency %	100%	-	-
Fuel	Electricity	-	-
Approx Age	40	-	-
ASHRAE Service Life	15	-	-
Remaining Life	(25)	-	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Pumps

Tag	HW CIRCULATOR		
Unit Type	Domestic Hot Water Circulator	-	-
Qty	1	-	-
Location	B-wing Mechanical & Electrical Room	-	-
Area Served	Domestic Hot Water System	-	-
Manufacturer	BG	-	-
Model #	-	-	-
Serial #	-	-	-
Horse Power	Fractional	-	-
Flow	-	-	-
Motor Info	-	-	-
Electrical Power	-	-	-
RPM	-	-	-
Motor Efficiency %	-	-	-
Approx Age	5	-	-
ASHRAE Service Life	20	-	-
Remaining Life	15	-	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Split A/C Systems

Condensing Unit

Tag	Split CU	Split CU	Mini Split CU
Unit Type	Air cooled DX	Air cooled DX	Air cooled DX
Qty	1	2	1
Location	B Wing Roof	B Wing Roof	B Wing Roof
Area Served	N/A	Cafeteria AHUs	Computer Closet
Manufacturer	York	Carrier	Mitsubishi
Model #	H2CB036S46A	38AKS034--601--	MUY A24NA
Serial #	MHWM438798	#1 0507Q06070, #2 0507Q06072	7008357
Cooling Capacity (Tons)	3	31	2
Refrigerant	R22	R22	R410A
Voltage / Phase	460/3	460/3	208 / 1
Cooling Efficiency	10 SEER (Est)	10.1 EER 13.1 IPLV	16 SEER
Indoor Unit	-	Cafeteria AHUs	Ductless Split
Approx Age	21	3	5 (Est)
Ashrae Service Life	15	15	15
Remaining Life	(6)	12	10
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Split A/C Systems

Condensing Unit

Tag	Split CU	Split CU	Split CU
Unit Type	Air cooled DX	Air cooled DX	Air cooled DX
Qty	2	2	1
Location	Core Building Roof	Core Building Roof	Core Building Roof
Area Served	Core AHUs	Core AHUs	Core AHUs
Manufacturer	Carrier	Carrier	Carrier
Model #	38AKS034--601--	38AKS024--621--	38AKS014--621--
Serial #	#1 0407Q06047 #2 0407Q06048	#1 0807G50045 #2 0807G50046	0807G30048
Cooling Capacity (Tons)	31	21	12.5
Refrigerant	R22	R22	R22
Voltage / Phase	460/3	460/3	460/3
Cooling Efficiency	10.1 EER 13.1 IPLV	10.5 EER 13.9 IPLV	12.1 EER 15.8 IPLV
Indoor Unit	AHU	AHU	AHU
Approx Age	3	3	3
Ashrae Service Life	15	15	15
Remaining Life	12	12	10
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Split A/C Systems

Air Handling Unit

Tag	HV-7 - 1	HV-7 - 2	HV-8
Unit Type	Split Air Handling Unit	Split Air Handling Unit	Split Air Handling Unit
Qty	1	1	1
Location	Core Building Mezzanine	Core Building Mezzanine	Core Building Mezzanine
Area Served	Auditorium	Auditorium	General Office Area
Manufacturer	Nesbitt	Nesbitt	Nesbitt
Model #	DX28-6	DX28-6	DX16-6
Serial #	LFC70HF	LFC70HF	LPC45HF
Cooling Capacity (Tons)	31	31	13
Voltage / Phase	460 / 3	460 / 3	460 / 3
Cooling Coil	Direct Expansion	Direct Expansion	Direct Expansion
Supply Flow, CFM	12,000 (Est)	12,000 (Est)	5,000 (Est)
Heating Type	Electric Coil	Electric Coil	Electric Coil
Input	N/A	N/A	N/A
Economizer	Outside Air	Outside Air	Outside Air
Supply Motor HP	3 (Est)	3 (Est)	3 (Est)
Supply Motor Efficiency	-	-	-
Approx. Age	40	40	40
ASHRAE Service Life	15	15	15
Remaining Life	(25)	(25)	(25)
Notes	Units are original to the building		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Split A/C Systems

Air Handling Unit

Tag	HV-9	HV 10	HV 11 & 12
Unit Type	Split Air Handling Unit	Split Air Handling Unit	Split Air Handling Unit
Qty	1	1	2
Location	Core Building Mezzanine	Core Building Mezzanine	B Wing Mezzanine
Area Served	Lecture Room	Library and Teachers Work	Cafeteria
Manufacturer	Nesbitt	Nesbitt	Nesbitt
Model #	DX28-6	DX20-6	DX20-6
Serial #	LPC45HF	LPC35HF	LPC 55HF
Cooling Capacity (Tons)	21	21	31 Tons
Voltage / Phase	460 / 3	460 / 3	460 / 3
Cooling Coil	Direct Expansion	Direct Expansion	Direct Expansion
Supply Flow, CFM	8,000 (Est)	8,000 (Est)	12,000 (Est)
Heating Type	Electric Coil	Electric Coil	Electric Coil
Input	N/A	N/A	N/A
Economizer	Outside Air	Outside Air	Outside Air
Supply Motor HP	3 (Est)	3 (Est)	3 HP
Supply Motor Efficiency	-	-	0.875
Approx. Age	40	40	40
ASHRAE Service Life	15	15	15
Remaining Life	(25)	(25)	(25)
Notes	Units are original to the building		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Rooftop / AC Units

Tag	C-Wing RTU #1	C-Wing RTU #2	-
Unit Type	Packaged RTU	Packaged RTU	-
Qty	1	1	-
Location	C-Wing Roof	C-Wing Roof	-
Area Served	C Wing core areas	C Wing core areas	-
Manufacturer	YORK	CARRIER	-
Model #	DM240E54C4BAA1	50TM-016G-F611CD	-
Serial #	N0D5973958	1607U10603	-
Flow Capacity, CFM	8000 (est)	6000 (est)	-
Cooling Type	DX	DX	-
Cooling Capacity (Tons)	19.3	15	-
Cooling Efficiency (SEER/EER)	8.5 EER 8.05 IPLV	9.7 EER 9.9 IPLV	-
Heating Type	Electric	Electric	-
Heating Input (MBH)	54 kW 184 MBH	32 kW 109 MBH	-
Heating Efficiency	100%	100%	-
Economizer	Air side economizer with power exhaust	Air side economizer with power exhaust	-
Approx Age	5	3	-
ASHRAE Service Life	15	15	-
Remaining Life	10	12	-
Comments	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Rooftop / AC Units

Tag	A-Wing RTU #1	A-Wing RTU #2	-
Unit Type	Packaged RTU	Packaged RTU	-
Qty	1	1	-
Location	A Wing Roof	A Wing Roof	-
Area Served	A Wing Core	A Wing Core	-
Manufacturer	YORK	YORK	-
Model #	-	-	-
Serial #	-	-	-
Flow Capacity, CFM	-	-	-
Cooling Type	-	-	-
Cooling Capacity (Tons)	20 Ton (est)	15Ton (est)	-
Cooling Efficiency (SEER/EER)	-	-	-
Heating Type	Electric	Electric	-
Heating Input (MBH)	-	-	-
Heating Efficiency	-	-	-
Economizer	Air side	Air side	-
Approx Age	15 (Est)	15 (Est)	-
ASHRAE Service Life	15	15	-
Remaining Life	0	0	-
Comments	Old units no information available		-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Unit Ventilators

Tag	**UV**	-	-
Unit Type	Heating and Cooling	-	-
Qty	28	-	-
Location	Classrooms	-	-
Manufacturer	ITT Nesbitt	-	-
Model #	5551250-22-X3-A	-	-
Serial #	39617 (one of the units)	-	-
Flow Capacity	-	-	-
Cooling Type	Packaged DX	-	-
Cooling Capacity (Tons)	4.0	-	-
Estimated Cooling Efficiency (EER)	8	-	-
Heating Type	Electric Coil	-	-
Heating Input (MBH)	12 kW (Est) 41 MBH	-	-
Approx Age	40	-	-
Ashrae Service Life	15	-	-
Remaining Life	(25)	-	-
Comments	-	-	-
	-	-	-

MAJOR EQUIPMENT LIST

Concord Engineering Group

Salem City BOE - High School

Heating and Ventilation Units

Tag	HV	HV	HV
Unit Type	Heating and Ventilation	Heating and Ventilation	Heating and Ventilation
Qty	4	2	1
Location	Gym	Locker Rooms	Kitchen
Area Served	Gym	Locker Rooms	Kitchen
Manufacturer	-	-	-
Model #	-	-	-
Serial #	-	-	-
Fan HP	-	-	-
Cooling Type	None	None	None
Heating Type	Electric	Electric	Electric
Heating Input (MBH)	-	-	-
Efficiency	-	-	-
Approx Age	40	40	40
Ashrae Service Life	15	15	15
Remaining Life	(25)	(25)	(25)
Comments	-	-	-

Investment Grade Lighting Audit

CEG Job #: 9C10083
Project: Salem High School
219 Walnut Street
Salem, NJ 08079
Bldg. Sq. Ft. 142,841

Salem High School

KWH COST: $0.154

ECM #1: 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
651	Electrical Room	1200	2	1	"Industrial" Relector, 26w CFL	26	0.05	62.4	$9.61	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
362.34	Gym	3000	24	6	2x4, 6 Lamp, 54w T5HO Fixture w/Occupancy Sensor	354	8.50	25,488.0	$3,925.15	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Boy's Back Locker Area	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	556.4	$85.69	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$78.48	$28.00	$56.00	0.02	46.8	$7.21	7.77
613	Rear Storage	1200	1	1	Industrial Fixture, 100w A19 Lamp	100	0.10	120.0	$18.48	1	1	(1) 26w CFL Lamp	26	0.03	31.2	$4.80	$20.00	$20.00	0.07	88.8	$13.68	1.46
242.11	Boy's Locker Room	2600	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	1,669.2	$257.06	6	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.59	1528.8	$235.44	$28.00	$168.00	0.05	140.4	$21.62	7.77
111.11		2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
221.11	Boy's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
613	Locker Room Side Exit	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.10	260.0	$40.04	1	1	(1) 26w CFL Lamp	26	0.03	67.6	$10.41	$20.00	$20.00	0.07	192.4	$29.63	0.68
602		8760	1	2	Incandescent Exit Sign	20	0.02	175.2	$26.98	1	1	LED Exit Sign	2	0.00	17.52	$2.70	$65.00	$65.00	0.02	157.68	$24.28	2.68
221.11	Gym Office and Laundry	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
221.11	Boy's Showers	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.19	483.6	$74.47	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	$60.06	$14.00	$42.00	0.04	93.6	$14.41	2.91
111.11	Boy's Gym Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
625	Boy's Gym Office Rest Room	600	1	2	Fan/Light Combo (2) 150w A Lamp	300	0.30	180.0	$27.72	1	2	(1) 18w CFL Lamp	36	0.04	21.6	$3.33	$20.00	$20.00	0.26	158.4	$24.39	0.82
651	Girl's Rear Storage	1200	2	1	"Industrial" Relector, 26w CFL	26	0.05	62.4	$9.61	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Girl's Rear Locker Area	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
221.11	Girl's Locker Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.37	967.2	$148.95	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$120.12	$14.00	$84.00	0.07	187.2	$28.83	2.91
221.11	Girl's Locker Room Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91

Investment Grade Lighting Audit

221.11	Girl's Showers	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
221.11	Girl's Front Locker Area	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
111.14	Locker Room Hall	3000	4	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.19	576.0	$88.70	4	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.10	300	$46.20	$80.00	$320.00	0.09	276	$42.50	7.53
111.11	Girl's Gym Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
649	Gym Office Rest Room	2600	1	2	Fan/Light Combo (2) 26w CFL Lamp	56	0.06	145.6	$22.42	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	B51 AD Office	2600	9	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.30	772.2	$118.92	9	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.23	585	$90.09	$7.00	$63.00	0.07	187.2	$28.83	2.19
222.24	Girl's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
121.11	School Store	1600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	249.6	$38.44	2	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.12	185.6	$28.58	$100.00	$200.00	0.04	64	$9.86	20.29
651	Stage	1200	8	1	"Industrial" Relector, 26w CFL	26	0.21	249.6	$38.44	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
613	Stage Storage	1200	1	1	Industrial Fixture, 100w A19 Lamp	100	0.10	120.0	$18.48	1	1	(1) 26w CFL Lamp	26	0.03	31.2	$4.80	$20.00	$20.00	0.07	88.8	$13.68	1.46
242.11	B28 Training Room	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	$128.53	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$117.72	$28.00	$84.00	0.03	70.2	$10.81	7.77
800	Cafeteria	3000	25	1	Pendant Mnt. Globe Fixture, 500w A Lamp	500	12.50	37,500.0	$5,775.00	25	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	4.43	13275	$2,044.35	$220.00	$5,500.00	8.08	24225	$3,730.65	1.47
801		1800	24	1	Square, Wall Mntd. Down Light, 75w R30	75	1.80	3,240.0	$498.96	24	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.62	1123.2	$172.97	$20.00	$480.00	1.18	2116.8	$325.99	1.47
221.11	Kitchen	2600	34	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.11	5,480.8	$844.04	34	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.70	4420	$680.68	$14.00	$476.00	0.41	1060.8	$163.36	2.91
111.11	Kitchen Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
652	Pantry	2600	3	1	"Industrial" Relector, 42w CFL	42	0.13	327.6	$50.45	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Kitchen Rest Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	148.8	$22.92	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$18.48	$14.00	$28.00	0.02	28.8	$4.44	6.31
242.21	Kitchen Office	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$42.84	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	$39.24	$28.00	$28.00	0.01	23.4	$3.60	7.77
221.31	B7 Choral	2600	24	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.49	3,868.8	$595.80	24	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.20	3120	$480.48	$14.00	$336.00	0.29	748.8	$115.32	2.91
613	Music Office	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.10	260.0	$40.04	1	1	(1) 26w CFL Lamp	26	0.03	67.6	$10.41	$20.00	$20.00	0.07	192.4	$29.63	0.68

Investment Grade Lighting Audit

221.31	B1 Band	2600	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.74	4,513.6	$695.09	28	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.40	3640	$560.56	$14.00	$392.00	0.34	873.6	$134.53	2.91
111.11	Band Uniforms	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	57.6	$8.87	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	30	$4.62	$80.00	$80.00	0.02	27.6	$4.25	18.82
111.11	Band Storage	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	57.6	$8.87	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	30	$4.62	$80.00	$80.00	0.02	27.6	$4.25	18.82
211.11	Band Corner Storage	1200	2	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.07	79.2	$12.20	2	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.05	60	$9.24	$7.00	$14.00	0.02	19.2	$2.96	4.73
111.11	Band Practice Room	1200	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	115.2	$17.74	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	60	$9.24	$80.00	$160.00	0.05	55.2	$8.50	18.82
221.31	B6 Classroom	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	3,224.0	$496.50	20	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.00	2600	$400.40	$14.00	$280.00	0.24	624	$96.10	2.91
221.31	B11 Classroom	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	3,224.0	$496.50	20	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.00	2600	$400.40	$14.00	$280.00	0.24	624	$96.10	2.91
221.31	B12 Weight Room	2600	32	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.98	5,158.4	$794.39	32	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.60	4160	$640.64	$14.00	$448.00	0.38	998.4	$153.75	2.91
264.25	Lobby/ Corridor	4400	6	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	1.03	4,540.8	$699.28	6	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	0.89	3907.2	$601.71	$42.00	$252.00	0.14	633.6	$97.57	2.58
563		4400	58	1	Recessed Down Light, 26w CFL Lamp	26	1.51	6,635.2	$1,021.82	58	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	D13 Office	2600	4	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$171.37	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$156.96	$28.00	$112.00	0.04	93.6	$14.41	7.77
264.25		2600	2	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.34	894.4	$137.74	2	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	0.30	769.6	$118.52	$42.00	$84.00	0.05	124.8	$19.22	4.37
222.25	Corridors	4400	89	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	5.52	24,279.2	$3,739.00	89	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	4.45	19580	$3,015.32	$14.00	$1,246.00	1.07	4699.2	$723.68	1.72
264.25	Main Office	2600	8	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	1.38	3,577.6	$550.95	8	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	1.18	3078.4	$474.07	$42.00	$336.00	0.19	499.2	$76.88	4.37
264.25	Side Office	2600	1	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.17	447.2	$68.87	1	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	0.15	384.8	$59.26	$42.00	$42.00	0.02	62.4	$9.61	4.37
264.25	Side Office	2600	3	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.52	1,341.6	$206.61	3	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	0.44	1154.4	$177.78	$42.00	$126.00	0.07	187.2	$28.83	4.37
111.11	Vault	2600	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	124.8	$19.22	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	65	$10.01	$80.00	$80.00	0.02	59.8	$9.21	8.69

Investment Grade Lighting Audit

111.11	Copy Room/ Kitchen	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
222.21	Guidance - Center Office	2600	8	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.50	1,289.6	$198.60	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	$160.16	$14.00	$112.00	0.10	249.6	$38.44	2.91
111.11	Giudance - Conference Room	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
211.11	Copy Room	2600	1	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.03	85.8	$13.21	1	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.03	65	$10.01	$7.00	$7.00	0.01	20.8	$3.20	2.19
327.23	Guidance - Library Hall	2600	7	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	0.22	564.2	$86.89	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Conference Room	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	834.6	$128.53	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$117.72	$28.00	$84.00	0.03	70.2	$10.81	7.77
111.11	Electrical Closet	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	57.6	$8.87	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	30	$4.62	$80.00	$80.00	0.02	27.6	$4.25	18.82
613	Hall Closets	600	2	1	Industrial Fixture, 100w A19 Lamp	100	0.20	120.0	$18.48	2	1	(1) 26w CFL Lamp	26	0.05	31.2	$4.80	$20.00	$40.00	0.15	88.8	$13.68	2.93
221.11	Security Office	8760	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.25	2,172.5	$334.56	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	1752	$269.81	$14.00	$56.00	0.05	420.48	$64.75	0.86
562	Library	2600	11	1	Recessed Down Light, (1) 42w CFL Lamp	42	0.46	1,201.2	$184.98	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21		2600	30	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.86	4,836.0	$744.74	30	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.50	3900	$600.60	$14.00	$420.00	0.36	936	$144.14	2.91
602		8760	2	2	Incandescent Exit Sign	20	0.04	350.4	$53.96	2	1	LED Exit Sign	2	0.00	35.04	$5.40	$65.00	$130.00	0.04	315.36	$48.57	2.68
211.11	Library Storage	1200	5	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.17	198.0	$30.49	5	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.13	150	$23.10	$7.00	$35.00	0.04	48	$7.39	4.73
222.21	IT Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
613	Electrical Room	800	2	1	Industrial Fixture, 100w A19 Lamp	100	0.20	160.0	$24.64	2	1	(1) 26w CFL Lamp	26	0.05	41.6	$6.41	$20.00	$40.00	0.15	118.4	$18.23	2.19
222.21	Library Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
652	Mezzanine	1200	9	1	"Industrial" Relector, 42w CFL	42	0.38	453.6	$69.85	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

327.24	Library Conference Room	2600	12	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	0.37	967.2	$148.95	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	D3 Classroom	2600	10	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.62	1,612.0	$248.25	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	$200.20	$14.00	$140.00	0.12	312	$48.05	2.91
613.1	D49 Storage	600	2	1	Industrial Fixture, 200w A19 Lamp	200	0.40	240.0	$36.96	2	1	(1) 42w CFL Lamp	42	0.08	50.4	$7.76	$20.00	$40.00	0.32	189.6	$29.20	1.37
222.21	D45 Classroom	2600	9	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.56	1,450.8	$223.42	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	1170	$180.18	$14.00	$126.00	0.11	280.8	$43.24	2.91
624	Auditorium	1800	28	1	Down Light, 200w Incandescent	200	5.60	10,080.0	$1,552.32	28	1	Energy Star Rated, Dimmable 29w CFL Lamp	29	0.81	1461.6	$225.09	$60.00	$1,680.00	4.79	8618.4	$1,327.23	1.27
622		1800	8	1	Wall Mnt., (1) 100w A19 Lamp	100	0.80	1,440.0	$221.76	8	1	(1) 26w CFL Lamp	26	0.21	374.4	$57.66	$20.00	$160.00	0.59	1065.6	$164.10	0.98
222.31	D37 Lecture Hall	2600	22	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	1.28	3,317.6	$510.91	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	2860	$440.44	$14.00	$308.00	0.18	457.6	$70.47	4.37
222.21	Waiting Area - Nurse	2600	3	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	483.6	$74.47	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	$60.06	$14.00	$42.00	0.04	93.6	$14.41	2.91
211.11		2600	9	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.30	772.2	$118.92	9	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.23	585	$90.09	$7.00	$63.00	0.07	187.2	$28.83	2.19
111.11	Exam Room 1	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
111.11	Exam Room 2	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.10	249.6	$38.44	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.05	119.6	$18.42	8.69
3015	Nurse Rest Room	1200	1	1	Wall Mnt. !00w A Lamp	100	0.10	120.0	$18.48	1	1	26w CFL Lamp	26	0.03	31.2	$4.80	$20.00	$20.00	0.07	88.8	$13.68	1.46
242.21	Nurse's Office	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$128.53	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$117.72	$28.00	$84.00	0.03	70.2	$10.81	7.77
623	Lobby Bulletin Board	2600	4	1	Recessed "Wall Washer", 65w BR30	60	0.24	624.0	$96.10	4	1	Energy Star Rated, 26w CFL Flood Lamp	26	0.10	270.4	$41.64	$20.00	$80.00	0.14	353.6	$54.45	1.47
221.31	A1 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.36	3,546.4	$546.15	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	2860	$440.44	$14.00	$308.00	0.26	686.4	$105.71	2.91
221.31	A4 & A1 Prep Room	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	1,289.6	$198.60	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	$160.16	$14.00	$112.00	0.10	249.6	$38.44	2.91
221.31	A4 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.43	3,707.6	$570.97	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	2990	$460.46	$14.00	$322.00	0.28	717.6	$110.51	2.91
221.31	A6 Classroom	2600	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.74	4,513.6	$695.09	28	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.40	3640	$560.56	$14.00	$392.00	0.34	873.6	$134.53	2.91
651	A6 Storage & Rear Exit	2600	2	1	"Industrial" Relector, 26w CFL	26	0.05	135.2	$20.82	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	A11 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.36	3,546.4	$546.15	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	2860	$440.44	$14.00	$308.00	0.26	686.4	$105.71	2.91

Investment Grade Lighting Audit

221.31	A11 & A13 Prep Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.37	967.2	$148.95	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$120.12	$14.00	$84.00	0.07	187.2	$28.83	2.91
221.31	A13 Classroom	2600	25	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.55	4,030.0	$620.62	25	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.25	3250	$500.50	$14.00	$350.00	0.30	780	$120.12	2.91
651	A13 Storage	1200	1	1	"Industrial" Relector, 26w CFL	26	0.03	31.2	$4.80	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	A16 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.36	3,546.4	$546.15	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	2860	$440.44	$14.00	$308.00	0.26	686.4	$105.71	2.91
221.31	A17 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.99	2,579.2	$397.20	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	2080	$320.32	$14.00	$224.00	0.19	499.2	$76.88	2.91
221.31	A41 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.99	2,579.2	$397.20	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	2080	$320.32	$14.00	$224.00	0.19	499.2	$76.88	2.91
221.31	A42 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
221.31	A45 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$372.37	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$300.30	$14.00	$210.00	0.18	468	$72.07	2.91
221.31	A46 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$372.37	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$300.30	$14.00	$210.00	0.18	468	$72.07	2.91
221.31	A49 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
221.31	A53 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$372.37	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$300.30	$14.00	$210.00	0.18	468	$72.07	2.91
221.31	A51 Classroom	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$446.85	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$360.36	$14.00	$252.00	0.22	561.6	$86.49	2.91
221.31	A50 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
221.31	A55 Classroom	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.12	2,901.6	$446.85	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2340	$360.36	$14.00	$252.00	0.22	561.6	$86.49	2.91
221.31	A57 Classroom	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1,612.0	$248.25	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	$200.20	$14.00	$140.00	0.12	312	$48.05	2.91
221.31	A58 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$372.37	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$300.30	$14.00	$210.00	0.18	468	$72.07	2.91

Investment Grade Lighting Audit

221.31	A56 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
221.31	A61 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2,418.0	$372.37	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1950	$300.30	$14.00	$210.00	0.18	468	$72.07	2.91
221.31	A62 Classroom	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.87	2,256.8	$347.55	14	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.70	1820	$280.28	$14.00	$196.00	0.17	436.8	$67.27	2.91
652	Custodial Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.04	50.4	$7.76	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	A35 Youth Center	2600	13	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.81	2,095.6	$322.72	13	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.65	1690	$260.26	$14.00	$182.00	0.16	405.6	$62.46	2.91
242.21	Youth Center Office	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$85.69	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$78.48	$28.00	$56.00	0.02	46.8	$7.21	7.77
222.21	Group Room	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
222.21	A24 Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
221.31	A36 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
221.31	A37 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
613.1	A38 Book Room	1200	2	1	Industrial Fixture, 200w A19 Lamp	200	0.40	480.0	$73.92	2	1	(1) 42w CFL Lamp	42	0.08	100.8	$15.52	$20.00	$40.00	0.32	379.2	$58.40	0.68
222.21	Men's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
613.1	Custodial Closet	1200	1	1	Industrial Fixture, 200w A19 Lamp	200	0.20	240.0	$36.96	1	1	(1) 42w CFL Lamp	42	0.04	50.4	$7.76	$20.00	$20.00	0.16	189.6	$29.20	0.68
222.21	Women's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
221.31	A21 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
613.1	A20 Book Room	2600	2	1	Industrial Fixture, 200w A19 Lamp	200	0.40	1,040.0	$160.16	2	1	(1) 42w CFL Lamp	42	0.08	218.4	$33.63	$20.00	$40.00	0.32	821.6	$126.53	0.32
221.31	A22 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.05	2,740.4	$422.02	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	2210	$340.34	$14.00	$238.00	0.20	530.4	$81.68	2.91
222.21	A23 Work Room	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	1,934.4	$297.90	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1560	$240.24	$14.00	$168.00	0.14	374.4	$57.66	2.91

Investment Grade Lighting Audit

222.21	Copy/ Break Room	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	967.2	$148.95	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	$120.12	$14.00	$84.00	0.07	187.2	$28.83	2.91
100	Hall	2600	2	2	3' Channel, 2-Lamp, 30w T12, Mag. Ballast, Surface Mnt., No Lens	60	0.12	312.0	$48.05	2	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.05	130	$20.02	$80.00	$160.00	0.07	182	$28.03	5.71
3015	Rest Room - Break Room	2600	2	1	Wall Mnt. !00w A Lamp	100	0.20	520.0	$80.08	2	1	26w CFL Lamp	26	0.05	135.2	$20.82	$20.00	$40.00	0.15	384.8	$59.26	0.68
221.31	C13 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.43	3,707.6	$570.97	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	2990	$460.46	$14.00	$322.00	0.28	717.6	$110.51	2.91
222.21	C13 Office	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
222.21	C11 Editing	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	$99.30	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$80.08	$14.00	$56.00	0.05	124.8	$19.22	2.91
221.31	C10 Comp. Lab	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.80	4,674.8	$719.92	29	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.45	3770	$580.58	$14.00	$406.00	0.35	904.8	$139.34	2.91
221.31	C9 Comp. Lab	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.80	4,674.8	$719.92	29	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.45	3770	$580.58	$14.00	$406.00	0.35	904.8	$139.34	2.91
222.21	C15 Classroom	2600	10	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.62	1,612.0	$248.25	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	1300	$200.20	$14.00	$140.00	0.12	312	$48.05	2.91
221.31	C18 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.43	3,707.6	$570.97	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	2990	$460.46	$14.00	$322.00	0.28	717.6	$110.51	2.91
221.31	C19 Classroom	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.80	4,674.8	$719.92	29	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.45	3770	$580.58	$14.00	$406.00	0.35	904.8	$139.34	2.91
221.31	C35 Shop	2600	33	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.05	5,319.6	$819.22	33	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.65	4290	$660.66	$14.00	$462.00	0.40	1029.6	$158.56	2.91
221.31	C33 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.43	3,707.6	$570.97	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	2990	$460.46	$14.00	$322.00	0.28	717.6	$110.51	2.91
221.31	C30 Classroom	2600	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.18	3,062.8	$471.67	19	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.95	2470	$380.38	$14.00	$266.00	0.23	592.8	$91.29	2.91
221.31	C37 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.99	2,579.2	$397.20	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	2080	$320.32	$14.00	$224.00	0.19	499.2	$76.88	2.91
221.31	C38 Classroom	2600	39	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.42	6,286.8	$968.17	39	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.95	5070	$780.78	$14.00	$546.00	0.47	1216.8	$187.39	2.91

Investment Grade Lighting Audit

221.11	C38 Office	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
652	Custodial Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.04	50.4	$7.76	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Men's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
652	Electrical Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.04	50.4	$7.76	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	C42 Shop	2600	46	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.85	7,415.2	$1,141.94	46	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.30	5980	$920.92	$14.00	$644.00	0.55	1435.2	$221.02	2.91
221.11	C42 Office	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	322.4	$49.65	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$40.04	$14.00	$28.00	0.02	62.4	$9.61	2.91
652	C42 Storage	1200	2	1	"Industrial" Relector, 42w CFL	42	0.08	100.8	$15.52	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
652	Finishing Room	2600	2	1	"Industrial" Relector, 42w CFL	42	0.08	218.4	$33.63	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
122.21	Girl's Rest Room	2600	1	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.08	202.8	$31.23	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$20.02	$100.00	$100.00	0.03	72.8	$11.21	8.92
222.21		2600	1	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	161.2	$24.82	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$20.02	$14.00	$14.00	0.01	31.2	$4.80	2.91
221.31	C51 Shop	2600	34	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.11	5,480.8	$844.04	34	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.70	4420	$680.68	$14.00	$476.00	0.41	1060.8	$163.36	2.91
621	C51 Rest Room	2600	1	1	Recessed Light, 100w A Lamp	100	0.10	260.0	$40.04	1	1	(1) 26w CFL Lamp	26	0.03	67.6	$10.41	$20.00	$20.00	0.07	192.4	$29.63	0.68
222.31	C25 Classroom	2600	23	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	1.33	3,468.4	$534.13	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	2990	$460.46	$14.00	$322.00	0.18	478.4	$73.67	4.37
221.31	C26 Classroom	2600	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.18	3,062.8	$471.67	19	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.95	2470	$380.38	$14.00	$266.00	0.23	592.8	$91.29	2.91
221.31	C5 Classroom	2600	32	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.98	5,158.4	$794.39	32	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.60	4160	$640.64	$14.00	$448.00	0.38	998.4	$153.75	2.91
111.11		2600	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	124.8	$19.22	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	65	$10.01	$80.00	$80.00	0.02	59.8	$9.21	8.69
111.11	C5 Rest Room	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.05	57.6	$8.87	1	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.03	30	$4.62	$80.00	$80.00	0.02	27.6	$4.25	18.82
242.21	C5 Storage	1200	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	128.4	$19.77	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	117.6	$18.11	$28.00	$28.00	0.01	10.8	$1.66	16.84
705	Exterior	4400	17	1	70w MH, Architectural Wall Mnt.	92	1.56	6,881.6	$1,059.77	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
725		4400	10	1	150w HPS Wallpack	188	1.88	8,272.0	$1,273.89	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
713		4400	4	1	100w HPS 1x1 w/Prismatic Lens	125	0.50	2,200.0	$338.80	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

Investment Grade Lighting Audit

	Totals		1,712	312			130.24	358,112	$55,149	1,712	282			79.5	216,493	$33,340		$31,897	34.5	87,472	$13,471	2.37

CEG Job #: 9C10083
Project: Salem High School
Address: 219 Walnut Street
Salem, NJ 08079
Building SF: 142841

Salem High School

KWH COST: $0.154

ECM #2: 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
651	Electrical Room	1200	2	1	"Industrial" Relector, 26w CFL	26	0.052	62.4	$9.61	2	0	No Change	26	0.05	0%	62.4	$9.61	$0.00	$0.00	0.00	0	$0.00	0.00
362.34	Gym	3000	24	6	2x4, 6 Lamp, 54w T5HO Fixture w/Occupancy Sensor	354	8.496	25488	$3,925.15	24	0	No Change	354	8.50	0	25488	$3,925.15	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Boy's Back Locker Area	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	556.4	$85.69	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.19	10%	500.76	$77.12	$75.00	$75.00	0.02	55.64	$8.57	8.75
613	Rear Storage	1200	1	1	Industrial Fixture, 100w A19 Lamp	100	0.1	120	$18.48	1	0	No Change	100	0.10	0%	120	$18.48	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	Boy's Locker Room	2600	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.642	1669.2	$257.06	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	107	0.58	10%	1502.28	$231.35	$160.00	$160.00	0.06	166.92	$25.71	6.22
111.11		2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Boy's Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	0	No Change	62	0.12	0%	322.4	$49.65	$0.00	$0.00	0.00	0	$0.00	0.00
613	Locker Room Side Exit	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.1	260	$40.04	1	0	No Change	100	0.10	0%	260	$40.04	$0.00	$0.00	0.00	0	$0.00	0.00
602		8760	1	2	Incandescent Exit Sign	20	0.02	175.2	$26.98	1	0	No Change	20	0.02	0%	175.2	$26.98	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Gym Office and Laundry	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55
221.11	Boy's Showers	2600	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.186	483.6	$74.47	3	0	No Change	62	0.19	0%	483.6	$74.47	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Boy's Gym Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
625	Boy's Gym Office Rest Room	600	1	2	Fan/Light Combo (2) 150w A Lamp	300	0.3	180	$27.72	1	0	No Change	300	0.30	0%	180	$27.72	$0.00	$0.00	0.00	0	$0.00	0.00
651	Girl's Rear Storage	1200	2	1	"Industrial" Relector, 26w CFL	26	0.052	62.4	$9.61	2	0	No Change	26	0.05	0%	62.4	$9.61	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Girl's Rear Locker Area	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Girl's Locker Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.372	967.2	$148.95	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.33	10%	870.48	$134.05	$160.00	$160.00	0.04	96.72	$14.89	10.74
221.11	Girl's Locker Room Rest Room	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	0	No Change	62	0.12	0%	322.4	$49.65	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Girl's Showers	2600	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	0	No Change	62	0.25	0%	644.8	$99.30	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Girl's Front Locker Area	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	0	No Change	62	0.12	0%	322.4	$49.65	$0.00	$0.00	0.00	0	$0.00	0.00
111.14	Locker Room Hall	3000	4	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.192	576	$88.70	4	0	No Change	48	0.19	0%	576	$88.70	$0.00	$0.00	0.00	0	$0.00	0.00

111.11	Girl's Gym Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	1	Dual Technology Occupancy Sensor - Remote Mnt.	48	0.09	10%	224.64	$34.59	$160.00	$160.00	0.01	24.96	$3.84	41.63
649	Gym Office Rest Room	2600	1	2	Fan/Light Combo (2) 26w CFL Lamp	56	0.056	145.6	$22.42	1	0	No Change	56	0.06	0%	145.6	$22.42	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	B51 AD Office	2600	9	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.297	772.2	$118.92	9	1	Dual Technology Occupancy Sensor - Switch Mnt.	33	0.27	10%	694.98	$107.03	$75.00	$75.00	0.03	77.22	$11.89	6.31
222.24	Girl's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	0.124	322.4	$49.65	2	0	No Change	62	0.12	0%	322.4	$49.65	$0.00	$0.00	0.00	0	$0.00	0.00
121.11	School Store	1600	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.156	249.6	$38.44	2	0	No Change	78	0.16	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
651	Stage	1200	8	1	"Industrial" Relector, 26w CFL	26	0.208	249.6	$38.44	8	0	No Change	26	0.21	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
613	Stage Storage	1200	1	1	Industrial Fixture, 100w A19 Lamp	100	0.1	120	$18.48	1	0	No Change	100	0.10	0%	120	$18.48	$0.00	$0.00	0.00	0	$0.00	0.00
242.11	B28 Training Room	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.321	834.6	$128.53	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.29	10%	751.14	$115.68	$75.00	$75.00	0.03	83.46	$12.85	5.84
800	Cafeteria	3000	25	1	Pendant Mnt. Globe Fixture, 500w A Lamp	500	12.5	37500	$5,775.00	25	0	No Change	500	12.50	0%	37500	$5,775.00	$0.00	$0.00	0.00	0	$0.00	0.00
801		1800	24	1	Square, Wall Mntd. Down Light, 75w R30	75	1.8	3240	$498.96	24	0	No Change	75	1.80	0%	3240	$498.96	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Kitchen	2600	34	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	2.108	5480.8	$844.04	34	0	No Change	62	2.11	0%	5480.8	$844.04	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Kitchen Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	48	0.09	10%	224.64	$34.59	$75.00	$75.00	0.01	24.96	$3.84	19.51
652	Pantry	2600	3	1	"Industrial" Relector, 42w CFL	42	0.126	327.6	$50.45	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	42	0.11	10%	294.84	$45.41	$75.00	$75.00	0.01	32.76	$5.05	14.87
221.11	Kitchen Rest Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	148.8	$22.92	2	0	No Change	62	0.12	0%	148.8	$22.92	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Kitchen Office	2600	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	278.2	$42.84	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.10	10%	250.38	$38.56	$75.00	$75.00	0.01	27.82	$4.28	17.51
221.31	B7 Choral	2600	24	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.488	3868.8	$595.80	24	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.34	10%	3481.92	$536.22	$225.00	$225.00	0.15	386.88	$59.58	3.78
613	Music Office	2600	1	1	Industrial Fixture, 100w A19 Lamp	100	0.1	260	$40.04	1	0	No Change	100	0.10	0%	260	$40.04	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	B1 Band	2600	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.736	4513.6	$695.09	28	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.56	10%	4062.24	$625.58	$225.00	$225.00	0.17	451.36	$69.51	3.24
111.11	Band Uniforms	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	57.6	$8.87	1	0	No Change	48	0.05	0%	57.6	$8.87	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Band Storage	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	57.6	$8.87	1	0	No Change	48	0.05	0%	57.6	$8.87	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Band Corner Storage	1200	2	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.066	79.2	$12.20	2	0	No Change	33	0.07	0%	79.2	$12.20	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Band Practice Room	1200	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	115.2	$17.74	2	0	No Change	48	0.10	0%	115.2	$17.74	$0.00	$0.00	0.00	0	$0.00	0.00

221.31	B6 Classroom	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	3224	$496.50	20	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	1.12	10%	2901.6	$446.85	$160.00	$160.00	0.12	322.4	$49.65	3.22
221.31	B11 Classroom	2600	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	3224	$496.50	20	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.12	10%	2901.6	$446.85	$225.00	$225.00	0.12	322.4	$49.65	4.53
221.31	B12 Weight Room	2600	32	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.984	5158.4	$794.39	32	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.79	10%	4642.56	$714.95	$225.00	$450.00	0.20	515.84	$79.44	5.66
264.25	Lobby/ Corridor	4400	6	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	1.032	4540.8	$699.28	6	0	No Change	172	1.03	0%	4540.8	$699.28	$0.00	$0.00	0.00	0	$0.00	0.00
563		4400	58	1	Recessed Down Light, 26w CFL Lamp	26	1.508	6635.2	$1,021.82	58	0	No Change	26	1.51	0%	6635.2	$1,021.82	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	D13 Office	2600	4	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.428	1112.8	$171.37	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.39	10%	1001.52	$154.23	$75.00	$75.00	0.04	111.28	$17.14	4.38
264.25		2600	2	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.344	894.4	$137.74	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	172	0.31	10%	804.96	$123.96	$75.00	$75.00	0.03	89.44	$13.77	5.45
222.25	Corridors	4400	89	2	2x4, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Direct/Indirect	62	5.518	24279.2	$3,739.00	89	0	No Change	62	5.52	0%	24279.2	$3,739.00	$0.00	$0.00	0.00	0	$0.00	0.00
264.25	Main Office	2600	8	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	1.376	3577.6	$550.95	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	172	1.24	10%	3219.84	$495.86	$160.00	$160.00	0.14	357.76	$55.10	2.90
264.25	Side Office	2600	1	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.172	447.2	$68.87	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	172	0.15	10%	402.48	$61.98	$75.00	$75.00	0.02	44.72	$6.89	10.89
264.25	Side Office	2600	3	6	Round, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., White Diffuser	172	0.516	1341.6	$206.61	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	172	0.46	10%	1207.44	$185.95	$75.00	$75.00	0.05	134.16	$20.66	3.63
111.11	Vault	2600	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	124.8	$19.22	1	0	No Change	48	0.05	0%	124.8	$19.22	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Copy Room/ Kitchen	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Guidance - Center Office	2600	8	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.496	1289.6	$198.60	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	$178.74	$160.00	$160.00	0.05	128.96	$19.86	8.06
111.11	Giudance - Conference Room	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Guidance- Side Office	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Copy Room	2600	1	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.033	85.8	$13.21	1	0	No Change	33	0.03	0%	85.8	$13.21	$0.00	$0.00	0.00	0	$0.00	0.00
327.23	Guidance - Library Hall	2600	7	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	0.217	564.2	$86.89	7	0	No Change	31	0.22	0%	564.2	$86.89	$0.00	$0.00	0.00	0	$0.00	0.00

242.11	Conference Room	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.321	834.6	$128.53	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.29	10%	751.14	$115.68	$75.00	$75.00	0.03	83.46	$12.85	5.84
111.11	Electrical Closet	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	57.6	$8.87	1	0	No Change	48	0.05	0%	57.6	$8.87	$0.00	$0.00	0.00	0	$0.00	0.00
613	Hall Closets	600	2	1	Industrial Fixture, 100w A19 Lamp	100	0.2	120	$18.48	2	0	No Change	100	0.20	0%	120	$18.48	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Security Office	8760	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.248	2172.48	$334.56	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	1955.232	$301.11	$75.00	$75.00	0.02	217.248	$33.46	2.24
562	Library	2600	11	1	Recessed Down Light, (1) 42w CFL Lamp	42	0.462	1201.2	$184.98	11	1	Dual Technology Occupancy Sensor - Remote Mnt.	42	0.42	10%	1081.08	$166.49	$160.00	$160.00	0.05	120.12	$18.50	8.65
222.21		2600	30	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.86	4836	$744.74	30	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.67	10%	4352.4	$670.27	$225.00	$225.00	0.19	483.6	$74.47	3.02
602		8760	2	2	Incandescent Exit Sign	20	0.04	350.4	$53.96	2	0	No Change	20	0.04	0%	350.4	$53.96	$0.00	$0.00	0.00	0	$0.00	0.00
211.11	Library Storage	1200	5	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.165	198	$30.49	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	33	0.15	10%	178.2	$27.44	$75.00	$75.00	0.02	19.8	$3.05	24.60
222.21	IT Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55
613	Electrical Room	800	2	1	Industrial Fixture, 100w A19 Lamp	100	0.2	160	$24.64	2	0	No Change	100	0.20	0%	160	$24.64	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Library Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55
652	Mezzanine	1200	9	1	"Industrial" Relector, 42w CFL	42	0.378	453.6	$69.85	9	1	Dual Technology Occupancy Sensor - Remote Mnt.	42	0.34	10%	408.24	$62.87	$160.00	$160.00	0.04	45.36	$6.99	22.90
327.24	Library Conference Room	2600	12	2	2x2 2 Lamp, 14w T5, Recessed Mnt., Direct/Indirect	31	0.372	967.2	$148.95	12	1	Dual Technology Occupancy Sensor - Switch Mnt.	31	0.33	10%	870.48	$134.05	$75.00	$75.00	0.04	96.72	$14.89	5.04
222.21	D3 Classroom	2600	10	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.62	1612	$248.25	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	$223.42	$160.00	$160.00	0.06	161.2	$24.82	6.45
613.1	D49 Storage	600	2	1	Industrial Fixture, 200w A19 Lamp	200	0.4	240	$36.96	2	0	No Change	200	0.40	0%	240	$36.96	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	D45 Classroom	2600	9	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.558	1450.8	$223.42	9	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.50	10%	1305.72	$201.08	$160.00	$160.00	0.06	145.08	$22.34	7.16
624	Auditorium	1800	28	1	Down Light, 200w Incandescent	200	5.6	10080	$1,552.32	28	0	No Change	200	5.60	0%	10080	$1,552.32	$0.00	$0.00	0.00	0	$0.00	0.00
622		1800	8	1	Wall Mnt., (1) 100w A19 Lamp	100	0.8	1440	$221.76	8	0	No Change	100	0.80	0%	1440	$221.76	$0.00	$0.00	0.00	0	$0.00	0.00
222.31	D37 Lecture Hall	2600	22	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	1.276	3317.6	$510.91	22	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	58	1.15	10%	2985.84	$459.82	$225.00	$225.00	0.13	331.76	$51.09	4.40
222.21	Waiting Area - Nurse	2600	3	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.186	483.6	$74.47	3	0	No Change	62	0.19	0%	483.6	$74.47	$0.00	$0.00	0.00	0	$0.00	0.00
211.11		2600	9	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	33	0.297	772.2	$118.92	9	1	Dual Technology Occupancy Sensor - Switch Mnt.	33	0.27	10%	694.98	$107.03	$75.00	$75.00	0.03	77.22	$11.89	6.31
111.11	Exam Room 1	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00

111.11	Exam Room 2	2600	2	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.096	249.6	$38.44	2	0	No Change	48	0.10	0%	249.6	$38.44	$0.00	$0.00	0.00	0	$0.00	0.00
3015	Nurse Rest Room	1200	1	1	Wall Mnt. !00w A Lamp	100	0.1	120	$18.48	1	0	No Change	100	0.10	0%	120	$18.48	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Nurse's Office	2600	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.321	834.6	$128.53	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.29	10%	751.14	$115.68	$75.00	$75.00	0.03	83.46	$12.85	5.84
623	Lobby Bulletin Board	2600	4	1	Recessed "Wall Washer", 65w BR30	60	0.24	624	$96.10	4	0	No Change	60	0.24	0%	624	$96.10	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	A1 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.364	3546.4	$546.15	22	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.23	10%	3191.76	$491.53	$225.00	$225.00	0.14	354.64	$54.61	4.12
221.31	A4 & A1 Prep Room	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.496	1289.6	$198.60	8	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.45	10%	1160.64	$178.74	$160.00	$160.00	0.05	128.96	$19.86	8.06
221.31	A4 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.426	3707.6	$570.97	23	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.28	10%	3336.84	$513.87	$225.00	$225.00	0.14	370.76	$57.10	3.94
221.31	A6 Classroom	2600	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.736	4513.6	$695.09	28	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.56	10%	4062.24	$625.58	$225.00	$450.00	0.17	451.36	$69.51	6.47
651	A6 Storage & Rear Exit	2600	2	1	"Industrial" Relector, 26w CFL	26	0.052	135.2	$20.82	2	0	No Change	26	0.05	0%	135.2	$20.82	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	A11 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.364	3546.4	$546.15	22	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.23	10%	3191.76	$491.53	$225.00	$225.00	0.14	354.64	$54.61	4.12
221.31	A11 & A13 Prep Room	2600	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.372	967.2	$148.95	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.33	10%	870.48	$134.05	$160.00	$160.00	0.04	96.72	$14.89	10.74
221.31	A13 Classroom	2600	25	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.55	4030	$620.62	25	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.40	10%	3627	$558.56	$225.00	$225.00	0.16	403	$62.06	3.63
651	A13 Storage	1200	1	1	"Industrial" Relector, 26w CFL	26	0.026	31.2	$4.80	1	0	No Change	26	0.03	0%	31.2	$4.80	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	A16 Classroom	2600	22	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.364	3546.4	$546.15	22	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.23	10%	3191.76	$491.53	$225.00	$225.00	0.14	354.64	$54.61	4.12
221.31	A17 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.992	2579.2	$397.20	16	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.89	10%	2321.28	$357.48	$225.00	$225.00	0.10	257.92	$39.72	5.66
221.31	A41 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.992	2579.2	$397.20	16	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.89	10%	2321.28	$357.48	$225.00	$225.00	0.10	257.92	$39.72	5.66
221.31	A42 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	5 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal)	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
221.31	A45 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$372.37	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	$335.13	$225.00	$225.00	0.09	241.8	$37.24	6.04

221.31	A46 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$372.37	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	$335.13	$225.00	$225.00	0.09	241.8	$37.24	6.04
221.31	A49 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
221.31	A53 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$372.37	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	$335.13	$225.00	$225.00	0.09	241.8	$37.24	6.04
221.31	A51 Classroom	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$446.85	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	$402.16	$225.00	$225.00	0.11	290.16	$44.68	5.04
221.31	A50 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
221.31	A55 Classroom	2600	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.116	2901.6	$446.85	18	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.00	10%	2611.44	$402.16	$225.00	$225.00	0.11	290.16	$44.68	5.04
221.31	A57 Classroom	2600	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.62	1612	$248.25	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	$223.42	$160.00	$160.00	0.06	161.2	$24.82	6.45
221.31	A58 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$372.37	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	$335.13	$225.00	$225.00	0.09	241.8	$37.24	6.04
221.31	A56 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
221.31	A61 Classroom	2600	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.93	2418	$372.37	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.84	10%	2176.2	$335.13	$225.00	$225.00	0.09	241.8	$37.24	6.04
221.31	A62 Classroom	2600	14	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.868	2256.8	$347.55	14	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.78	10%	2031.12	$312.79	$225.00	$225.00	0.09	225.68	$34.75	6.47
652	Custodial Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.042	50.4	$7.76	1	0	No Change	42	0.04	0%	50.4	$7.76	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	A35 Youth Center	2600	13	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.806	2095.6	$322.72	13	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.73	10%	1886.04	$290.45	$225.00	$225.00	0.08	209.56	$32.27	6.97
242.21	Youth Center Office	2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	556.4	$85.69	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.19	10%	500.76	$77.12	$75.00	$75.00	0.02	55.64	$8.57	8.75
222.21	Group Room	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55
222.21	A24 Office	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55

221.31	A36 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
221.31	A37 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
613.1	A38 Book Room	1200	2	1	Industrial Fixture, 200w A19 Lamp	200	0.4	480	$73.92	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	200	0.36	10%	432	$66.53	$75.00	$75.00	0.04	48	$7.39	10.15
222.21	Men's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
613.1	Custodial Closet	1200	1	1	Industrial Fixture, 200w A19 Lamp	200	0.2	240	$36.96	1	0	No Change	200	0.20	0%	240	$36.96	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Women's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
221.31	A21 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
613.1	A20 Book Room	2600	2	1	Industrial Fixture, 200w A19 Lamp	200	0.4	1040	$160.16	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	200	0.36	10%	936	$144.14	$75.00	$75.00	0.04	104	$16.02	4.68
221.31	A22 Classroom	2600	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.054	2740.4	$422.02	17	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.95	10%	2466.36	$379.82	$225.00	$225.00	0.11	274.04	$42.20	5.33
222.21	A23 Work Room	2600	12	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.744	1934.4	$297.90	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.67	10%	1740.96	$268.11	$160.00	$160.00	0.07	193.44	$29.79	5.37
222.21	Copy/ Break Room	2600	6	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.372	967.2	$148.95	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.33	10%	870.48	$134.05	$75.00	$75.00	0.04	96.72	$14.89	5.04
100	Hall	2600	2	2	3' Channel, 2-Lamp, 30w T12, Mag. Ballast, Surface Mnt., No Lens	60	0.12	312	$48.05	2	0	No Change	60	0.12	0%	312	$48.05	$0.00	$0.00	0.00	0	$0.00	0.00
3015	Rest Room - Break Room	2600	2	1	Wall Mnt. !00w A Lamp	100	0.2	520	$80.08	2	0	No Change	100	0.20	0%	520	$80.08	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	C13 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.426	3707.6	$570.97	23	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.28	10%	3336.84	$513.87	$225.00	$225.00	0.14	370.76	$57.10	3.94
222.21	C13 Office	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
222.21	C11 Editing	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	$99.30	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.22	10%	580.32	$89.37	$75.00	$75.00	0.02	64.48	$9.93	7.55
221.31	C10 Comp. Lab	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.798	4674.8	$719.92	29	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.62	10%	4207.32	$647.93	$225.00	$225.00	0.18	467.48	$71.99	3.13
221.31	C9 Comp. Lab	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.798	4674.8	$719.92	29	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.62	10%	4207.32	$647.93	$225.00	$225.00	0.18	467.48	$71.99	3.13

222.21	C15 Classroom	2600	10	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.62	1612	$248.25	10	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.56	10%	1450.8	$223.42	$160.00	$160.00	0.06	161.2	$24.82	6.45
221.31	C18 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.426	3707.6	$570.97	23	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.28	10%	3336.84	$513.87	$225.00	$225.00	0.14	370.76	$57.10	3.94
221.31	C19 Classroom	2600	29	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.798	4674.8	$719.92	29	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.62	10%	4207.32	$647.93	$225.00	$225.00	0.18	467.48	$71.99	3.13
221.31	C35 Shop	2600	33	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.046	5319.6	$819.22	33	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.84	10%	4787.64	$737.30	$225.00	$225.00	0.20	531.96	$81.92	2.75
221.31	C33 Classroom	2600	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.426	3707.6	$570.97	23	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.28	10%	3336.84	$513.87	$225.00	$225.00	0.14	370.76	$57.10	3.94
221.31	C30 Classroom	2600	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.178	3062.8	$471.67	19	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.06	10%	2756.52	$424.50	$225.00	$225.00	0.12	306.28	$47.17	4.77
221.31	C37 Classroom	2600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.992	2579.2	$397.20	16	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	0.89	10%	2321.28	$357.48	$225.00	$225.00	0.10	257.92	$39.72	5.66
221.31	C38 Classroom	2600	39	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.418	6286.8	$968.17	39	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	2.18	10%	5658.12	$871.35	$225.00	$450.00	0.24	628.68	$96.82	4.65
221.11	C38 Office	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
652	Custodial Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.042	50.4	$7.76	1	0	No Change	42	0.04	0%	50.4	$7.76	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Men's Rest Room	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
652	Electrical Closet	1200	1	1	"Industrial" Relector, 42w CFL	42	0.042	50.4	$7.76	1	0	No Change	42	0.04	0%	50.4	$7.76	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	C42 Shop	2600	46	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.852	7415.2	$1,141.94	46	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	2.57	10%	6673.68	$1,027.75	$225.00	$450.00	0.29	741.52	$114.19	3.94
221.11	C42 Office	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.124	322.4	$49.65	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.11	10%	290.16	$44.68	$75.00	$75.00	0.01	32.24	$4.96	15.11
652	C42 Storage	1200	2	1	"Industrial" Relector, 42w CFL	42	0.084	100.8	$15.52	2	0	No Change	42	0.08	0%	100.8	$15.52	$0.00	$0.00	0.00	0	$0.00	0.00
652	Finishing Room	2600	2	1	"Industrial" Relector, 42w CFL	42	0.084	218.4	$33.63	2	0	No Change	42	0.08	0%	218.4	$33.63	$0.00	$0.00	0.00	0	$0.00	0.00
122.21	Girl's Rest Room	2600	1	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.078	202.8	$31.23	1	0	No Change	78	0.08	0%	202.8	$31.23	$0.00	$0.00	0.00	0	$0.00	0.00
222.21		2600	1	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.062	161.2	$24.82	1	0	No Change	62	0.06	0%	161.2	$24.82	$0.00	$0.00	0.00	0	$0.00	0.00

221.31	C51 Shop	2600	34	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	2.108	5480.8	$844.04	34	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.90	10%	4932.72	$759.64	$225.00	$450.00	0.21	548.08	$84.40	5.33
621	C51 Rest Room	2600	1	1	Recessed Light, 100w A Lamp	100	0.1	260	$40.04	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	100	0.09	10%	234	$36.04	$75.00	$75.00	0.01	26	$4.00	18.73
222.31	C25 Classroom	2600	23	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	58	1.334	3468.4	$534.13	23	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	58	1.20	10%	3121.56	$480.72	$225.00	$225.00	0.13	346.84	$53.41	4.21
221.31	C26 Classroom	2600	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.178	3062.8	$471.67	19	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.06	10%	2756.52	$424.50	$225.00	$225.00	0.12	306.28	$47.17	4.77
221.31	C5 Classroom	2600	32	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.984	5158.4	$794.39	32	2	Dual Tech. Occupancy Sensor w/2 Pole Powerpack remote mount	62	1.79	10%	4642.56	$714.95	$225.00	$450.00	0.20	515.84	$79.44	5.66
111.11		2600	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	124.8	$19.22	1	0	No Change	48	0.05	0%	124.8	$19.22	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	C5 Rest Room	1200	1	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	0.048	57.6	$8.87	1	0	No Change	48	0.05	0%	57.6	$8.87	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	C5 Storage	1200	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.107	128.4	$19.77	1	0	No Change	107	0.11	0%	128.4	$19.77	$0.00	$0.00	0.00	0	$0.00	0.00
705		4400	17	1	70w MH, Architectural Wall Mnt.	92	1.564	6881.6	$1,059.77	17	0	No Change	92	1.56	0%	6881.6	$1,059.77	$0.00	$0.00	0.00	0	$0.00	0.00
725	Exterior	4400	10	1	150w HPS Wallpack	188	1.88	8272	$1,273.89	10	0	No Change	188	1.88	0%	8272	$1,273.89	$0.00	$0.00	0.00	0	$0.00	0.00
713		4400	4	1	100w HPS 1x1 w/Prismatic Lens	125	0.5	2200	$338.80	4	0	No Change	125	0.50	0%	2200	$338.80	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		**1,712**	**312**			**130.2**	**358,112.5**	**$55,149**	**1,712**	**100**			**122.2**		**337,219.7**	**$51,931.84**		**$16,575**	**8.03**	**20,893**	**$3,217**	**5.15**

Project Name: LGEA Solar PV Project - Salem BOE High School
Location: Salem, NJ
Description: Photovoltaic System - Direct Purchase

Simple Payback Analysis

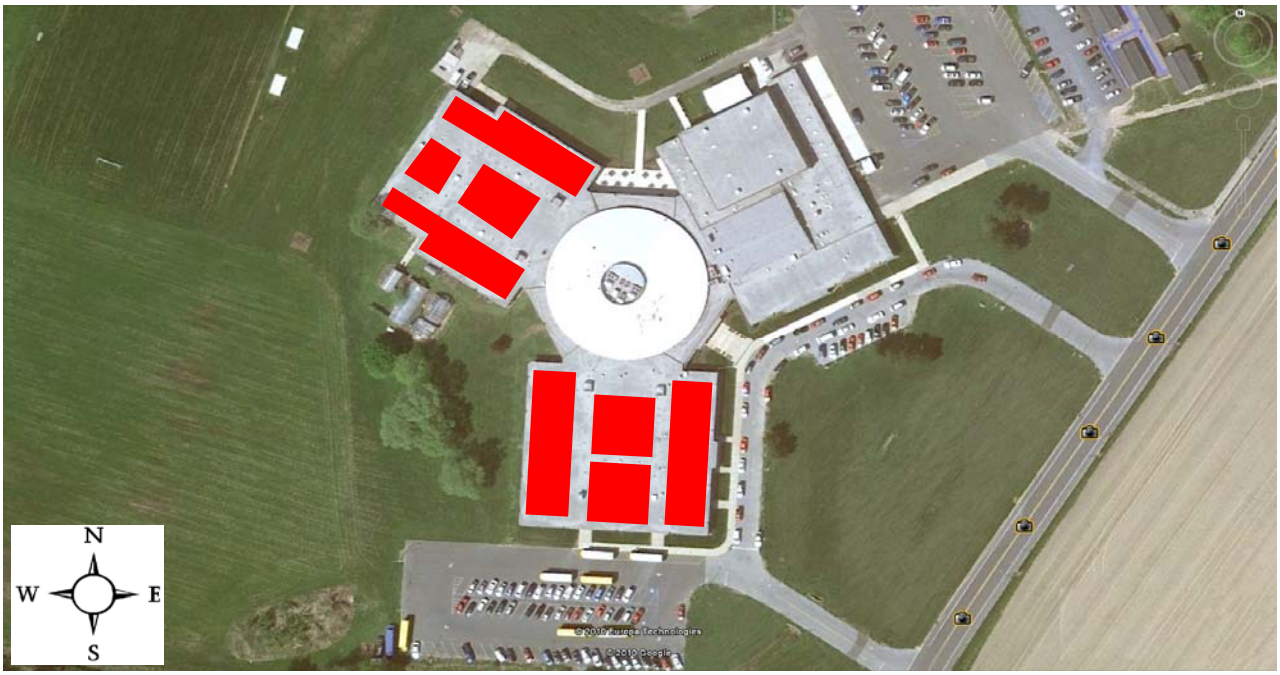
	Photovoltaic System - Direct Purchase
Total Construction Cost	$3,802,590
Annual kWh Production	556,647
Annual Energy Cost Reduction	$85,724
Annual SREC Revenue	$194,826
First Cost Premium	**$3,802,590**
Simple Payback:	**13.55** **Years**

Life Cycle Cost Analysis

Analysis Period (years):	25	Financing %:	0%
Financing Term (mths):	0	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.154**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	0.00%	SREC Value ($/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	$3,802,590	0	0	0	$0	(3,802,590)	0
1	$0	556,647	$85,724	$0	$194,826	$280,550	($3,522,040)
2	$0	553,864	$88,295	$0	$193,852	$282,148	($3,239,892)
3	$0	551,094	$90,944	$0	$192,883	$283,827	($2,956,065)
4	$0	548,339	$93,673	$0	$191,919	$285,591	($2,670,474)
5	$0	545,597	$96,483	$5,620	$190,959	$281,822	($2,388,652)
6	$0	542,869	$99,377	$5,592	$190,004	$283,790	($2,104,862)
7	$0	540,155	$102,359	$5,564	$189,054	$285,849	($1,819,013)
8	$0	537,454	$105,429	$5,536	$188,109	$288,002	($1,531,010)
9	$0	534,767	$108,592	$5,508	$187,168	$290,252	($1,240,758)
10	$0	532,093	$111,850	$5,481	$186,233	$292,602	($948,156)
11	$0	529,433	$115,205	$5,453	$185,301	$295,054	($653,102)
12	$0	526,785	$118,662	$5,426	$184,375	$297,611	($355,492)
13	$0	524,152	$122,221	$5,399	$183,453	$300,276	($55,216)
14	$0	521,531	$125,888	$5,372	$182,536	$303,052	$247,836
15	$0	518,923	$129,665	$5,345	$181,623	$305,943	$553,779
16	$0	516,328	$133,555	$5,318	$180,715	$308,951	$862,730
17	$0	513,747	$137,561	$5,292	$179,811	$312,081	$1,174,811
18	$0	511,178	$141,688	$5,265	$178,912	$315,335	$1,490,147
19	$0	508,622	$145,939	$5,239	$178,018	$318,718	$1,808,865
20	$0	506,079	$150,317	$5,213	$177,128	$322,232	$2,131,097
21	$1	503,549	$154,826	$5,187	$176,242	$325,882	$2,456,978
22	$2	501,031	$159,471	$5,161	$175,361	$329,671	$2,786,650
23	$3	498,526	$164,255	$5,135	$174,484	$333,605	$3,120,254
24	$4	496,033	$169,183	$5,109	$173,612	$337,685	$3,457,940
25	$5	493,553	$174,259	$5,084	$172,744	$341,918	$3,799,858
	Totals:	13,112,350	$3,125,421	$112,295	$4,589,322	$7,602,448	$406,215
				Net Present Value (NPV)		**$3,799,883**	
				Internal Rate of Return (IRR)		**6.0%**	

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 BOE High School	30000	Sunpower SPR230	1837	14.7	27,011	422.51	556,647	60,621	15.64



Proposed PV Layout

PVWatts

AC Energy & Cost Savings

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	422.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	342.2 kW
Array Type:	Fixed Tilt
Array Tilt:	39.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.4 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.61	39824	6132.90
2	4.20	41461	6384.99
3	4.78	50024	7703.70
4	5.23	51377	7912.06
5	5.44	53930	8305.22
6	5.48	50479	7773.77
7	5.55	52190	8037.26
8	5.41	51423	7919.14
9	5.23	49216	7579.26
10	4.60	46024	7087.70
11	3.59	36564	5630.86
12	3.17	34135	5256.79
Year	4.69	556647	85723.64

Note: Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1

MELINK CORPORATION

INTELLI-HOOD VARIABLE EXHAUST CONTROLLER

ENERGY SAVINGS REPORT

COMPANY: CEG

RETROFIT

ADDRESS: Salem High School

Salem, NJ Dec-15-10

APPLICATION: Main Kitchen

- MOTOR OPERATING SAVINGS:	$398	/YEAR
- HEATING SAVINGS:	$2,386	/YEAR
- COOLING SAVINGS:	$441	/YEAR
- TOTAL SAVINGS:	$3,225	/YEAR
- INSTALLED COST:	$29,500	
- PAYBACK PERIOD:	9.1	YEARS
- RATE OF RETURN - 5 YEARS:	-15.5	%
10 YEARS:	4.1	%

The projected savings shown above are based on the above store's operating hours, HVAC system, cooking load, and geographic location.

I. MOTOR OPERATING SAVINGS

INPUT DATA:

A Operating Hours Per Day	9	HRS/DAY
B Operating Days Per Week	5	DAYS/WK
C Operating Weeks Per Year	42	WKS/YR
D Horsepower of Fan Motor(s)	3	HP
E Load Factor of Fan Motor(s)	0.88	
F Cost Per Kilowatt Hour	0.154	$/KWHR

CONSTANT EXHAUST VOLUME ANALYSIS:

G Total Time (A x B x C)	1890	HRS/YR
H Total KWHR/HP/YR (0.746/0.9 x G)	1566.6	KWHR/HP/YR

VARIABLE EXHAUST VOLUME ANALYSIS:

% Rated RPM H	% Run Time I	Time HRS/YR J=FxI	Output KW/HP K	System Effic. L	Input KW/HP M=K/L	KWHR/ HP/YR N=JxM
100	5	94.5	0.746	0.9	0.829	78.3
90	15	283.5	0.544	0.9	0.604	171.4
80	15	283.5	0.382	0.9	0.424	120.3
70	20	378	0.256	0.9	0.284	107.5
60	25	472.5	0.161	0.9	0.179	84.5
50	10	189	0.093	0.9	0.103	19.5
40	5	94.5	0.048	0.9	0.053	5.0
30	5	94.5	0.020	0.9	0.022	2.1
20	0	0	0.015	0.9	0.017	0.0
10	0	0	0.010	0.90	0.011	0.0
O Total KWH/HP/YR (Total of Column N)						588.7

CALCULATION:

SAVINGS = (H - O) x D x E x F = $398 /YEAR

==========

II. CONDITIONED MAKE-UP AIR - HEATING

INPUT DATA:

A Previous Net Exhaust Volume	10150	CFM
B New Net Exhaust Volume (1)	6902	CFM
C Winter Building Temperature	70	F
D Previous Net Heat Load (2)	275467	kBTU
E New Net Heat Load (2)	187317	kBTU
F Operating Hours Per Day	9	HRS/DAY
G Operating Days Per Week	5	DAYS/WK
- Heating Fuel Type	Electricity	
H Cost Per Fuel Unit (3)	0.154	$/UNIT
J BTU Per Fuel Unit (4)	3.413	kBTU/UNIT
K System Efficiency (4)	100%	

CALCULATION:

SAVINGS = (D - E) x 0.6 x H / (J x K)

= $2,386 /YEAR

==========

NOTES:

(1) Determine the New Exhaust Volume by completing TABLE 1. The New Exhaust Volume equals the AVG % RPM x the Previous Exhaust Volume.

(2) Using design weather data via the Outdoor Airload Calculator and multiplied by days/year ratio.

(3) Using local energy costs.

(4) Using typical system efficiency.

TABLE 1

% Rated RPM (F)	% Run Time (I)	F x I
100	5	5
90	15	14
80	15	12
70	20	14
60	25	15
50	10	5
40	5	2
30	5	2
20	0	0
10	0	0
AVG % RPM =		68%

III. CONDITIONED MAKE-UP AIR SAVINGS - COOLING

INPUT DATA:

A Previous Net Exhaust Volume	10150	CFM
B New Net Exhaust Volume (1)	6902	CFM
C Previous Net Cooling Load (2)	126738.74	kBTU
D New Net Cooling Load (2)	86182	kBTU
E AC Correction Factor (3)	1	
F Cost Per Fuel Unit (5)	0.154	$/kWH
G COP (6)	2.5	

CALCULATION:

SAVINGS = (C - D) x 0.6 x E x F / (3.413 x G)

= $441 /YEAR
==========

NOTES:

(1) Using New Exhaust Volume from CONDITIONED MAKE-UP AIR SAVINGS - HEATING on page 2. See Note 1.

(2) Obtained from Outdoor Airload Calculator

(3) Using design weather data.

(4) The multiplier corrects for actual % outside air.

(5) Using local energy costs.

(6) Using typical system efficiency.

AFTER-TAX CASH FLOW ANALYSIS

INPUT DATA:

FIRST YEAR SAVINGS	$3,225 /YEAR
INITIAL COST PLUS INSTALLATION	$29,500
MARGINAL TAX RATE	0%
ESTIMATED ANNUAL INCREASE IN ENERGY COSTS	3%

YEAR	SAVINGS	COST	DEPREC. %	DEPREC. $	NET AFTER-TAX CASH FLOW
0		-29,500			-29,500
1	3225	-	29	8555	3225
2	3322	-	20	5900	3322
3	3421	-	13	3835	3421
4	3524	-	10	2950	3524
5	3630	-	9	2655	3630
6	3739	-	9	2655	3739
7	3851	-	9	2655	3851
8	3966	-			3966
9	4085	-			4085
10	4208	-			4208

CALCULATIONS:

NET PRESENT VALUE = 5 YEARS @ 15%	-$15,752 ;	INTERNAL RATE OF RETURN (IRR) =	-15.5 %
NET PRESENT VALUE = 10 YEARS @ 15%	-$10,046 ;	INTERNAL RATE OF RETURN (IRR) =	4.1 %

NOTE:

Net After-tax Cash Flow is calculated as follows:
NATCF = SAVINGS - COSTS - TAX RATE(SAVINGS - COSTS - DEPRECIATION)

Net Present Value is calculated as follows:
NPV = C(0) + C(1)/(1 + r) + C(2)/(1 + r)^2 + ... + C(n)/(1 + r)^n
(where C(n) is the net cash flow for the nth year
and r is the opportunity cost of capital)

IRR is calculated by trial and error using the formula:
NPV = C(0) + C(1)/(1 + IRR) + C(2)/(1 + IRR)^2 + ... + C(n)/(1 + IRR)^n

Solar Thermal Calculations

Concord Engineering Group

Salem High School

SOLAR THERMAL SYSTEM CALCULATIONS (FLAT PLATE COLLECTORS)

Solar Thermal Panel SF:	800
Solar Panel Qty:	17
Panel Direction:	180° (South)
Tilt Angle (degree from horizontal):	40.7°
Ave Solar Thermal Operating Temperature:	90
Panel Area (SF per panel):	48

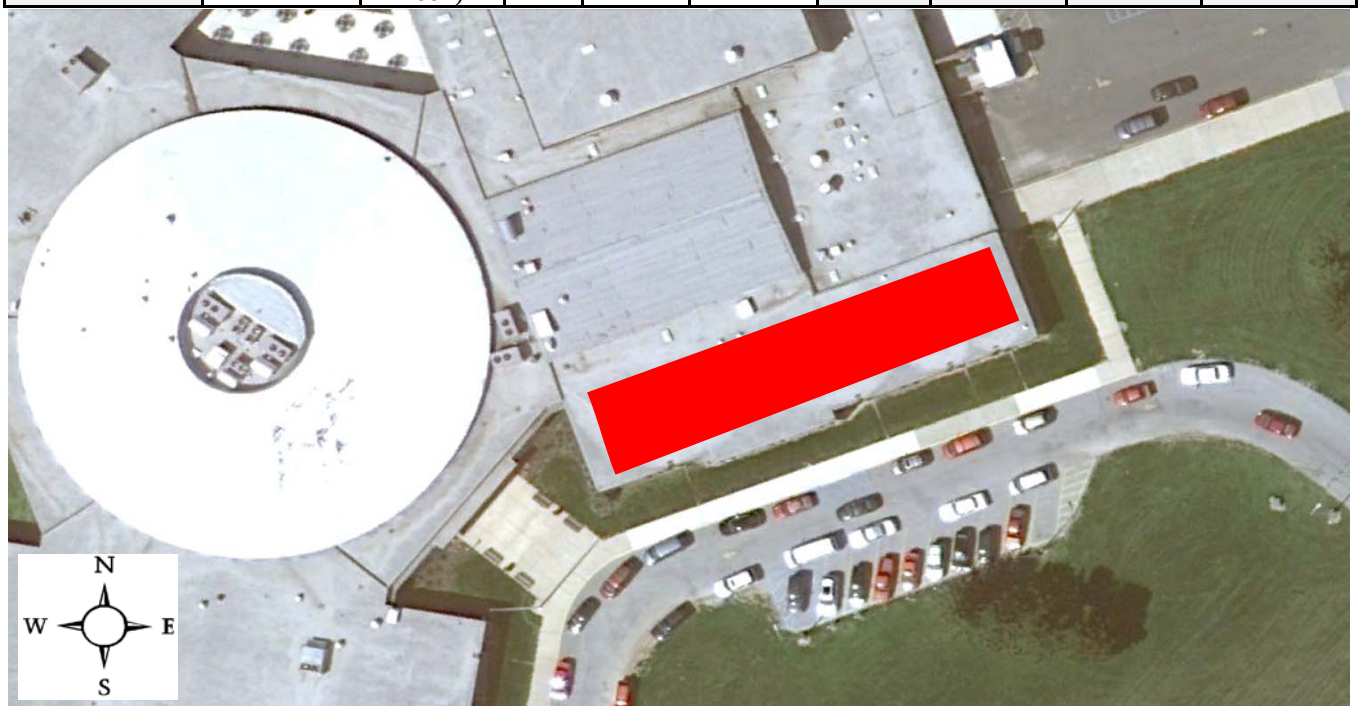
*Solar Panel Efficiencies are based on Viesmann Flat Plate collector model VITOSOL 200F

Month	AMB T	AVE ΔT	SOLAR RADIATION			DHW PRODUCTION		
	(°F)	(°F)	KWH/M^2/Day	KWH/SF/Day	Panel Eff.	Net KWH/SF/Day	Net KWH	Net kBtu
1	33	57	3.48	0.323	43.8%	0.142	3,451	11,781
2	31	59	4.46	0.414	43.8%	0.182	4,423	15,099
3	48	42	4.78	0.444	52.3%	0.232	5,659	19,320
4	55	35	5.13	0.477	55.2%	0.263	6,402	21,857
5	61	29	5.34	0.496	60.8%	0.302	7,349	25,089
6	70	20	5.73	0.532	63.7%	0.339	8,253	28,175
7	80	10	5.57	0.517	69.3%	0.359	*4,368*	14,913
8	85	5	5.7	0.530	72.2%	0.382	*4,653*	15,885
9	75	15	5.02	0.466	66.5%	0.310	7,552	25,782
10	65	25	4.71	0.438	60.8%	0.266	6,482	22,129
11	47	43	3.5	0.325	52.3%	0.170	4,144	14,146
12	36	54	2.88	0.268	46.7%	0.125	3,040	10,380
TOTALS							**65,774**	**224,554**
AVERAGE			**4.69**	**0.436**		**0.256**	**5,481**	**18,713**

Notes: Solar radiation values obtained from National Renewable Energy Laboratory PVWatts Version 1 Calculator Program
Assumed 50% of production utilized during July and August.

Solar Thermal System Panel Layout

Building	Net Panel Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Average kWh (heat)	Total Annual kWh (heat)	Average kBtu (heat)	Total Annual kBtu (heat)
Salem High School	800	Viesmann Flat Plate (VITOSOL 200F)	17	48.0	816	5,481	65,774	18,713	224,554



.= Proposed Solar Thermal Layout

Notes:

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