# LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

**PREPARED FOR:**

**MT. OLIVE TWP. SCHOOL DISTRICT**
**CHESTER M. STEPHENS ELEMENTARY SCHOOL**

**99 SUNSET DRIVE**
**BUDD LAKE, NJ, 07828**

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# I. EXECUTIVE SUMMARY

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

Mount Olive Township School District
Chester M. Stephens Elementary School
99 Sunset Drive,
Budd Lake, NJ, 07828

Municipal Contact Person: Mr. Thomas Scerbo

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 | $115,059 |
| Natural Gas | $58,786 |
| Total | $173,845 |

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 Upgrade - Classrooms and Offices | $4,620 | $1,020 | 4.5 | 231.0% |
| ECM #2 | Lighting Upgrade - Gymnasium | $4,260 | $1,640 | 2.6 | 477.5% |
| ECM #3 | Lighting Occupancy Sensors / Daylight Sensors | $12,160 | $3,095 | 3.9 | 281.8% |
| ECM #4 | Replace CRT Monitors | $8,200 | $1,497 | 5.5 | 173.9% |
| ECM #5 | Replace 3-Ton Rooftop AC Unit | $9,724 | $204 | 47.7 | -68.6% |
| ECM #6 | Install Gas Fired Hot Water Heaters | $18,800 | $3,512 | 5.4 | 180.2% |
| ECM #7 | Replace Sanyo Mini Split Units | $17,072 | $2,490 | 6.9 | 118.8% |
| ECM #8 | Replace Windows | $450,000 | $11,208 | 40.1 | -62.6% |
| ECM #9 | Premium Efficiency Motors | $1,269 | $91 | 14.0 | 7.1% |
| **RENEWABLE ENERGY MEASURES (REM's)** | | | | | |
| **ECM NO.** | **DESCRIPTION** | **NET INSTALLATION COST** | **ANNUAL SAVINGS** | **SIMPLE PAYBACK (Yrs)** | **SIMPLE LIFETIME ROI** |
| REM #1 | Solar PV Installation | $1,863,000 | $131,438 | 14.2 | 5.8% |

**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 Upgrade - Classrooms and Offices | 2.0 | 6,008 | 0 |
| ECM #2 | Lighting Upgrade - Gymnasium | 3.2 | 10,195 | 0 |
| ECM #3 | Lighting Occupancy Sensors / Daylight Sensors | 6.7 | 19,237 | 0 |
| ECM #4 | Replace CRT Monitors | 0.0 | 9,299 | 0 |
| ECM #5 | Replace 3-Ton Rooftop AC Unit | 0.7 | 1,234 | 0 |
| ECM #6 | Install Gas Fired Hot Water Heaters | 0 | 32,461 | (1,166) |
| ECM #7 | Replace Sanyo Mini Split Units | 2.7 | 8,072 | 0 |
| ECM #8 | Replace Windows | 0 | 0 | 7,625 |
| ECM #9 | Premium Efficiency Motors | 0.2 | 563 | 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 | 165.6 | 257,217 | 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 Upgrade - Classrooms and Offices
- **ECM #2** Lighting Upgrade - Gymnasium
- **ECM #3** Lighting Occupancy Sensors / Daylight Sensors
- **ECM #4** Replace CRT Monitors
- **ECM #6** Install Condensing Hot Water Heater
- **ECM #7** Replace Ductless Mini Split Units

**ECM #1 Lighting Upgrade - Classrooms and Offices**

The majority of the lighting in the Chester M. Stephens Elementary School building was updated to modern fluorescent fixtures. However, there are still some older fluorescent fixtures with T12 lamps and incandescent bulbs in a number of the areas such as corridors, equipment rooms, classrooms, utility closets and storage areas. T8 lamps with electronic ballasts use less energy while providing longer equipment life. In addition, compact fluorescent lamps provide a simple and easy way to reduce electrical energy incandescent lamps use. CEG recommends retrofitting remaining T12 fixtures with T8 lamps and electronic ballasts and replacing all of the incandescent lamps with compact fluorescent lamps. This ECM has a simple payback of 4.5 years.

**ECM #2 Lighting Upgrade – Gymnasium**

The existing metal halide fixtures in the gymnasium provide adequate light for the space, however with a few drawbacks that should be considered. In addition to the color, and operability drawbacks, the existing metal halide fixtures use approximately 30% more energy than a T-5 HO fixture to provide the equivalent light. Overall savings for this ECM is approximately $1,640 per year and pays back in 2.6 years.

**ECM #3 Lighting Occupancy Sensors / Daylight 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. Daylight Sensors were included in this ECM to show the relative effect of daylight harvesting in addition to occupancy sensors. The combination of both options still pays back in 3.9 years and therefore is recommended to be installed.

**ECM #4 Replace CRT Monitors**

Some of the computers in the building utilize CRT computer monitors. This type of monitors are outdated and have several disadvantages such as; significantly increased energy consumption,

large amount of desk space usage, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of the drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves energy as well as provides other ergonomic benefits. This ECM has a simple payback of 5.5 years and it is recommended for the building.

**ECM #6 Install Condensing Hot Water Heater**

Condensing hot water heaters are a low cost approach to providing efficient hot water to the facility. The savings for this ECM is based on the fuel switching from electric heat to natural gas, which is from an expensive source of energy (electricity) to one inexpensive source (natural gas). This ECM pays back quickly in 5.4 years. The installation for new condensing hot water heaters is extremely straight forward and can be implemented by almost any plumbing contractor.

**ECM #7 Replace Dutcless Mini Split Units**

Two computer rooms and two classrooms are conditioned with older ductless mini split air conditioning units. Typically ductless mini split AC units are very efficient compared to other types of packaged air conditioners. However, newer mini split units provide even higher full load and part load efficiencies due to the advances in inverter motor technologies, more efficient heat exchangers and refrigerants. Current efficiencies are as high as SEER 18 for typical 2-Ton units and SEER 25 for typical 1-Ton systems. It is recommended to implement both ECMs, which has a simple payback of 6.9 years.

**Renewable Energy Analysis**

Renewable Energy Measures (REMs) were also reviewed for implementation at the Chester Stephens Elementary School. CEG utilized a roof mounted solar array to house a substantial PV system. The recommended 207 kW PV system will produce approximately 257,000 kWh of electricity annually and will reduce the schools electrical consumption from the grid by 36%. The system's calculated simple payback of 14.2 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.

**Retro-Commissioning**

In addition to the above recommendations, based on the review of the facility's energy bills and discussions with the School District, the energy audit team recommends Retro-Commissioning of this facility to meet the following objectives:

- Bring existing HVAC equipment to its proper operational state including air and water distribution systems
- Reduce energy use and energy costs
- Improve indoor air quality
- 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
- Identify the location of the most comfort problems or trouble spots in the building
- Review current O&M practices

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**

To provide assistance to small public entities in the effort to implement valuable ECMs, the NJ Clean Energy program in combination with the BPU has initiated the "Direct Install Program". This program provides extremely large incentives to facilities such as the Chester M. Stephens Elementary School building, to jump start energy projects. The direct install program offers incentives up to 60% of the installation costs through the services of pre-approved contractors. The program is directed towards one for one replacement projects that save energy and provide valuable upgrades for the facility for only 40% of the installation cost. Moreover, the program currently has a 200 kW maximum demand limit for applicability. This demand limit is capable of being waived if the School District is able to receive a portion of their respective Township Local Government's American Recovery and Reinvestment Act (ARRA) funding towards energy efficiency improvements. Therefore, for facilities over the 200 kW maximum demand limit, such as Mountain View Elementary School, the School District will need to coordinate Direct Install efforts with the Township's Local Government.

**Conclusion**

Overall, the Chester M. Stephens Elementary 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 Mt. Olive BOE will realize further energy savings at the Chester M. Stephens Elementary School.

## II. INTRODUCTION

The comprehensive energy audit covers the 88,745 square foot Chester M. Stephens Elementary School, which includes classrooms, library, kindergarten, cafeteria, gymnasium, multi-purpose rooms, art room, music room, restrooms, kitchen, storage spaces, maintenance shop and administration offices.

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:

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

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

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

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

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

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

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

# IV. HISTORIC ENERGY CONSUMPTION/COST

## A. Energy Usage / Tariffs

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

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

The gas usage profile shows the actual natural gas energy usage for the facility. New Jersey Natural Gas (NJNG) provides natural gas to the facility under the General Service Large (GSL) transport service rate structure. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

The third party commodity provider Pepco was responsible for providing the supply of gas to the building. The facility switched to a HESS as the new commodity provider starting from July 2010. Commodity (Supply) and delivery is billed separately for each respective utility service.

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

| Description | Average |
|---|---|
| Electricity | 16.1¢ / kWh |
| Natural Gas | $1.47 / Therm |

**Table 3**
**Electricity Billing Data**

**ELECTRIC USAGE SUMMARY**

Utility Provider: Jersey Central Power & Light (JCPL)
Rate: General Service Secondary 3 Phase
Meter No: G15131139
Customer ID No: 100000708675
Third Party Utility Provider: -
TPS Meter / Acct No: -

| MONTH OF USE | CONSUMPTION | DEMAND | TOTAL BILL |
|---|---|---|---|
| Sep-09 | 51,600 | 230.4 | $8,772 |
| Oct-09 | 54,800 | 223.2 | $9,048 |
| Nov-09 | 60,000 | 193.6 | $9,556 |
| Dec-09 | 82,000 | 201.6 | $12,622 |
| Jan-10 | 93,600 | 215.6 | $14,313 |
| Feb-10 | 60,000 | 239.2 | $9,870 |
| Mar-10 | 73,200 | 205.6 | $11,451 |
| Apr-10 | 45,200 | 202.8 | $7,596 |
| May-10 | 51,600 | 186.4 | $8,363 |
| Jun-10 | 52,000 | 189.6 | $8,528 |
| Jul-10 | 56,000 | 218.0 | $9,281 |
| Aug-10 | 35,200 | 111.2 | $5,660 |
| **Totals** | **715,200** | **239.2 Max** | **$115,059** |

**AVERAGE DEMAND** **201.4 KW average**
**AVERAGE RATE** **$0.161** **$/kWh**

**Figure 1**
**Electricity Usage Profile**
**Chester M. Stephens Elementary School**
**Sep-09 through Aug-10**

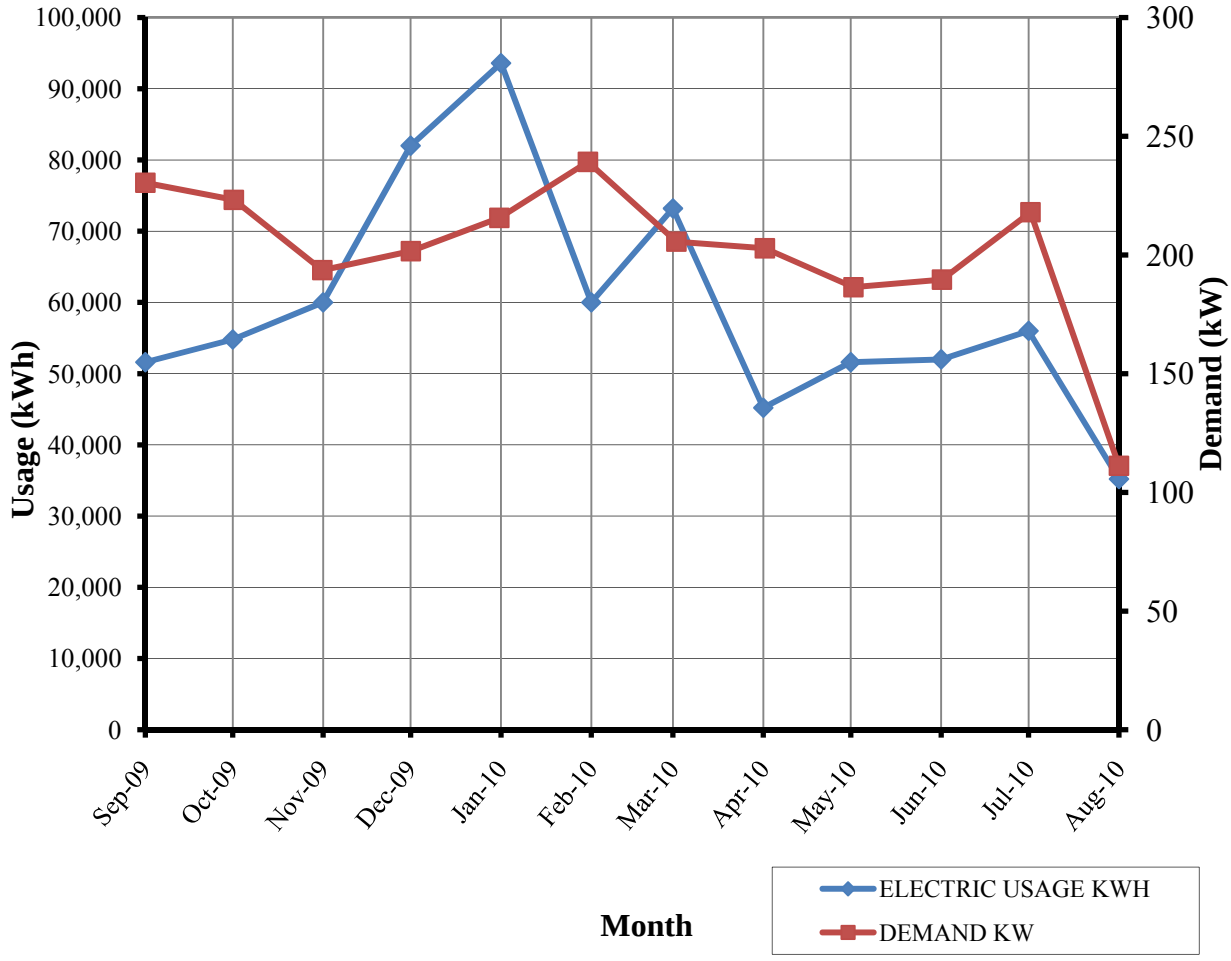


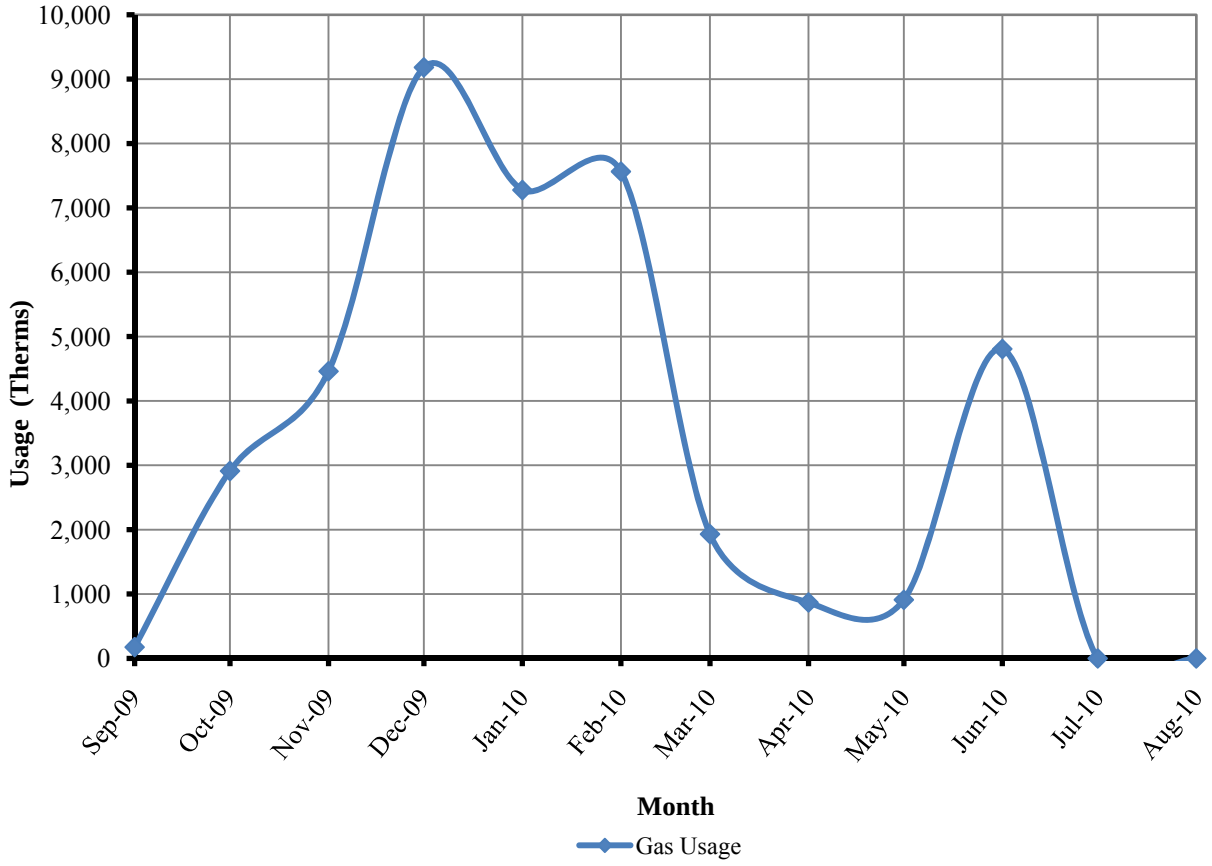
**Table 4**
**Natural Gas Billing Data**

**NATURAL GAS USAGE SUMMARY**

Utility Provider: New Jersey Natural Gas
Rate: GSL
Meter No: 00810528
Point of Delivery ID: -
Third Party Utility Provider: Pepco, Hess
TPS Meter No: 220007302423,

| MONTH OF USE | CONSUMPTION (THERMS) | TOTAL BILL |
|---|---|---|
| Sep-09 | 175.93 | $697.36 |
| Oct-09 | 2,912.58 | $4,925.36 |
| Nov-09 | 4,461.35 | $7,006.61 |
| Dec-09 | 9,182.98 | $12,484.91 |
| Jan-10 | 7,277.10 | $9,981.63 |
| Feb-10 | 7,564.39 | $10,358.97 |
| Mar-10 | 1,932.23 | $3,125.06 |
| Apr-10 | 869.69 | $1,730.88 |
| May-10 | 911.01 | $1,791.20 |
| Jun-10 | 4,808.45 | $5,509.57 |
| Jul-10 | 0.00 | $0.00 |
| Aug-10 | 0.00 | $1,174.31 |
| **TOTALS** | **40,095.71** | **$58,785.86** |
| **AVERAGE RATE:** | **$1.47** | **$/THERM** |

**Figure 2**
**Natural Gas Usage Profile**
**Chester M. Stephens Elementary School**
**Sep-09 through Aug-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:

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

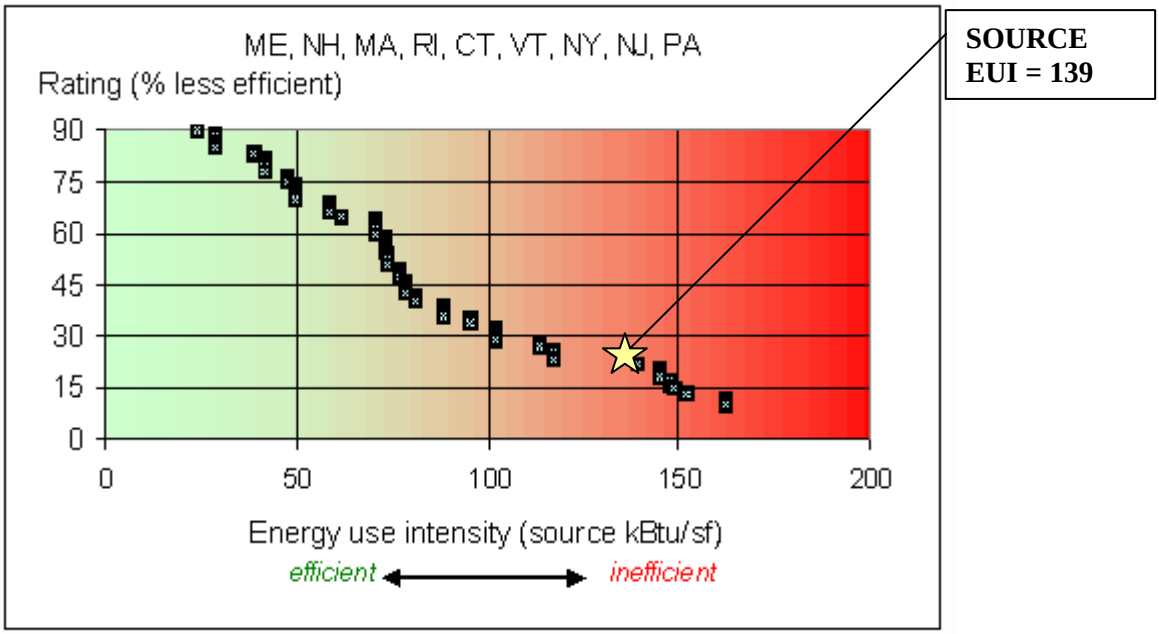
$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu X SS Ratio} + \text{Gas Usage in kBtu X SS Ratio})}{\text{Building Square Footage}}$$

**Table 5**
**Facility Energy Use Index (EUI) Calculation**

| ENERGY USE INTENSITY CALCULATION | | | | | | |
|---|---|---|---|---|---|---|
| ENERGY TYPE | BUILDING USE | | | SITE ENERGY | SITE-SOURCE RATIO | SOURCE ENERGY |
| | kWh | Therms | Gallons | kBtu | | kBtu |
| ELECTRIC | 715,200 | | | 2,441,693 | 3.340 | 8,155,254 |
| NATURAL GAS | | 40,096 | | 4,009,571 | 1.047 | 4,198,021 |
| TOTAL | 715,200 | 40,096 | | 6,451,264 | | 12,353,275 |
| *Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007. | | | | | | |
| **BUILDING AREA** | | 88,745 | SQUARE FEET | | | |
| **BUILDING SITE EUI** | | *73* | kBtu/SF/YR | | | |
| **BUILDING SOURCE EUI** | | *139* | kBtu/SF/YR | | | |

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

**Figure 3**
**Source Energy Use Intensity Distributions: Elementary School**



## C. EPA Energy Benchmarking System

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

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

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

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

User Name: mtoliveschools
Password: lgeaceg2010

Security Question: What city were you born in?
Security Answer: Mount Olive

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

**Table 6**
**ENERGY STAR Performance Rating**

| ENERGY STAR PERFORMANCE RATING | | |
|---|---|---|
| **FACILITY DESCRIPTION** | **ENERGY PERFORMANCE RATING** | **NATIONAL AVERAGE** |
| Chester M Stephens Elementary School | 45 | 50 |

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

## V. FACILITY DESCRIPTION

The 88,745 SF Elementary School is a single story facility comprised of classrooms, library, kindergarten, cafeteria, gymnasium, multi-purpose rooms, art room, music room, restrooms, kitchen, storage spaces, maintenance shop and administration offices. The facility was built in 1966.The hours of operation are between 8:00 am and 4:00 pm on the weekdays. The facility is closed on weekends. The student enrollment at Chester M. Stephens Elementary School is approximately 700 students and 60 staff.

The building exterior is comprised of concrete block wall construction with face brick exterior. The amount of insulation within the wall structure is unknown. Based on the time period the insulation would likely have been simply an air space or filled cores in the block walls. The roof structure is a built up rubber roof with loose gravel. The insulation value of the roof is unknown. Window construction consists of double pane clear glass windows with aluminum frames. The frames are no longer sealed air tight and prone to leakage due to age. Blinds are utilized throughout the perimeter spaces. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. Overall condition of the envelope is fair with respect to the building age.

HVAC Systems

The building has a combination of various types of heating and cooling systems throughout the building. Majority of the heating for the building is provided with two (2) gas fired 4,180 MBH hot water boilers made by Universal Boiler Company. The boilers are equipped with modulating dual fuel burners made by Gordon Piatt. The boilers were installed 2001. Hot water is circulated throughout the building via two (2) 7.5HP hot water pumps located in the boiler room. Major users of the hot water are the unit ventilators, cabinet heaters, fin tube radiators, unit heaters in the classrooms and the offices and hot water coils in the air handling units serving the offices and the gymnasium heating and ventilation units.

The classrooms in this school are heated and cooled with unit ventilators. There are approximately 55 unit ventilators in the building. The unit ventilators appeared to be in good condition. 10 of these units are heat pump units made by American Air Filter. The remaining 45 unit ventilators are made by Magic Aire. These units are equipped with hot water coils for heating. Approximately 25 of these units are also equipped with DX coils for coiling. DX cooling is achieved with a variety of split condensers located on the roof of the building. The condensing unit capacities vary between 2 – 4 Tons. The condensing units are made by York, Sanyo and Goodman.

There are three (3) ductless mini split air conditioners made by Sanyo, EMI and Larkin serving computer closets and a small area in kitchen. There are six (6) rooftop air conditioning units serving the music room, band room, faculty room, guidance office, library, conference room and bathrooms. Five of the rooftop units are 3-5 Ton, high efficiency cooling only units made by Lennox. The Lennox units are equipped with 100% outside air economizers. The remaining unit is a 3-Ton Trane cooling only unit made in 1996. This unit serves the conference room. It is in fair condition. Gymnasium heating is provided with two (2) ceiling hung heating and ventilation units made by Herman Nelson. These units appear to be original to the building.

Exhaust System

Unit ventilators provide the minimum outside air intake and exhaust in the majority of the classrooms. Some of the classrooms have dedicated exhaust fans located on the roof. The toilet rooms have dedicated roof exhausters as well. The kitchen includes a commercial exhaust hood, which is utilized for heat exhaust over cooking equipment. The kitchen hood is manually controlled by a wall switch. The exhaust fan is located directly behind the hood discharging air through a side wall opening.

HVAC System Controls

The building HVAC systems are controlled by a MetaSys central building automation system. The Metasys control system is capable of operating the boilers, unit ventilators, rooftop A/C units and exhausters based on a time of day usage. The BAS system operates the heating water supply temperature based on outdoor air temperature. It is expected that the outside air dampers on each unit ventilator is intended to be controlled by this central system. Based on information provided, it is unknown to whether or not the outside air dampers function properly based on occupancy. It is expected that due to age, a portion of the existing outside air dampers on the unit ventilators are not operational and could be fixed open or closed.

Domestic Hot Water

Domestic hot water for the restrooms, kitchen, and various sinks throughout the school is provided by two electric hot water heaters. The units are both made by AO Smith and they appear to be in good condition. First unit is a 100-gallon water heater with a 36 kW capacity while the second unit is 120-gallon unit with 24kW heating capacity. The domestic hot water piping insulation appeared to be in good condition. The kitchen dishwasher requires 160°F – 180°F domestic hot water. The domestic hot water temperature is boosted by an under-counter electric booster heater. The capacity information for the booster heater was not accessible.

Lighting

Typical lighting throughout building is fluorescent tube lay-in fixtures with T-8 lamps and magnetic ballasts. There is a small amount of fixtures in the building with older T12 lamps and magnetic ballasts. Some of the storage rooms and closets are lit with a mixture of incandescent lamps and compact fluorescent lamps. The gym lighting is provided by 250W low-bay metal halide fixtures. The building exterior is lit 100W high pressure sodium wall pack light fixtures and 175W metal halide flood light fixtures on the exterior walls. All lighting throughout the building is controlled by manual switches.

## 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 – Classrooms, Offices and Storage Spaces

**Description:**

The majority of the lighting throughout the Chester M. Stephens Elementary School building is provided with modern fixtures with T8 lamps and electronic ballasts. However, some of the classrooms, corridors, storage spaces, utility closets and bathrooms in the buildings still have a variety of older fixtures with T12 lamps with magnetic ballasts, incandescent lamps and compact fluorescent 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.

This ECM 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 your existing fixtures, or hardwired into your 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.

There are incentives available from NJ Smart Start® Program for these retrofits. 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.

$$\text{SmartStart®}\ Incentive = (\#\ of\ 1-4\ lamp\ fixtures \times\ \$10) = 50 \times\ \$10 = \$500$$

Replacement and Maintenance Savings are calculated as follows:

$$Savings = (reduction in\ lamps\ replaced\ per\ year) \times (repacment\$\ per\ lamp + Labor\$\ per\ lamp)$$

$$Savings = (7.57 \times \$2\ per\ lamp + \$5\ per\ lamp) = \$53$$

**Energy Savings Summary:**

| ECM #1 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $5,120 |
| **NJ Smart Start Equipment Incentive ($):** | $500 |
| **Net Installation Cost ($):** | $4,620 |
| **Maintenance Savings ($/Yr):** | $53 |
| **Energy Savings ($/Yr):** | $967 |
| **Total Yearly Savings ($/Yr):** | $1,020 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 4.5 |
| **Simple Lifetime ROI** | 231.0% |
| **Simple Lifetime Maintenance Savings** | $795 |
| **Simple Lifetime Savings** | $15,293 |
| **Internal Rate of Return (IRR)** | 21% |
| **Net Present Value (NPV)** | $7,550.92 |

## ECM #2: Lighting Upgrade - Gymnasium

**Description:**

The gymnasium at Chester M. Stephens Elementary School utilizes 250W low bay metal halide fixtures for its lighting. Metal halide bulbs provide a reasonably efficient option for bay lighting however a few draw-backs that are common. Metal halide fixtures often have poor overall efficacy which limits the amount of light actually leaving the fixture. Also metal halide bulbs require a significant warm-up period and even longer cool down period eliminating the potential for occupancy sensors frequent switching. This symptom encourages the gymnasium lighting to be left on continuously during the day. Another drawback is the reduced lumen output (Lumen Maintenance) of the metal halide bulb over its life time. Average bulb output or "mean lumens," is approximately 25% less than the bulb's initial lumens for typical metal halide lamps. In addition the most rapid rate of light output decline is during the beginning of its life, approximately 15-20% light loss within the first 20% of its rated life. It is important to note that the light loss has no savings in energy used; therefore the overall light efficiency is continuously decreasing with age. The final drawback is the light quality or Color Rendering Index (CRI). Typical values for metal halide bulbs is 65, which is a measure of how close the light is to true "full spectrum" light produced by sunlight or incandescent lighting. Metal halide bulbs also show noticeable color shifting when the bulb is reaching the end of its life.

Utilizing fluorescent fixtures in low and high bay spaces is a superior option over metal halide fixtures in all areas described above. Although metal halide fixtures provide light very efficiently at the start of the bulb life, the average efficiency over the life is below that of fluorescent fixtures.

This ECM includes replacement of each of the existing gymnasium low bay metal halide light fixtures with T5HO fixtures with reflective lenses and wire cage protection. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures. The bulb replacement cost for T-5 HO lamps compared to the existing metal halide lamps were found to be approximately equal and therefore not included in the savings calculations.

Hours of Operation

Gymnasium: 3,200 Hours/Yr

**Energy Savings Calculations:**

The **Investment Grade Lighting Audit Appendix** outlines the proposed retrofits, costs, savings, and payback periods.

NJ Smart Start® Program Incentives are calculated as follows:

From the **Smart Start Incentive Appendix**, the following incentives are warranted:

For replacement of HID (250-399W) with new T-5 or T-8 fixtures = $50/Fixture

$$\text{Smart Start ® Incentive} = (\#\ \text{of 250W Metal Halide Fixture Replaced} \times \$50)$$

$$\text{Smart Start ® Incentive} = (30 \times \$50) = \$1{,}500$$

There is no significant replacement or maintenance savings generated with this ECM.

**Energy Savings Summary:**

| ECM #2 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $5,760 |
| **NJ Smart Start Equipment Incentive ($):** | $1,500 |
| **Net Installation Cost ($):** | $4,260 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $1,640 |
| **Total Yearly Savings ($/Yr):** | $1,640 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 2.6 |
| **Simple Lifetime ROI** | 477.5% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $24,603 |
| **Internal Rate of Return (IRR)** | 38% |
| **Net Present Value (NPV)** | $15,320.30 |

## ECM #3: Lighting Occupancy Sensors / Daylight Sensors

**Description:**

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

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

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 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:**

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

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

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

| | |
|---|---|
| Dual Technology Occupancy Sensor | $160 per installation |
| Daylight Sensor | $160 per installation |
| 2 Pole Power Pack w/Dual Tech. Occupancy Sensor | $225 per installation |
| Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | $125 per installation |

Cost includes material and labor.

See the **Investment Grade Lighting Audit Appendix** for details.

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

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

$$\text{Smart Start® Incentive} = (\#\ \text{of wall mount} \times \$\ 20) + (\#\ \text{of ceiling mount} \times 35)$$
$$\text{Smart Start® Incentive} = (0 \times \$\ 20) + (65 \times \$35) = \$2{,}275$$

**Energy Savings Summary:**

| ECM #3 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $14,435 |
| **NJ Smart Start Equipment Incentive ($):** | $2,275 |
| **Net Installation Cost ($):** | $12,160 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $3,095 |
| **Total Yearly Savings ($/Yr):** | $3,095 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 3.9 |
| **Simple Lifetime ROI** | 281.8% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $46,422 |
| **Internal Rate of Return (IRR)** | 24% |
| **Net Present Value (NPV)** | $24,785.21 |

## ECM #4: Computer Monitor Replacement

**Description:**

Majority of the computers throughout the school building offices utilize CRT computer monitors. These computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of the drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits as well.

Based on the site survey it was noted that a number of the computers were left on and allowed to run 24 / 7. The majority of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors are based on manufacture's specifications.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the building. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the administration building IT team. The calculations are based on the following operating assumptions:

**Energy Savings Calculations:**

| | |
|---|---|
| # of Computers: | 82 |
| Run Time %: | 90% |
| Weeks per Yr: | 42 |
| Hrs per Week: | 60 |

$$\text{Electric Usage} = \frac{\#\text{of Computers} \times \text{Run Time \%} \times \text{Monitor Power (W)} \times \text{Operation (Hrs)}}{1000\left(\frac{\text{W}}{\text{KW}}\right)}$$

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

| COMPUTER MONITOR CALCULATIONS | | | |
|---|---|---|---|
| **ECM INPUTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **ECM INPUTS** | CRT Monitors | LCD Monitor | |
| **# of Computers** | 82 | 82 | |
| **Monitor Power Cons. (W)** | 75 | 25 | |
| **Run Time %** | 90% | 90% | |
| **Operating Hrs per Week** | 60 | 60 | |
| **Operating Weeks per Yr** | 42 | 42 | |
| **Elec Cost ($/kWh)** | 0.161 | 0.161 | |
| **ENERGY SAVINGS CALCULATIONS** | | | |
| **ECM RESULTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **Electric Usage (kWh)** | 13,948 | 4,649 | 9,299 |
| **Energy Cost ($)** | $2,246 | $749 | $1,497 |
| **COMMENTS:** | | | |

Installation cost of new monitors is estimated based on current pricing for a 17" LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be $100. Cost of installation is summarized in the table below.

| COST & SAVINGS SUMMARY | | | |
|---|---|---|---|
| **ECM INPUT** | **# OF UNITS** | **UNIT COST** | **TOTAL COST** |
| **CRT MONITORS** | 82 | $100 | $8,200 |
| **Total** | 82 | | $8,200 |

**Energy Savings Summary:**

| ECM #4 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $8,200 |
| **NJ Smart Start Equipment Incentive ($):** | $0 |
| **Net Installation Cost ($):** | $8,200 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $1,497 |
| **Total Yearly Savings ($/Yr):** | $1,497 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 5.5 |
| **Simple Lifetime ROI** | 173.9% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $22,457 |
| **Internal Rate of Return (IRR)** | 16% |
| **Net Present Value (NPV)** | $9,672.36 |

## ECM #5: Replace 3-Ton Rooftop AC Unit

The rooftop air conditioning unit serving the conference room is old and in poor condition. The unit is inefficient compared to today's high efficiency standards. The efficiency of the unit is estimated to be 10 SEER in cooling operation based on the age of the equipment.

This ECM includes installation of a new rooftop unit to replace the existing 3-Ton TRANE rooftop unit. New high efficiency rooftop unit is based on Rheem's packaged rooftop units (Prestige Series). Cooling efficiency is 14 SEER.

**Energy Savings Calculations:**

Average Electric costs: $0.165 / kWh (based on summer time average rates)

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

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

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

| ROOFTOP UNIT REPLACEMENT CALCULATIONS | | | |
|---|---|---|---|
| **ECM INPUTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **ECM INPUTS** | Existing RTU Unit | High Efficiency RTU Unit | |
| **Cooling Capacity, Tons** | 3 | 3 | |
| **Efficiency (SEER)** | 10 | 14 | |
| **Annual Cooling Hours** | 1200 | 1200 | |
| **Elec Cost ($/kWh)** | $0.165 | $0.165 | |
| **ENERGY SAVINGS CALCULATIONS** | | | |
| **ECM RESULTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **Cooling Energy Cnsmption, kWh** | 4320 | 3085.714286 | 1,234 |
| **Cooling Demand, kW** | 3.6 | 2.6 | 1.0 |
| **Total Electric Energy (kWh)** | 4,320 | 3,086 | 1,234 |
| **Total Electric Demand (KW)** | 4 | 3 | 1.0 |
| **Electric Energy Cost ($)** | $713 | $509 | $204 |
| **COMMENTS:** | Proposed High Efficiency AC units is based on Trane Packaged Air Conditioners | | |

Installation cost for the new rooftop unit is estimated to be $10,000.

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

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

## Energy Savings Summary:

| ECM #5 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $10,000 |
| **NJ Smart Start Equipment Incentive ($):** | $276 |
| **Net Installation Cost ($):** | $9,724 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $204 |
| **Total Yearly Savings ($/Yr):** | $204 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 47.7 |
| **Simple Lifetime ROI** | -68.6% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $3,055 |
| **Internal Rate of Return (IRR)** | -12% |
| **Net Present Value (NPV)** | ($7,292.75) |

## ECM #6: Condensing Domestic Hot Water Heater

**Description:**

The primary source for domestic hot water for the building is provided by two large electric hot water heaters with a total 24kW (82 MBH) and 36kW (123 MBH) elements. The heaters provide hot water for the bathrooms, utility sinks and the kitchen. This form of hot water heating is expensive due to the high cost of electricity. Condensing hot water heaters provide substantially improved operating costs over electric hot water heaters. The thermal efficiency of condensing hot water heaters is approximately 95%.

This ECM includes installation of two new central tank type condensing hot water heater to replace the existing electric hot water heaters.

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

**Energy Savings Calculations:**

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

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

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

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

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

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

| CONDENSING DOM. HOT WATER HEATER CALCULATIONS | | | |
|---|---|---|---|
| **ECM INPUTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **ECM INPUTS** | Existing Electric Hot Water Heater | High Efficiency Condensing HW Heater | |
| **Number of People** | 760 | 760 | |
| **Lavatory Sink Time (Minutes)** | 0.25 | 0.25 | |
| **Sink Uses per Day per Person** | 2 | 2 | |
| **Faucet Gallons Per Minute (GPM)** | 2.5 | 2.5 | |
| **Domestic Water Temperature Change (°F)** | 70 | 70 | |
| **Days of operation per year** | 200 | 200 | |
| **Sink Usage (BTU)** | 110,789,000 | 110,789,000 | |
| **Heating Efficiency** | 100% | 95% | |
| **Total Usage (BTU)** | 110,789,000 | 110,789,000 | |
| **Electric Cost ($/kWh)** | 0.161 | 0.161 | |
| **Nat Gas Cost ($/Therm)** | 1.47 | 1.47 | |
| **ENERGY SAVINGS CALCULATIONS** | | | |
| **ECM RESULTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **Electric Consumption (kWh)** | 32,461 | 0 | 32,461 |
| **Nat Gas Consumption (Therms)** | 0 | 1,166 | (1,166) |
| **Energy Cost ($)** | $5,226 | $1,714 | $3,512 |
| **COMMENTS:** | *Savings are based on LEED-NC Version 2.2 Reference Guide for faucet and shower flow rates. Usage per person is estimated. | | |

**Cost, Rebates and Incentives**

Typical installed cost for a condensing hot water heater is estimated to be $10,000.

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

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

Below is the summary table for the summary of costs and incentives for this ECM.

| COST & SAVINGS SUMMARY | | | | | |
|---|---|---|---|---|---|
| **ECM INPUT** | **INSTALLED COST per UNIT** | **SMART START REBATES Per UNIT** | **TOTAL COST PER UNIT** | **# OF UNITS** | **TOTAL NET COST** |
| AO SMITH BTH 150 | $10,000 | $600 | $9,400 | 2 | $18,800 |
| **TOTAL** | | | **$9,400** | **2** | **$18,800** |

**Energy Savings Summary:**

| ECM #6 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $20,000 |
| **NJ Smart Start Equipment Incentive ($):** | $1,200 |
| **Net Installation Cost ($):** | $18,800 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $3,512 |
| **Total Yearly Savings ($/Yr):** | $3,512 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 5.4 |
| **Simple Lifetime ROI** | 180.2% |
| **Simple Lifetime Maintenance Savings** | 0 |
| **Simple Lifetime Savings** | $52,678 |
| **Internal Rate of Return (IRR)** | 17% |
| **Net Present Value (NPV)** | $23,124.70 |

## ECM #7: Replace Mini Split Air Conditioners

**Description:**

Two computer rooms are conditioned with ductless mini split AC systems made by Sanyo and EMI. In addition, there are three classrooms conditioned with three (3) 2-Ton Sanyo mini split A/C units. All four (4) Sanyo units are standard efficiency units and they are over 15 years old. New ductless mini split air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants. Current efficiencies are as high as SEER 18 for typical 2-Ton units and SEER 25 for typical 1-Ton systems.

This ECM includes one-to-one replacement of the existing ductless split air conditioning units with newer high efficiency models. A summary of this ECM can be found in the table below:

| IMPLEMENTATION SUMMARY | | | |
|---|---|---|---|
| **ECM INPUTS** | **Number of Units** | **Cooling Capacity** | **Total Capacity** |
| **1-Ton Sanyo** | 1 | 12,000 | 1 |
| **2-Ton Sanyo** | 3 | 24,000 | 6 |
| **2-Ton EMI** | 1 | 24,000 | 2 |
| **Total** | 5 | | 9 |

The basis for this ECM is Sanyo high efficiency cooling only units with Inverter motors or similar units with single wall mounted indoor units and ground or roof mounted outdoor units.

**Energy Savings Calculations:**

Cooling Energy Savings:

Seasonal energy consumption of the air conditioners at the cooling mode is calculated with the equation below:

$$\text{Energy Savings, kWh} = \text{Cooling Capacity,} \frac{\text{BTU}}{\text{Hr}} \times \left( \frac{1}{\text{SEER}_{\text{Old}}} - \frac{1}{\text{SEER}_{\text{New}}} \right) \times \frac{\text{Operation Hours}}{1000 \frac{\text{W}}{\text{kWh}}}$$

$$\text{Demand Savings, kW} = \frac{\text{Energy Savings (kWh)}}{\text{Hours of Cooling}}$$

$$\text{Cooling Cost Savings} = \text{Energy Savings, kWh} \times \text{Cost of Electricity ,} \left( \frac{\$}{\text{kWh}} \right)$$

| ENERGY SAVINGS CALCULATIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| ECM INPUTS | COOLING CAPACITY, BTU/Hr | ANNUAL COOLING HOURS | EXISTING UNITS SEER | SPLIT UNITS SEER | # OF UNITS | ENERGY SAVINGS kWh | DEMAND SAVINGS kW |
| **1-Ton Sanyo** | 12,000 | 8,760 | 11 | 20 | 1 | 4,300 | 0.5 |
| **2-Ton Sanyo** | 24,000 | 1,320 | 11 | 18 | 3 | 3,360 | 2.5 |
| **2-Ton EMI** | 24,000 | 8,760 | 11 | 18 | 1 | 7,433 | 0.8 |
| **Total** | | | | | 5 | 15,093 | 3.9 |

**Project Cost, Incentives and Maintenance Savings**

From the NJ Smart Start® Program appendix, the replacement of window AC units with ductless mini split AC units falls under the category "Unitary HVAC Split System" and warrants an incentive based on efficiency (SEER) at or above 14 for this type of systems. The program incentives are calculated as follows:

$$\text{SmartStart® Incentive} = (\text{CoolingTons} \times \$/\text{Ton Incentive})$$

| DUCTLESS MINI SPLIT AC UNITS REBATE SUMMARY | | | | |
|---|---|---|---|---|
| UNIT DESCRIPTION | UNIT EFFICIENCY | REBATE $/TON | PROPOSED CAPACITY TONS | TOTAL REBATE $ |
| 5.4 tons or less Unitary AC and Split System | ≥14 SEER | $92 | 9 | $828 |
| **TOTAL** | | | **9** | **$828** |

Summary of cost, savings and payback for this ECM is below.

| COST & SAVINGS SUMMARY | | | | | | | |
|---|---|---|---|---|---|---|---|
| ECM INPUTS | INSTALLED COST | # OF UNITS | TOTAL COST | REBATES | NET COST | ENERGY SAVING | PAY BACK YEARS |
| **1-Ton Sanyo** | $2,700 | 1 | $2,700 | $92 | $2,608 | $710 | 3.7 |
| **2-Ton Sanyo** | $3,800 | 3 | $11,400 | $552 | $10,848 | $554 | 19.6 |
| **2-Ton EMI** | $3,800 | 1 | $3,800 | $184 | $3,616 | $1,226 | 2.9 |
| **Total** | | 5 | $17,900 | $828 | $17,072 | $2,490 | 6.9 |

There is no significant maintenance savings due to implementation of this ECM.

**Energy Savings Summary:**

| ECM #7 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $17,900 |
| **NJ Smart Start Equipment Incentive ($):** | $828 |
| **Net Installation Cost ($):** | $17,072 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $2,490 |
| **Total Yearly Savings ($/Yr):** | $2,490 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 6.9 |
| **Simple Lifetime ROI** | 118.8% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $37,355 |
| **Internal Rate of Return (IRR)** | 12% |
| **Net Present Value (NPV)** | $12,657.76 |

## ECM #8: Window Replacement

**Description:**

The building consists of a combination of double and single pane operable windows with aluminum frames throughout the building. The double pane windows are original to the building. Single pane windows were installed as the original windows failed, cracked or broke. 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. The Elementary School has no central cooling system except for the offices. In addition, the school is closed during majority of the cooling season. As a result, 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:**

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

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

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

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

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

| WINDOW REPLACEMENT CALCULATIONS | | | |
|---|---|---|---|
| **ECM INPUTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **Description:** | Existing Windows (Single and double) | Double Pane Low-E Windows | |
| **Original Bldg Area (SF)** | 88,745 | 88,745 | |
| **Average Ceiling Height (Ft)** | 9 | 9 | |
| **Window (SF)** | 6,000 | 6,000 | |
| **U-Value (BTU/HR/SF*°F)** | 0.8 | 0.45 | 0.35 |
| **Average Leakage Rate (Air Changes per Hr)** | 1.0 | 0.5 | 0.5 |
| **Heating System Efficiency (%)** | 80% | 80% | |
| **Heating Degree Days (HDD)** | 4,496 | 4,496 | |
| **Design Day Temp Diff (°F)** | 65 | 65 | |
| **Heating Hrs Per Day (Hrs)** | 24 | 24 | |
| **Gas Cost ($/Therm)** | 1.47 | 1.47 | |
| **Gas Heat Value (BTU/Therm)** | 100,000 | 100,000 | |
| **ENERGY SAVINGS CALCULATIONS** | | | |
| **ECM RESULTS** | **EXISTING** | **PROPOSED** | **SAVINGS** |
| **Leakage Energy (Therms)** | 11,850 | 5,925 | 5,925 |
| **Conductive Energy (Therms)** | 3,885 | 2,185 | 1,699 |
| **Total Heating Energy (Therms)** | 15,735 | 8,110 | 7,625 |
| **Gas Energy Cost ($)** | $23,130 | $11,922 | $11,208 |
| **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 $450,000.

**Energy Savings Summary:**

| ECM #8 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $450,000 |
| **NJ Smart Start Equipment Incentive ($):** | $0 |
| **Net Installation Cost ($):** | $450,000 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $11,208 |
| **Total Yearly Savings ($/Yr):** | $11,208 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 40.1 |
| **Simple Lifetime ROI** | -62.6% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $168,122 |
| **Internal Rate of Return (IRR)** | -10% |
| **Net Present Value (NPV)** | ($316,197.67) |

## ECM #9: Install NEMA Premium Efficient Pump Motors

**Description:**

The hot water circulation pumps at this facility are standard efficiency motors with 88.5% efficiency. The improved efficiency of the NEMA premium efficient motors is primarily due to better designs with use of better materials to reduce losses. Because the motors operate continuously during heating season, even small increases in efficiency can yield significant energy and dollar savings. Replacing the existing system hot water loop pump motors with new efficient motors is a simple change that can provide substantial savings.

This energy conservation measure replaces one of the two 7.5 HP hot water motors with NEMA Premium® Efficient Motors. This motor should be programmed to run most of the year while remaining motor should be kept as spare. NEMA Premium® is the most efficient motor designation in the marketplace today.

**Energy Savings Calculations:**

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

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor (Assumed 90%)

Motor Efficiency = Motor Nameplate Efficiency

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

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

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

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

| PREMIUM EFFICIENCY MOTOR CALCULATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| EQP TAG | HOURS OF OPERATION | MOTOR HP | LOAD FACTOR | EXISTING EFFICIENCY | NEMA PREMIUM EFFICIENCY | POWER SAVINGS kW | ENERGY SAVINGS kWH | COST SAVINGS |
| P-1 | 3600 | 7.5 | 90% | 88.5% | 91.0% | 0.16 | 563 | $91 |
| **Total Savings** | | | | | | **0.2** | **563** | **$91** |

Premium Efficiency based on TFEC Motors

**Cost, Rebates and Incentives**

SmartStart Building® incentive for 7.5 hp NEMA motor = $81/motor.

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

| MOTOR REPLACEMENT PLAN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| MOTOR POWER HP | QTY | ENCL. TYPE | NO. OF POLES | INSTALLED COST | SMART START INCENTIVE | TOTAL COST | TOTAL SAVINGS | SIMPLE PAYBACK |
| 7.5 | 1 | ODP | 4-Pole | $1,390 | $81 | $1,309 | $91 | 14.4 |
| | | | | **Totals:** | | $1,309 | $91 | 14.4 |

**Energy Savings Summary:**

| ECM #9 - ENERGY SAVINGS SUMMARY | |
|---|---|
| **Installation Cost ($):** | $1,350 |
| **NJ Smart Start Equipment Incentive ($):** | $81 |
| **Net Installation Cost ($):** | $1,269 |
| **Maintenance Savings ($/Yr):** | $0 |
| **Energy Savings ($/Yr):** | $91 |
| **Total Yearly Savings ($/Yr):** | $91 |
| **Estimated ECM Lifetime (Yr):** | 15 |
| **Simple Payback** | 14.0 |
| **Simple Lifetime ROI** | 7.1% |
| **Simple Lifetime Maintenance Savings** | $0 |
| **Simple Lifetime Savings** | $1,359 |
| **Internal Rate of Return (IRR)** | 1% |
| **Net Present Value (NPV)** | ($187.43) |

## 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 energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). 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 and parking lot area of the building being audited for the purposes of determining a potential for a photovoltaic system. It was determined that a parking lot area of 14,700 S.F. can be utilized for a canopy style 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 207 kilowatts could be installed. A system of this size has an estimated kilowatt hour production of 257,000 KWh annually, reducing the overall utility bill by approximately 36% 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 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 | 14.2 Years | 5.6% |

*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 School to invest in a solar system through a Direct Purchase CEG does not recommend the School pursue this route. It would be more advantageous for the School to solicit Power Purchase Agreement (PPA) Providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA

Provider would sell all of the electric generated by Solar Arrays to the School at a reduced rate compared to their existing electric rate.

In addition to the Solar Analysis, CEG also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. 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, and the kilowatt demand for the building is below the threshold (200 kW) for purchase of a commercial wind turbine. Therefore, wind energy is not a viable option to implement.

# IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

**Load Profile:**

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

Electricity:

The electricity usage profile demonstrates a typical cooling load profile for school facilities that have some occupancy during the summer months. Historical usage is relatively steady throughout the year with an average monthly usage of 59,600 kWh and an average monthly demand of 201kW. Largest consumption months were November - March.

The historical usage profile is beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to the relatively flat load profile and reduction of summer load. 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 JCP&L's BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months July and August have no consumption. The average winter (Nov-Mar) consumption is 6,084 therms and the average summer (Apr-Oct) consumption is 1,382 therms. The month of June 2010 is noted as abnormally high with usage in excess of 4,808 therms whereas usage for July and August is zero and September is under 200 therms.

This load profile will yield less favorable natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by the summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flat load profile, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers. Third Party Supplier (TPS) natural gas commodity contracts that offer product structures that include either a firm, fixed price or market based rate with basis lock in for 100% of the facilities natural gas requirements are recommended due to current low market pricing.

**Tariff Analysis:**

Electricity:

This facility receives electrical service through Jersey Central Power & Light (JCP&L) on a GS-Sec (General Service Secondary) rate. Service classification GS-Sec is available for general service purposes on secondary voltages not included under Service Classifications RS, RT, RGT or GST. This facility's rate is a single or three phase service at secondary voltages. This facility has not contracted a Third Party Supplier (TPS) to provide electric commodity service. For electric supply (generation) service, the client has a choice to either use JCP&L'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 facility's current BGS-FP average price to compare for GS-Sec rate is $0.1180/kWh.

The utility, JCP&L 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 or natural gas from.

JCP&L's Delivery Service rate includes the following charges: Customer Charge, Supplemental Customer Charge, Distribution Charge (kW Demand), kWh Charge, Non-utility Generation Charge, TEFA, SBC, SCC, Standby Fee and RGGI.

Natural Gas:

This facility currently receives natural gas distribution service through New Jersey Natural Gas (NJNG) on rate schedule GSL (General Service - Large) and has contracted a Third Party Supplier (TPS) to provide natural gas commodity service.

NJNG provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier

defaults or fails to provide commodity service. Please refer to the link below for a recap of natural gas BGSS charges from New Jersey Natural Gas for rate schedule GSL. http://www.njng.com/pdf/Oct2010LargeCommercialPriceTable.pdf

The utility, NJNG is responsible for maintaining the existing network of pipes that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. New Jersey Natural's delivery service rate includes the following charges: Customer Service Charge, Demand Charge and Delivery Charge.

**Electric and Natural Gas Commodities 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.

## 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.

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

**Chester M. Stephens Elementary 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 ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY** | | | | | | | | | | | | | | | |
| ECM #1 | Lighting Upgrade - Classrooms and Offices | $2,048 | $3,072 | $500 | $4,620 | $967 | $53 | $1,020 | 15 | $15,293 | $795 | 231.0% | 4.5 | 20.77% | $7,550.92 |
| ECM #2 | Lighting Upgrade - Gymnasium | $2,304 | $3,456 | $1,500 | $4,260 | $1,640 | $0 | $1,640 | 15 | $24,603 | $0 | 477.5% | 2.6 | 38.20% | $15,320.30 |
| ECM #3 | Lighting Occupancy Sensors / Daylight Sensors | $5,774 | $8,661 | $2,275 | $12,160 | $3,095 | $0 | $3,095 | 15 | $46,422 | $0 | 281.8% | 3.9 | 24.50% | $24,785.21 |
| ECM #4 | Replace CRT Monitors | $8,200 | $0 | $0 | $8,200 | $1,497 | $0 | $1,497 | 15 | $22,457 | $0 | 173.9% | 5.5 | 16.38% | $9,672.36 |
| ECM #5 | Replace 3-Ton Rooftop AC Unit | $10,000 | $0 | $276 | $9,724 | $204 | $0 | $204 | 15 | $3,055 | $0 | -68.6% | 47.7 | -11.89% | ($7,292.75) |
| ECM #6 | Install Gas Fired Hot Water Heaters | $20,000 | $0 | $1,200 | $18,800 | $3,512 | $0 | $3,512 | 15 | $52,678 | $0 | 180.2% | 5.4 | 16.88% | $23,124.70 |
| ECM #7 | Replace Sanyo Mini Split Units | $17,900 | $0 | $828 | $17,072 | $2,490 | $0 | $2,490 | 15 | $37,355 | $0 | 118.8% | 6.9 | 11.88% | $12,657.76 |
| ECM #8 | Replace Windows | $450,000 | $0 | $0 | $450,000 | $11,208 | $0 | $11,208 | 15 | $168,122 | $0 | -62.6% | 40.1 | -10.36% | ($316,197.67) |
| ECM #9 | Premium Efficiency Motors | $850 | $500 | $81 | $1,269 | $91 | $0 | $91 | 15 | $1,359 | $0 | 7.1% | 14.0 | 0.87% | ($187.43) |
| **REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY** | | | | | | | | | | | | | | | |
| REM #1 | Solar PV Installation | $1,863,000 | $0 | $0 | $1,863,000 | $41,412 | $90,026 | $131,438 | 15 | $1,971,568 | $1,350,389 | 5.8% | 14.2 | 0.72% | ($293,903.04) |

**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<br>$600 per ton, EER ≥ 18<br>$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)<br>$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<br>$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<br>Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases) | $40 per electronic communicated motor |

## Other Equipment Incentives

| | |
|---|---|
| Performance Lighting | $1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation |
| Custom Electric and Gas Equipment Incentives | not prescriptive |
| Custom Measures | $0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%. |
| Multi Measures Bonus | 15% |

# STATEMENT OF ENERGY PERFORMANCE
# Chester M. Stephens Elem School

**Building ID:** 2404061
**For 12-month Period Ending:** July 31, 2010[1]
**Date SEP becomes ineligible:** N/A
**Date SEP Generated:** October 04, 2010

**Facility**
Chester M. Stephens Elem School
99 Sunset Drive
Budd Lake, NJ 07828

**Facility Owner**
Public Schools of Mt. Olive
89 Route 46
Budd Lake, NH 07828

**Primary Contact for this Facility**
Thomas Scerbo
89 Route 46
Budd Lake, NJ 07828

**Year Built:** 1900
**Gross Floor Area (ft²):** 88,745

**Energy Performance Rating**[2] (1-100) 42

**Site Energy Use Summary**[3]

| | |
|---|---|
| Electricity - Grid Purchase(kBtu) | 2,446,921 |
| Natural Gas (kBtu)[4] | 4,009,545 |
| Total Energy (kBtu) | 6,456,466 |

**Energy Intensity**[5]

| | |
|---|---|
| Site (kBtu/ft²/yr) | 73 |
| Source (kBtu/ft²/yr) | 139 |

**Emissions** (based on site energy use)

| | |
|---|---|
| Greenhouse Gas Emissions ($MtCO_2e$/year) | 586 |

**Electric Distribution Utility**
FirstEnergy - Jersey Central Power & Lt Co

**National Average Comparison**

| | |
|---|---|
| National Average Site EUI | 68 |
| National Average Source EUI | 131 |
| % Difference from National Average Source EUI | 7% |
| 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** | Chester M. Stephens Elem 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** | 99 Sunset Drive, Budd Lake, NJ 07828 | 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** | 88,745 Sq. Ft. | Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area. | | ☐ |
| **Open Weekends?** | No | Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days. | | ☐ |
| **Number of PCs** | 127 | 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** | 50 % | Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment? | | ☐ |
| **Percent Heated** | 100 % | Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment? | | ☐ |
| **Months** | 10(Optional) | Is this school in operation for at least 8 months of the year? | | ☐ |

| | | | |
|---|---|---|---|
| **High School?** | No | Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'. | |

# ENERGY STAR® Data Checklist for Commercial Buildings

## *Energy Consumption*

***Power Generation Plant or Distribution Utility:*** FirstEnergy - Jersey Central Power & Lt Co

**Fuel Type: Electricity**

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

| Start Date | End Date | Energy Use (kWh (thousand Watt-hours)) |
|---|---|---|
| 06/25/2010 | 07/22/2010 | 56,000.00 |
| 05/25/2010 | 06/23/2010 | 52,000.00 |
| 04/25/2010 | 05/24/2010 | 51,600.00 |
| 03/25/2010 | 04/24/2010 | 45,200.00 |
| 02/25/2010 | 03/24/2010 | 73,200.00 |
| 01/25/2010 | 02/24/2010 | 60,000.00 |
| 12/25/2009 | 01/24/2010 | 93,600.00 |
| 11/25/2009 | 12/24/2009 | 82,000.00 |
| 10/25/2009 | 11/24/2009 | 60,000.00 |
| 09/25/2009 | 10/24/2009 | 54,800.00 |
| 08/25/2009 | 09/24/2009 | 51,600.00 |
| **Electric Meter Consumption (kWh (thousand Watt-hours))** | | **680,000.00** |
| **Electric Meter Consumption (kBtu (thousand Btu))** | | **2,320,160.00** |
| **Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))** | | **2,320,160.00** |
| **Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?** | | ☐ |

**Fuel Type: Natural Gas**

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

| Start Date | End Date | Energy Use (therms) |
|---|---|---|
| 06/04/2010 | 07/06/2010 | 4,808.45 |
| 05/01/2010 | 06/03/2010 | 911.00 |
| 04/01/2010 | 04/30/2010 | 870.00 |
| 03/01/2010 | 03/31/2010 | 1,932.00 |
| 02/01/2010 | 02/28/2010 | 7,564.00 |
| 01/01/2010 | 01/31/2010 | 7,277.00 |
| 12/01/2009 | 12/31/2009 | 9,183.00 |
| 11/01/2009 | 11/30/2009 | 4,461.00 |
| 10/01/2009 | 10/31/2009 | 2,913.00 |
| 09/01/2009 | 09/30/2009 | 176.00 |
| 08/01/2009 | 08/31/2009 | 0.00 |

| | |
|---|---|
| **Gas Consumption (therms)** | **40,095.45** |
| **Gas Consumption (kBtu (thousand Btu))** | **4,009,545.00** |
| **Total Natural Gas Consumption (kBtu (thousand Btu))** | **4,009,545.00** |
| **Is this the total Natural Gas consumption at this building including all Natural Gas meters?** | ☐ |

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

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

## Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same 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**
Chester M. Stephens Elem School
99 Sunset Drive
Budd Lake, NJ 07828

**Facility Owner**
Public Schools of Mt. Olive
89 Route 46
Budd Lake, NH 07828

**Primary Contact for this Facility**
Thomas Scerbo
89 Route 46
Budd Lake, NJ 07828

## General Information

| Chester M. Stephens Elem School | |
|---|---|
| Gross Floor Area Excluding Parking: ($ft^2$) | 88,745 |
| Year Built | 1900 |
| For 12-month Evaluation Period Ending Date: | July 31, 2010 |

## Facility Space Use Summary

| School Building | |
|---|---|
| Space Type | K-12 School |
| Gross Floor Area($ft^2$) | 88,745 |
| Open Weekends? | No |
| Number of PCs | 127 |
| Number of walk-in refrigeration/freezer units | 2 |
| Presence of cooking facilities | Yes |
| Percent Cooled | 50 |
| Percent Heated | 100 |
| Months° | 10 |
| High School? | No |
| School District° | Mt Olive |

## Energy Performance Comparison

| | Evaluation Periods | | Comparisons | | |
|---|---|---|---|---|---|
| **Performance Metrics** | **Current** (Ending Date 07/31/2010) | **Baseline** (Ending Date 06/30/2010) | **Rating of 75** | **Target** | **National Average** |
| Energy Performance Rating | 42 | 44 | 75 | N/A | 50 |
| Energy Intensity | | | | | |
| *Site ($kBtu/ft^2$)* | 73 | 71 | 53 | N/A | 68 |
| *Source ($kBtu/ft^2$)* | 139 | 136 | 102 | N/A | 131 |
| Energy Cost | | | | | |
| *$/year* | N/A | N/A | N/A | N/A | N/A |
| *$/$ft^2$/year* | N/A | N/A | N/A | N/A | N/A |
| Greenhouse Gas Emissions | | | | | |
| $MtCO_2e$/year | 586 | 572 | 429 | N/A | 548 |
| $kgCO_2e/ft^2$/year | 7 | 6 | 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.

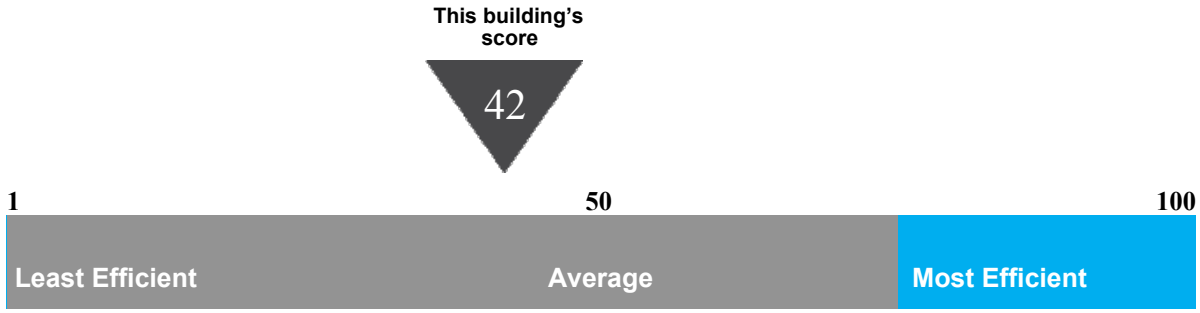
# Statement of Energy Performance

## 2010

Chester M. Stephens Elem School
99 Sunset Drive
Budd Lake, NJ 07828

Portfolio Manager Building ID: 2404061

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 139 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending July 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: 10/04/2010

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## A/C Condensing Units

| Tag | Split CU | Mini Split CU | Split CU | Mini Split CU |
|---|---|---|---|---|
| **Unit Type** | Air cooled condensing unit | Air cooled condensing unit | Air cooled condensing unit | Air cooled condensing unit |
| **Qty** | 25 | 4 | 2 | 1 |
| **Location** | Roof | Roof | Ground | Roof |
| **Area Served** | Classroom UVs | Computer Room | Classroom UVs | Computer Room |
| **Manufacturer** | York | Sanyo | Goodman | EMI |
| **Model #** | H1RA042 (7)<br>H1RA024 (2)<br>H1RA036 (8)<br>H1RA048 (5) | CL2422 (3)<br>C1211 (1) | G8C130301DA (2) | SCC24DF0000AA0A |
| **Serial #** | - | 0008461, 164924, 164924 | 0905119911 | 1-01-C-8817-11 |
| **Cooling Capacity (Tons)** | 2 Ton x 2<br>3 Ton x 8<br>3.5 Ton x 7<br>4 Ton x 5 | 1 Ton x 1<br>3 Ton x 2 | 3 Ton | 2 Ton |
| **Voltage / Phase** | 208/1 | 208/1 | 208/2 | 208/1 |
| **Efficiency (SEER)** | 10 | 11 | 13 | 11 |
| **Approx Age** | 10 | 15 | 1 | 15 |
| **Ashrae Service Life** | 15 | 15 | 15 | 15 |
| **Remaining Life** | 5 | 0 | 14 | 0 |
| **Comments** | - | - | - | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Boilers

| | | | |
|---|---|---|---|
| **Tag** | **Boiler-1 & 2** | - | - |
| **Unit Type** | Hot Water - Cast Iron | - | - |
| **Qty** | 2 | - | - |
| **Location** | Boiler Room | - | - |
| **Area Served** | Whole Bldg | - | - |
| **Manufacturer** | Universal Boiler Works | - | - |
| **Model #** | 100W4 | - | - |
| **Serial #** | 15764-1 & 15764-2 | - | - |
| **Input Capacity (GPH)** | 4,180 MBH | - | - |
| **Rated Output Capacity (MBH)** | 3,660 MBH (Gross) | - | - |
| **Approx. Efficiency %** | 88% | - | - |
| **Fuel** | Nat Gas | - | - |
| **Approx Age** | 9 | - | - |
| **Ashrae Service Life** | 30 | - | - |
| **Remaining Life** | 21 | - | - |
| **Burner** | Gordon-Piatt Energy Group | - | - |
| **Type** | Dual fuel, modulating | - | - |
| **Firing Rate (MBH)** | Min: 1,400<br>Max: 4,200 | - | - |
| **Comments** | - | - | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Domestic Water Heaters

| Tag | HWH-1 | HWH-2 | - |
|---|---|---|---|
| **Unit Type** | Electric HWH | Electric HWH | - |
| **Qty** | 1 | 1 | - |
| **Location** | Utility Room | Utility Room | - |
| **Area Served** | - | - | - |
| **Manufacturer** | AO Smith | AO Smith | - |
| **Model #** | DVE 120 100 | DVE 120 920 | - |
| **Serial #** | 0904M001293 | H07M004319 | - |
| **Size (Gallons)** | 100 | 120 | - |
| **Input Capacity (MBH/KW)** | 36 kW | 24 kW | - |
| **Recovery (Gal/Hr)** | N/A | N/A | - |
| **Efficiency %** | 100% | 100.00% | - |
| **Fuel** | Electric | Electric | - |
| **Approx Age** | 1 | 3 | - |
| **Ashrae Service Life** | 12 | 12 | - |
| **Remaining Life** | 11 | 9 | - |
| **Comments** | - | - | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Heating and Ventilation Units

| Tag | HV-1 & 2 | - |
|---|---|---|
| **Unit Type** | Heating and Ventilation Unit | - |
| **Qty** | 2 | - |
| **Location** | Gymnasium | - |
| **Area Served** | Gymnasium | - |
| **Manufacturer** | Herman Nelsen | - |
| **Model #** | - | - |
| **Serial #** | - | - |
| **Fan HP** | ~ 3 HP | - |
| **Cooling Type** | None | - |
| **Heating Type** | Hot Water Coil | - |
| **Heating Input (MBH)** | - | - |
| **Efficiency** | 100% | - |
| **Approx Age** | 30 | - |
| **Ashrae Service Life** | 30 | - |
| **Remaining Life** | 0 | - |
| **Comments** | Units were recently furnished with hot water coils. | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Pumps

| Tag | Hot Water Pump | Boiler By-pass | - |
|---|---|---|---|
| **Unit Type** | Base Mounted - End Suction | Pipe mounted | - |
| **Qty** | 2 | 1 | - |
| **Location** | Boiler Room | Boiler Room | - |
| **Area Served** | Prımary Hot Water Loop UVs , radiators | Boilers | - |
| **Manufacturer** | Armstrong | Armstrong | - |
| **Model #** | - | 3x3x6 | - |
| **Serial #** | - | 430029 | - |
| **Horse Power** | 7.5 | 3/4 | - |
| **Flow** | 280 | 100.00 | - |
| **Motor Info** | Marathon Electric | Marathon Electric | - |
| **Electrical Power** | 460V, 3PH | 460V, 3PH | - |
| **RPM** | 1760 | 1725 | - |
| **Motor Efficiency %** | 88.5% | - | - |
| **Approx Age** | 9 | 9 | - |
| **Ashrae Service Life** | 20 | 10 | - |
| **Remaining Life** | 11 | 1 | - |
| **Comments** | Constant speed. High efficiency motor. | Constant speed | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Rooftop / AC Units

| Tag | RTU 1 - 5 | RTU | - |
|---|---|---|---|
| **Unit Type** | Cooling Only | Cooling Only | - |
| **Qty** | 5 | 1 | - |
| **Location** | Roof | Roof | - |
| **Area Served** | Music Room<br>Faculty Room<br>Guidence Office<br>Library<br>Bathrooms | Conference Room | - |
| **Manufacturer** | Lennox | Trane | - |
| **Model #** | LCA060HN1G (2)<br>LCA048HN1G (1)<br>LCA036HN1G (2) | TCH036A300BA | - |
| **Serial #** | 5601C07500 | L256LMT3H | - |
| **Cooling Type** | Packaged DX | Packaged DX | - |
| **Cooling Capacity (Tons)** | 5-Ton (2), 4-Ton (1)<br>3-Ton (2) | 3.0 Tons | - |
| **Cooling Efficiency (SEER/EER)** | 10 EER | 8.0 EER (Est.) | - |
| **Heating Type** | None | None | - |
| **Heating Input (MBH)** | None | None | - |
| **Approx Age** | 10 | 14 | - |
| **Ashrae Service Life** | 15 | 15 | - |
| **Remaining Life** | 5 | 1 | - |
| **Comments** | - | Unit is in poor condition | - |

# MAJOR EQUIPMENT LIST

## Concord Engineering Group

### Mt. Olive - Chester Stephens Elementary School

## Unit Ventilators

| Tag | UV-1 | UV-2 | UV-3 |
|---|---|---|---|
| **Unit Type** | Heating Only | Heating and Cooling | Heat Pump |
| **Qty** | 20 | 25 | 10 |
| **Location** | Classrooms<br>Floor or Ceiling | Classrooms<br>Floor or Ceiling | Classrooms |
| **Manufacturer** | Magic Aire | Magic Aire | American Air Filter |
| **Model #** | MUVA4-3 | MUVA4-3 | Enervent II<br>EDBNCXAAAE35517<br>006 |
| **Serial #** | W010169404 | | 6 WH70204 00<br>(1 unit) |
| **Flow Capacity** | 1250 | 1250 | - |
| **Cooling Type** | None | DX with remote<br>condensing unit | Packaged DX |
| **Cooling Capacity (Tons)** | None | 4 | 4 |
| **Estimated Cooling Efficiency (EER)** | None | 10 | 10 |
| **Heating Type** | Hot Water Coil | Hot Water Coil | Heat Pump |
| **Heating Input (MBH)** | 68 | 68 | 47.3 |
| **Efficiency** | 100% | 100% | Est COP 2.5 |
| **Approx Age** | 10 | 10 | 10 |
| **Ashrae Service Life** | 15 | 15 | 15 |
| **Remaining Life** | 5 | 5 | 5 |
| **Comments** | - | - | - |

**CEG Job #:** 9C10050
**Project:** Chester M. Stephens ES
**Address:** 99 Sunset Drive, Budd Lake, NJ, 07828
**Bldg. Sq. Ft.** 88,745

**Chester M. Stephens ES**

**KWH COST:** $0.161

## ECM #1 & 2: 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 |
| 222.21 | Media Center | 2600 | 28 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.62 | 4,222.4 | $679.29 | 28 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A11 Office | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312.0 | $50.19 | 4 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A13 A/V Storage | 2600 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 390.0 | $62.74 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A14 Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72.0 | $11.58 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A15 Classroom | 2600 | 22 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.66 | 1,716.0 | $276.07 | 22 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | | 2600 | 9 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.27 | 702.0 | $112.94 | 9 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A15 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A16 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2,418.0 | $389.00 | 31 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A16 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A17 Classroom | 2600 | 35 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.05 | 2,730.0 | $439.19 | 35 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A17 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A18 Storage | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A19 Classroom | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A21 Classroom | 2600 | 39 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.17 | 3,042.0 | $489.39 | 39 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A21 Restroom | 1200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 108.0 | $17.37 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 142.21 | A22 Classroom | 2600 | 3 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 156 | 0.47 | 1,216.8 | $195.76 | 3 | 3 | 3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit | 86 | 0.26 | 670.8 | $107.92 | $100.00 | $300.00 | 0.21 | 546 | $87.84 | 3.42 |
| 122.21 | Corridor near A17 | 4400 | 8 | 2 | 2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 78 | 0.62 | 2,745.6 | $441.70 | 8 | 2 | 2 Lamp, 32w T8, Elect. Ballast; retrofit | 58 | 0.46 | 2041.6 | $328.45 | $100.00 | $800.00 | 0.16 | 704 | $113.26 | 7.06 |
| 121.11 | A23 Classroom | 2600 | 18 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 1.40 | 3,650.4 | $587.27 | 18 | 2 | 2 Lamp, 32w T8, Elect. Ballast; retrofit | 58 | 1.04 | 2714.4 | $436.68 | $100.00 | $1,800.00 | 0.36 | 936 | $150.58 | 11.95 |
| 211.11 | A24 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2,418.0 | $389.00 | 31 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A24 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A25 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2,418.0 | $389.00 | 31 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211.11 | A25 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A26 Tech Closet | 1200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 108.0 | $17.37 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Corridor - A Wing | 4400 | 28 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.62 | 7,145.6 | $1,149.56 | 28 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 127.21 | | 4400 | 1 | 2 | 2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 78 | 0.08 | 343.2 | $55.21 | 1 | 3 | 3 Lamp, 17w T8, Elect. Ballast; retrofit | 47 | 0.05 | 206.8 | $33.27 | $100.00 | $100.00 | 0.03 | 136.4 | $21.94 | 4.56 |
| 211.11 | Restroom | 1300 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 156.0 | $25.10 | 4 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A8 Nurse | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A7 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936.0 | $150.58 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A6 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936.0 | $150.58 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A5 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936.0 | $150.58 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A4 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A3 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A2 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A1 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936.0 | $150.58 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Kitchen | 2600 | 20 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.60 | 1,560.0 | $250.97 | 20 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 617 | | 2600 | 4 | 1 | Hood Light w/Globe & Cage, 100w A19 Lamp | 100 | 0.40 | 1,040.0 | $167.31 | 4 | 1 | (1) 26w CFL Lamp | 26 | 0.10 | 270.4 | $43.50 | $20.00 | $80.00 | 0.30 | 769.6 | $123.81 | 0.65 |
| 222.41 | Kitchen Restroom | 1200 | 1 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Direct/Indirect | 58 | 0.06 | 69.6 | $11.20 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Kitchen Entrance | 2600 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 156.0 | $25.10 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Cafeteria | 2600 | 50 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.50 | 3,900.0 | $627.42 | 50 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.14 | Switchgear | 2600 | 2 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.12 | 301.6 | $48.52 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Café Stage | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Lobby | 4400 | 12 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.70 | 3,062.4 | $492.67 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Vestibule | 4400 | 6 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.35 | 1,531.2 | $246.34 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |

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| 121.14 | D 68 Elec. Closet | 1200 | 1 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens | 78 | 0.08 | 93.6 | $15.06 | 1 | 2 | 2 Lamp, 32w T8, Elect. Ballast; retrofit | 58 | 0.06 | 69.6 | $11.20 | $100.00 | $100.00 | 0.02 | 24 | $3.86 | 25.90 |
| 222.11 | D67 Custodial Closet | 1200 | 1 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect | 58 | 0.06 | 69.6 | $11.20 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D66 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936.0 | $150.58 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D66 Restroom | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72.0 | $11.58 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 121.11 | Girl's Restroom | 3200 | 3 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 0.23 | 748.8 | $120.46 | 3 | 2 | 2 Lamp, 32w T8, Elect. Ballast; retrofit | 58 | 0.17 | 556.8 | $89.58 | $100.00 | $300.00 | 0.06 | 192 | $30.89 | 9.71 |
| 121.11 | Boy's Restroom | 3200 | 3 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 0.23 | 748.8 | $120.46 | 3 | 2 | 2 Lamp, 32w T8, Elect. Ballast; retrofit | 58 | 0.17 | 556.8 | $89.58 | $100.00 | $300.00 | 0.06 | 192 | $30.89 | 9.71 |
| 221.34 | D65 Elec. Closet | 1200 | 3 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens | 58 | 0.17 | 208.8 | $33.59 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D64 Classroom | 2600 | 9 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.27 | 702.0 | $112.94 | 9 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D63 Guidance | 2600 | 8 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.24 | 624.0 | $100.39 | 8 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Boy's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480.0 | $77.22 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Women's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480.0 | $77.22 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Faculty Lounge | 2600 | 20 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.60 | 1,560.0 | $250.97 | 20 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D61 Copy Room | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312.0 | $50.19 | 4 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Corridor "D" | 4400 | 14 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.81 | 3,572.8 | $574.78 | 14 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.11 | D60 Band | 2600 | 18 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 1.04 | 2,714.4 | $436.68 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.11 | Band Offices | 2600 | 3 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 0.17 | 452.4 | $72.78 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 142.11 | Band Storage | 1200 | 1 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 156 | 0.16 | 187.2 | $30.12 | 1 | 3 | 3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit | 86 | 0.09 | 103.2 | $16.60 | $100.00 | $100.00 | 0.07 | 84 | $13.51 | 7.40 |
| 211.11 | C59 Classroom | 2600 | 32 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.96 | 2,496.0 | $401.55 | 32 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468.0 | $75.29 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C58 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2,418.0 | $389.00 | 31 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C56 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2,418.0 | $389.00 | 31 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C57 Storage | 1200 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 216.0 | $34.75 | 6 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C55 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C47 Classroom | 2600 | 32 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.96 | 2,496.0 | $401.55 | 32 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C48 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |

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| 211.11 | C49 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C50 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C51 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C52 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C53 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C54 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C47A Storage | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480.0 | $77.22 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C46A Elec./ Storage Closet | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288.0 | $46.33 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C46 Maintenace Shop | 3200 | 56 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.68 | 5,376.0 | $864.88 | 56 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.14 | C46B Boiler Room | 4400 | 8 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.46 | 2,041.6 | $328.45 | 8 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 4 | Paint Room | 3200 | 2 | 1 | 100w MH Explosion Proof Fixture | 125 | 0.25 | 800.0 | $128.70 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Office | 2600 | 3 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.17 | 452.4 | $72.78 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Boy's Restroom | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288.0 | $46.33 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Girl's Restroom | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288.0 | $46.33 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45D Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72.0 | $11.58 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45C Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72.0 | $11.58 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45 Classroom | 2600 | 38 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.14 | 2,964.0 | $476.84 | 38 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C44 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1,638.0 | $263.52 | 21 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B42 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B41 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B40 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B39 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B38 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.11 | B37 Elec. Closet | 1200 | 2 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 0.12 | 139.2 | $22.39 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B29 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |

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| 222.21 | B30 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.93 | 2,412.8 | $388.16 | 16 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | B32 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.93 | 2,412.8 | $388.16 | 16 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | B33 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.93 | 2,412.8 | $388.16 | 16 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | B34 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.93 | 2,412.8 | $388.16 | 16 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | B35 Classroom | 2600 | 3 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.17 | 452.4 | $72.78 | 3 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B36 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B28 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B27 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1,404.0 | $225.87 | 18 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Girl's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480.0 | $77.22 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Boy's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480.0 | $77.22 | 5 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Cust. Closet | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36.0 | $5.79 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 100 | Display Case | 4400 | 4 | 2 | 3' Channel, 2-Lamp, 30w T12, Mag. Ballast, Surface Mnt., No Lens | 60 | 0.24 | 1,056.0 | $169.89 | 4 | 1 | 1 Lamp, 32w T8, Elect. Ballast; fixture | 30 | 0.12 | 528 | $84.94 | $80.00 | $320.00 | 0.12 | 528 | $84.94 | 3.77 |
| 746 | Gym | 3200 | 30 | 1 | 250w MH LoBay w/Prismatic Lens | 295 | 8.85 | 28,320.0 | $4,556.04 | 24 | 4 | 2x4 54w T5HO 4 Lamp w/Reflective Lens, Wire Cage | 236 | 5.66 | 18124.8 | $2,915.87 | $240.00 | $5,760.00 | 3.19 | 10195.2 | $1,640.17 | 3.51 |
| 221.14 | Gym Storage | 1200 | 12 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.70 | 835.2 | $134.36 | 12 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 242.21 | Main Office | 3200 | 9 | 4 | 2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 104 | 0.94 | 2,995.2 | $481.86 | 9 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A9A Conference Room | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312.0 | $50.19 | 4 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A9B Work Room | 2600 | 11 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.33 | 858.0 | $138.03 | 11 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Office | 2600 | 2 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.12 | 301.6 | $48.52 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Principal's Office | 2600 | 4 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.23 | 603.2 | $97.04 | 4 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 142.21 | Side Offices & Conference Room | 2600 | 8 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 156 | 1.25 | 3,244.8 | $522.01 | 8 | 3 | 3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit | 86 | 0.69 | 1788.8 | $287.78 | $100.00 | $800.00 | 0.56 | 1456 | $234.24 | 3.42 |
| 222.21 | Corridor "B" | 4400 | 26 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.51 | 6,635.2 | $1,067.45 | 26 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 713 | Entrance Canopy | 8760 | 2 | 1 | 100w HPS 1x1 w/Prismatic Lens | 125 | 0.25 | 2,190.0 | $352.32 | 2 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 713 | Side Entrance | 4400 | 1 | 1 | 100w HPS 1x1 w/Prismatic Lens | 125 | 0.13 | 550.0 | $88.48 | 1 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 710 | Exterior | 4400 | 8 | 1 | 100w HPS Wallpack | 125 | 1.00 | 4,400.0 | $707.86 | 8 | 0 | No Change | 0 | 0.00 | 0 | $0.00 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 738 | | 4400 | 4 | 1 | 175w MH Flood | 210 | 0.84 | 3,696.0 | $594.60 | 4 | 1 | 150w MH Energy Master Lamp; Venture Lighting | 185 | 0.74 | 3256 | $523.82 | $30.00 | $120.00 | 0.10 | 440 | $70.79 | 1.70 |
| | **Totals** | | 1,477 | 163 | | | 65.15 | 190,725 | $30,683 | 1,471 | | | | 9.6 | 30,888 | $4,969 | | $10,880 | 5.2 | 16,203 | $2,607 | 4.17 |

**NOTES:** 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacement calculations

**CEG Job #:** 9C10050
**Project:** Chester M. Stephens ES
**Address:** 99 Sunset Drive, Budd Lake, NJ, 07828
**Building SF:** 88,745

**Chester M. Stephens ES**

**KWH COST:** $0.161

## ECM #3: 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 |
| 222.21 | Media Center | 2600 | 28 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.624 | 4222.4 | $679.29 | 28 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 1.46 | 10% | 3800.16 | $611.36 | $225.00 | $225.00 | 0.16 | 422.24 | $67.93 | 3.31 |
| 211.11 | A11 Office | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312 | $50.19 | 4 | 0 | No Change | 30 | 0.12 | 0% | 312 | $50.19 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A13 A/V Storage | 2600 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 390 | $62.74 | 5 | 0 | No Change | 30 | 0.15 | 0% | 390 | $62.74 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A14 Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72 | $11.58 | 2 | 0 | No Change | 30 | 0.06 | 0% | 72 | $11.58 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A15 Classroom | 2600 | 22 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.66 | 1716 | $276.07 | 22 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.59 | 10% | 1544.4 | $248.46 | $225.00 | $225.00 | 0.07 | 171.6 | $27.61 | 8.15 |
| 211.11 | | 2600 | 9 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.27 | 702 | $112.94 | 9 | 1 | Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | 30 | 0.24 | 10% | 631.8 | $101.64 | $125.00 | $125.00 | 0.03 | 70.2 | $11.29 | 11.07 |
| 211.11 | A15 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A16 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2418 | $389.00 | 31 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.84 | 10% | 2176.2 | $350.10 | $225.00 | $225.00 | 0.09 | 241.8 | $38.90 | 5.78 |
| 211.11 | A16 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A17 Classroom | 2600 | 35 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.05 | 2730 | $439.19 | 35 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.95 | 10% | 2457 | $395.28 | $225.00 | $225.00 | 0.11 | 273 | $43.92 | 5.12 |
| 211.11 | A17 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A18 Storage | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A19 Classroom | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 0 | No Change | 30 | 0.18 | 0% | 468 | $75.29 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A21 Classroom | 2600 | 39 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.17 | 3042 | $489.39 | 39 | 2 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 1.05 | 10% | 2737.8 | $440.45 | $225.00 | $450.00 | 0.12 | 304.2 | $48.94 | 9.20 |
| 211.11 | A21 Restroom | 1200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 108 | $17.37 | 3 | 0 | No Change | 30 | 0.09 | 0% | 108 | $17.37 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 142.21 | A22 Classroom | 2600 | 3 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 156 | 0.468 | 1216.8 | $195.76 | 3 | 0 | No Change | 156 | 0.47 | 0% | 1216.8 | $195.76 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 122.21 | Corridor near A17 | 4400 | 8 | 2 | 2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 78 | 0.624 | 2745.6 | $441.70 | 8 | 0 | No Change | 78 | 0.62 | 0% | 2745.6 | $441.70 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 121.11 | A23 Classroom | 2600 | 18 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 1.404 | 3650.4 | $587.27 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 78 | 1.26 | 10% | 3285.36 | $528.54 | $225.00 | $225.00 | 0.14 | 365.04 | $58.73 | 3.83 |
| 211.11 | A24 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2418 | $389.00 | 31 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.84 | 10% | 2176.2 | $350.10 | $225.00 | $225.00 | 0.09 | 241.8 | $38.90 | 5.78 |
| 211.11 | A24 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A25 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2418 | $389.00 | 31 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.84 | 10% | 2176.2 | $350.10 | $225.00 | $225.00 | 0.09 | 241.8 | $38.90 | 5.78 |
| 211.11 | A25 Restroom | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A26 Tech Closet | 1200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 108 | $17.37 | 3 | 0 | No Change | 30 | 0.09 | 0% | 108 | $17.37 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Corridor - A Wing | 4400 | 28 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.624 | 7145.6 | $1,149.56 | 28 | 0 | No Change | 58 | 1.62 | 0% | 7145.6 | $1,149.56 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 127.21 | | 4400 | 1 | 2 | 2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 78 | 0.078 | 343.2 | $55.21 | 1 | 0 | No Change | 78 | 0.08 | 0% | 343.2 | $55.21 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Restroom | 1300 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 156 | $25.10 | 4 | 0 | No Change | 30 | 0.12 | 0% | 156 | $25.10 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A8 Nurse | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 0 | No Change | 30 | 0.18 | 0% | 468 | $75.29 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A7 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936 | $150.58 | 12 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.32 | 10% | 842.4 | $135.52 | $225.00 | $225.00 | 0.04 | 93.6 | $15.06 | 14.94 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 1 | Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | 30 | 0.16 | 10% | 421.2 | $67.76 | $125.00 | $125.00 | 0.02 | 46.8 | $7.53 | 16.60 |
| 211.11 | A6 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936 | $150.58 | 12 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.32 | 10% | 842.4 | $135.52 | $225.00 | $225.00 | 0.04 | 93.6 | $15.06 | 14.94 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 1 | Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | 30 | 0.16 | 10% | 421.2 | $67.76 | $125.00 | $125.00 | 0.02 | 46.8 | $7.53 | 16.60 |
| 211.11 | A5 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936 | $150.58 | 12 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.32 | 10% | 842.4 | $135.52 | $225.00 | $225.00 | 0.04 | 93.6 | $15.06 | 14.94 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 1 | Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | 30 | 0.16 | 10% | 421.2 | $67.76 | $125.00 | $125.00 | 0.02 | 46.8 | $7.53 | 16.60 |
| 211.11 | A4 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | A3 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211.11 | A2 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | A1 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936 | $150.58 | 12 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.32 | 10% | 842.4 | $135.52 | $225.00 | $225.00 | 0.04 | 93.6 | $15.06 | 14.94 |
| 211.11 | Kitchen | 2600 | 20 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.6 | 1560 | $250.97 | 20 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.54 | 10% | 1404 | $225.87 | $225.00 | $225.00 | 0.06 | 156 | $25.10 | 8.97 |
| 617 | | 2600 | 4 | 1 | Hood Light w/Globe & Cage, 100w A19 Lamp | 100 | 0.4 | 1040 | $167.31 | 4 | 0 | No Change | 100 | 0.40 | 0% | 1040 | $167.31 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.41 | Kitchen Restroom | 1200 | 1 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Direct/Indirect | 58 | 0.058 | 69.6 | $11.20 | 1 | 0 | No Change | 58 | 0.06 | 0% | 69.6 | $11.20 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Kitchen Entrance | 2600 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 156 | $25.10 | 2 | 0 | No Change | 30 | 0.06 | 0% | 156 | $25.10 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Cafeteria | 2600 | 50 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.5 | 3900 | $627.42 | 50 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 1.35 | 10% | 3510 | $564.68 | $225.00 | $225.00 | 0.15 | 390 | $62.74 | 3.59 |
| 221.14 | Switchgear | 2600 | 2 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.116 | 301.6 | $48.52 | 2 | 0 | No Change | 58 | 0.12 | 0% | 301.6 | $48.52 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Café Stage | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 0 | No Change | 30 | 0.18 | 0% | 468 | $75.29 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Lobby | 4400 | 12 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.696 | 3062.4 | $492.67 | 12 | 0 | No Change | 58 | 0.70 | 0% | 3062.4 | $492.67 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Vestibule | 4400 | 6 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.348 | 1531.2 | $246.34 | 6 | 1 | Daylight Sensor (Sensorswitch PP-20 & CM-PC or equal) | 58 | 0.31 | 10% | 1378.08 | $221.70 | $160.00 | $160.00 | 0.03 | 153.12 | $24.63 | 6.50 |
| 121.14 | D 68 Elec. Closet | 1200 | 1 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens | 78 | 0.078 | 93.6 | $15.06 | 1 | 0 | No Change | 78 | 0.08 | 0% | 93.6 | $15.06 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.11 | D67 Custodial Closet | 1200 | 1 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Indirect | 58 | 0.058 | 69.6 | $11.20 | 1 | 0 | No Change | 58 | 0.06 | 0% | 69.6 | $11.20 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D66 Classroom | 2600 | 12 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.36 | 936 | $150.58 | 12 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.32 | 10% | 842.4 | $135.52 | $160.00 | $160.00 | 0.04 | 93.6 | $15.06 | 10.63 |
| 211.11 | D66 Restroom | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72 | $11.58 | 2 | 0 | No Change | 30 | 0.06 | 0% | 72 | $11.58 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 121.11 | Girl's Restroom | 3200 | 3 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 0.234 | 748.8 | $120.46 | 3 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 78 | 0.21 | 10% | 673.92 | $108.42 | $160.00 | $160.00 | 0.02 | 74.88 | $12.05 | 13.28 |
| 121.11 | Boy's Restroom | 3200 | 3 | 2 | 1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 78 | 0.234 | 748.8 | $120.46 | 3 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 78 | 0.21 | 10% | 673.92 | $108.42 | $160.00 | $160.00 | 0.02 | 74.88 | $12.05 | 13.28 |
| 221.34 | D65 Elec. Closet | 1200 | 3 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens | 58 | 0.174 | 208.8 | $33.59 | 3 | 0 | No Change | 58 | 0.17 | 0% | 208.8 | $33.59 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | D64 Classroom | 2600 | 9 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.27 | 702 | $112.94 | 9 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.24 | 10% | 631.8 | $101.64 | $160.00 | $160.00 | 0.03 | 70.2 | $11.29 | 14.17 |
| 211.11 | D63 Guidance | 2600 | 8 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.24 | 624 | $100.39 | 8 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.22 | 10% | 561.6 | $90.35 | $160.00 | $160.00 | 0.02 | 62.4 | $10.04 | 15.94 |
| 211.11 | Boy's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480 | $77.22 | 5 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.14 | 10% | 432 | $69.50 | $160.00 | $160.00 | 0.02 | 48 | $7.72 | 20.72 |
| 211.11 | Women's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480 | $77.22 | 5 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.14 | 10% | 432 | $69.50 | $160.00 | $160.00 | 0.02 | 48 | $7.72 | 20.72 |

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| 211.11 | Faculty Lounge | 2600 | 20 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.6 | 1560 | $250.97 | 20 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.54 | 10% | 1404 | $225.87 | $225.00 | $225.00 | 0.06 | 156 | $25.10 | 8.97 |
| 211.11 | D61 Copy Room | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312 | $50.19 | 4 | 0 | No Change | 30 | 0.12 | 0% | 312 | $50.19 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Corridor "D" | 4400 | 14 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.812 | 3572.8 | $574.78 | 14 | 0 | No Change | 58 | 0.81 | 0% | 3572.8 | $574.78 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 221.11 | D60 Band | 2600 | 18 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 1.044 | 2714.4 | $436.68 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 0.94 | 10% | 2442.96 | $393.02 | $225.00 | $225.00 | 0.10 | 271.44 | $43.67 | 5.15 |
| 221.11 | Band Offices | 2600 | 3 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 0.174 | 452.4 | $72.78 | 3 | 0 | No Change | 58 | 0.17 | 0% | 452.4 | $72.78 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 142.11 | Band Storage | 1200 | 1 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens | 156 | 0.156 | 187.2 | $30.12 | 1 | 0 | No Change | 156 | 0.16 | 0% | 187.2 | $30.12 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C59 Classroom | 2600 | 32 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.96 | 2496 | $401.55 | 32 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.86 | 10% | 2246.4 | $361.39 | $225.00 | $225.00 | 0.10 | 249.6 | $40.15 | 5.60 |
| 211.11 | | 2600 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 468 | $75.29 | 6 | 1 | Daylight Sensor Utilizing Power Pack Installed w/Occ Sensor | 30 | 0.16 | 10% | 421.2 | $67.76 | $125.00 | $125.00 | 0.02 | 46.8 | $7.53 | 16.60 |
| 211.11 | C58 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2418 | $389.00 | 31 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.84 | 10% | 2176.2 | $350.10 | $225.00 | $225.00 | 0.09 | 241.8 | $38.90 | 5.78 |
| 211.11 | C56 Classroom | 2600 | 31 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.93 | 2418 | $389.00 | 31 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.84 | 10% | 2176.2 | $350.10 | $225.00 | $225.00 | 0.09 | 241.8 | $38.90 | 5.78 |
| 211.11 | C57 Storage | 1200 | 6 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.18 | 216 | $34.75 | 6 | 0 | No Change | 30 | 0.18 | 0% | 216 | $34.75 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C55 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C47 Classroom | 2600 | 32 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.96 | 2496 | $401.55 | 32 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.86 | 10% | 2246.4 | $361.39 | $225.00 | $225.00 | 0.10 | 249.6 | $40.15 | 5.60 |
| 211.11 | C48 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C49 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C50 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C51 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 211.11 | C52 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C53 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C54 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | C47A Storage | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480 | $77.22 | 5 | 0 | No Change | 30 | 0.15 | 0% | 480 | $77.22 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C46A Elec./ Storage Closet | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288 | $46.33 | 3 | 0 | No Change | 30 | 0.09 | 0% | 288 | $46.33 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C46 Maintenace Shop | 3200 | 56 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.68 | 5376 | $864.88 | 56 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 1.51 | 10% | 4838.4 | $778.39 | $225.00 | $225.00 | 0.17 | 537.6 | $86.49 | 2.60 |
| 221.14 | C46B Boiler Room | 4400 | 8 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.464 | 2041.6 | $328.45 | 8 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 58 | 0.42 | 10% | 1837.44 | $295.60 | $160.00 | $160.00 | 0.05 | 204.16 | $32.84 | 4.87 |
| 4 | Paint Room | 3200 | 2 | 1 | 100w MH Explosion Proof Fixture | 125 | 0.25 | 800 | $128.70 | 2 | 0 | No Change | 125 | 0.25 | 0% | 800 | $128.70 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Office | 2600 | 3 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.174 | 452.4 | $72.78 | 3 | 0 | No Change | 58 | 0.17 | 0% | 452.4 | $72.78 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Boy's Restroom | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288 | $46.33 | 3 | 0 | No Change | 30 | 0.09 | 0% | 288 | $46.33 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | Girl's Restroom | 3200 | 3 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.09 | 288 | $46.33 | 3 | 0 | No Change | 30 | 0.09 | 0% | 288 | $46.33 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45D Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72 | $11.58 | 2 | 0 | No Change | 30 | 0.06 | 0% | 72 | $11.58 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45C Storage | 1200 | 2 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.06 | 72 | $11.58 | 2 | 0 | No Change | 30 | 0.06 | 0% | 72 | $11.58 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | C45 Classroom | 2600 | 38 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 1.14 | 2964 | $476.84 | 38 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 1.03 | 10% | 2667.6 | $429.16 | $225.00 | $225.00 | 0.11 | 296.4 | $47.68 | 4.72 |
| 211.11 | C44 Classroom | 2600 | 21 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.63 | 1638 | $263.52 | 21 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.57 | 10% | 1474.2 | $237.17 | $225.00 | $225.00 | 0.06 | 163.8 | $26.35 | 8.54 |
| 211.11 | B42 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | B41 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | B40 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |

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| 211.11 | B39 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | B38 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 221.11 | B37 Elec. Closet | 1200 | 2 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 58 | 0.116 | 139.2 | $22.39 | 2 | 0 | No Change | 58 | 0.12 | 0% | 139.2 | $22.39 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | B29 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 222.21 | B30 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.928 | 2412.8 | $388.16 | 16 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 0.84 | 10% | 2171.52 | $349.35 | $225.00 | $225.00 | 0.09 | 241.28 | $38.82 | 5.80 |
| 222.21 | B32 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.928 | 2412.8 | $388.16 | 16 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 0.84 | 10% | 2171.52 | $349.35 | $225.00 | $225.00 | 0.09 | 241.28 | $38.82 | 5.80 |
| 222.21 | B33 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.928 | 2412.8 | $388.16 | 16 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 0.84 | 10% | 2171.52 | $349.35 | $225.00 | $225.00 | 0.09 | 241.28 | $38.82 | 5.80 |
| 222.21 | B34 Classroom | 2600 | 16 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.928 | 2412.8 | $388.16 | 16 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 58 | 0.84 | 10% | 2171.52 | $349.35 | $225.00 | $225.00 | 0.09 | 241.28 | $38.82 | 5.80 |
| 222.21 | B35 Classroom | 2600 | 3 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.174 | 452.4 | $72.78 | 3 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 58 | 0.16 | 10% | 407.16 | $65.50 | $160.00 | $160.00 | 0.02 | 45.24 | $7.28 | 21.98 |
| 211.11 | B36 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | B28 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | B27 Classroom | 2600 | 18 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.54 | 1404 | $225.87 | 18 | 1 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 30 | 0.49 | 10% | 1263.6 | $203.28 | $225.00 | $225.00 | 0.05 | 140.4 | $22.59 | 9.96 |
| 211.11 | Girl's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480 | $77.22 | 5 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.14 | 10% | 432 | $69.50 | $160.00 | $160.00 | 0.02 | 48 | $7.72 | 20.72 |
| 211.11 | Boy's Restroom | 3200 | 5 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.15 | 480 | $77.22 | 5 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.14 | 10% | 432 | $69.50 | $160.00 | $160.00 | 0.02 | 48 | $7.72 | 20.72 |
| 211.11 | Cust. Closet | 1200 | 1 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.03 | 36 | $5.79 | 1 | 0 | No Change | 30 | 0.03 | 0% | 36 | $5.79 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 100 | Display Case | 4400 | 4 | 2 | 3' Channel, 2-Lamp, 30w T12, Mag. Ballast, Surface Mnt., No Lens | 60 | 0.24 | 1056 | $169.89 | 4 | 0 | No Change | 60 | 0.24 | 0% | 1056 | $169.89 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 746 | Gym | 3200 | 30 | 1 | 250w MH LoBay w/Prismatic Lens | 295 | 8.85 | 28320 | $4,556.04 | 24 | 2 | 2 Pole Power Pack w/Dual Tech. Occupancy Sensor (Sensorswitch or equal) | 295 | 6.37 | 10% | 20390.4 | $3,280.35 | $225.00 | $450.00 | 2.48 | 7929.6 | $1,275.69 | 0.35 |

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| 221.14 | Gym Storage | 1200 | 12 | 2 | 1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens | 58 | 0.696 | 835.2 | $134.36 | 12 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 58 | 0.63 | 10% | 751.68 | $120.93 | $160.00 | $160.00 | 0.07 | 83.52 | $13.44 | 11.91 |
| 242.21 | Main Office | 3200 | 9 | 4 | 2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 104 | 0.936 | 2995.2 | $481.86 | 9 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 104 | 0.84 | 10% | 2695.68 | $433.67 | $160.00 | $160.00 | 0.09 | 299.52 | $48.19 | 3.32 |
| 211.11 | A9A Conference Room | 2600 | 4 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.12 | 312 | $50.19 | 4 | 0 | No Change | 30 | 0.12 | 0% | 312 | $50.19 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 211.11 | A9B Work Room | 2600 | 11 | 1 | 1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens | 30 | 0.33 | 858 | $138.03 | 11 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 30 | 0.30 | 10% | 772.2 | $124.23 | $160.00 | $160.00 | 0.03 | 85.8 | $13.80 | 11.59 |
| 222.21 | Office | 2600 | 2 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.116 | 301.6 | $48.52 | 2 | 0 | No Change | 58 | 0.12 | 0% | 301.6 | $48.52 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Principal's Office | 2600 | 4 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 0.232 | 603.2 | $97.04 | 4 | 1 | Dual Technology Occupancy Sensor (Sensorswitch or equal) | 58 | 0.21 | 10% | 542.88 | $87.34 | $160.00 | $160.00 | 0.02 | 60.32 | $9.70 | 16.49 |
| 142.21 | Side Offices & Conference Room | 2600 | 8 | 4 | 2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens | 156 | 1.248 | 3244.8 | $522.01 | 8 | 0 | No Change | 156 | 1.25 | 0% | 3244.8 | $522.01 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 222.21 | Corridor "B" | 4400 | 26 | 2 | 2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens | 58 | 1.508 | 6635.2 | $1,067.45 | 26 | 0 | No Change | 58 | 1.51 | 0% | 6635.2 | $1,067.45 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 713 | Entrance Canopy | 8760 | 2 | 1 | 100w HPS 1x1 w/Prismatic Lens | 125 | 0.25 | 2190 | $352.32 | 2 | 0 | No Change | 125 | 0.25 | 0% | 2190 | $352.32 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 713 | Side Entrance | 4400 | 1 | 1 | 100w HPS 1x1 w/Prismatic Lens | 125 | 0.125 | 550 | $88.48 | 1 | 0 | No Change | 125 | 0.13 | 0% | 550 | $88.48 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 710 | Exterior | 4400 | 8 | 1 | 100w HPS Wallpack | 125 | 1 | 4400 | $707.86 | 8 | 0 | No Change | 125 | 1.00 | 0% | 4400 | $707.86 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| 738 | | 4400 | 4 | 1 | 175w MH Flood | 210 | 0.84 | 3696 | $594.60 | 4 | 0 | No Change | 210 | 0.84 | 0% | 3696 | $594.60 | $0.00 | $0.00 | 0.00 | 0 | $0.00 | 0.00 |
| | Totals | | 1,477 | 163 | | | 65.1 | 190,725.2 | $30,683 | 1,471 | 71 | | | 58.4 | | 171,488.3 | $27,588.55 | | $14,435 | 6.72 | 19,237 | $3,095 | 4.66 |

**Project Name:** LGEA Solar PV Project - Chester M. Stephens Elementary School
**Location:** Budd, NJ
**Description:** Photovoltaic System - Direct Purchase

**Simple Payback Analysis**

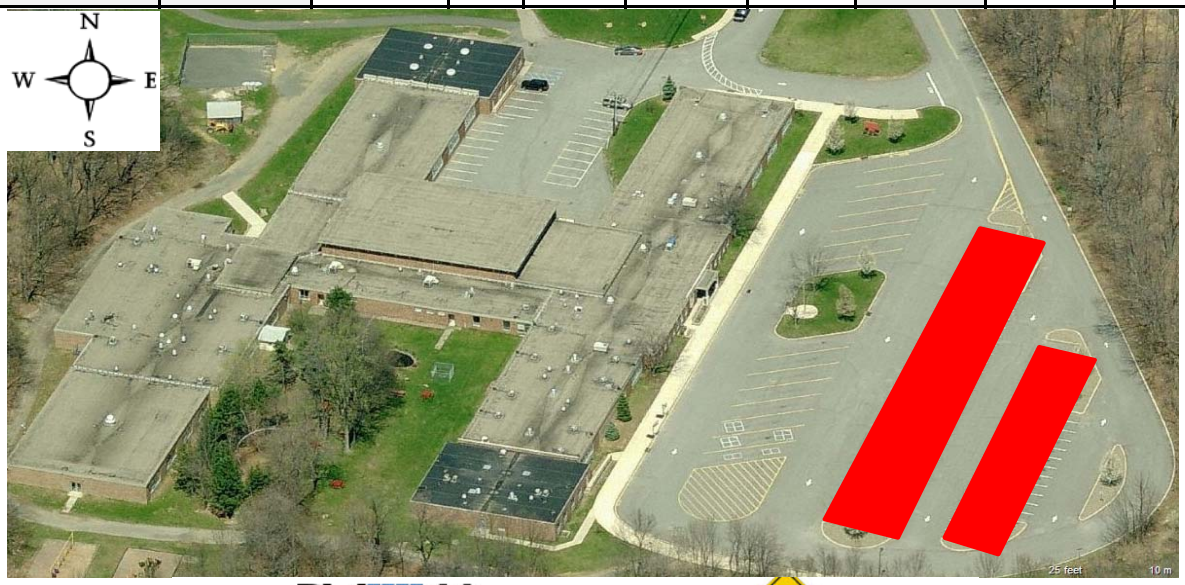
| | Photovoltaic System - Direct Purchase |
|---|---|
| Total Construction Cost | $1,863,000 |
| Annual kWh Production | 257,217 |
| Annual Energy Cost Reduction | $41,412 |
| Annual SREC Revenue | $90,026 |
| First Cost Premium | **$1,863,000** |
| Simple Payback: | **14.17** **Years** |

**Life Cycle Cost Analysis**

| | | | |
|---|---|---|---|
| Analysis Period (years): | 25 | Financing %: | 0% |
| Financing Term (mths): | 0 | Maintenance Escalation Rate: | 3.0% |
| Average Energy Cost ($/kWh) | **$0.161** | Energy Cost Escalation Rate: | 3.0% |
| Financing Rate: | 0.00% | SREC Value ($/kWh) | $0.350 |

| Period | Additional Cash Outlay | Energy kWh Production | Energy Cost Savings | Additional Maint Costs | SREC Revenue | Net Cash Flow | Cumulative Cash Flow |
|---|---|---|---|---|---|---|---|
| 0 | $1,863,000 | 0 | 0 | 0 | $0 | (1,863,000) | 0 |
| 1 | $0 | 257,217 | $41,412 | $0 | $90,026 | $131,438 | ($1,731,562) |
| 2 | $0 | 255,931 | $42,654 | $0 | $89,576 | $132,230 | ($1,599,332) |
| 3 | $0 | 254,651 | $43,934 | $0 | $89,128 | $133,062 | ($1,466,270) |
| 4 | $0 | 253,378 | $45,252 | $0 | $88,682 | $133,934 | ($1,332,336) |
| 5 | $0 | 252,111 | $46,609 | $2,597 | $88,239 | $132,252 | ($1,200,084) |
| 6 | $0 | 250,851 | $48,008 | $2,584 | $87,798 | $133,222 | ($1,066,863) |
| 7 | $0 | 249,596 | $49,448 | $2,571 | $87,359 | $134,236 | ($932,627) |
| 8 | $0 | 248,348 | $50,931 | $2,558 | $86,922 | $135,295 | ($797,331) |
| 9 | $0 | 247,107 | $52,459 | $2,545 | $86,487 | $136,402 | ($660,930) |
| 10 | $0 | 245,871 | $54,033 | $2,532 | $86,055 | $137,556 | ($523,374) |
| 11 | $0 | 244,642 | $55,654 | $2,520 | $85,625 | $138,759 | ($384,615) |
| 12 | $0 | 243,418 | $57,324 | $2,507 | $85,196 | $140,013 | ($244,602) |
| 13 | $0 | 242,201 | $59,044 | $2,495 | $84,770 | $141,319 | ($103,283) |
| 14 | $0 | 240,990 | $60,815 | $2,482 | $84,347 | $142,679 | $39,396 |
| 15 | $0 | 239,785 | $62,639 | $2,470 | $83,925 | $144,094 | $183,491 |
| 16 | $0 | 238,587 | $64,518 | $2,457 | $83,505 | $145,566 | $329,057 |
| 17 | $0 | 237,394 | $66,454 | $2,445 | $83,088 | $147,097 | $476,154 |
| 18 | $0 | 236,207 | $68,448 | $2,433 | $82,672 | $148,687 | $624,841 |
| 19 | $0 | 235,026 | $70,501 | $2,421 | $82,259 | $150,339 | $775,180 |
| 20 | $0 | 233,850 | $72,616 | $2,409 | $81,848 | $152,055 | $927,235 |
| 21 | $1 | 232,681 | $74,795 | $2,397 | $81,438 | $153,836 | $1,081,071 |
| 22 | $2 | 231,518 | $77,038 | $2,385 | $81,031 | $155,685 | $1,236,756 |
| 23 | $3 | 230,360 | $79,350 | $2,373 | $80,626 | $157,603 | $1,394,359 |
| 24 | $4 | 229,208 | $81,730 | $2,361 | $80,223 | $159,592 | $1,553,951 |
| 25 | $5 | 228,062 | $84,182 | $2,349 | $79,822 | $161,655 | $1,715,606 |
| | **Totals:** | 6,058,991 | $1,509,849 | $51,889 | $2,120,647 | $3,578,606 | ($1,706,110) |
| | | | | **Net Present Value (NPV)** | | **$1,715,631** | |
| | | | | **Internal Rate of Return (IRR)** | | **5.6%** | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| Chester M. Stevens Elemetary School | 14700 | Sunpower SPR230 | 900 | 14.7 | 13,234 | 207.00 | 257,217 | 29,700 | 15.64 |




PVWatts

AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

| Station Identification | |
|---|---|
| City: | Atlantic_City |
| State: | New_Jersey |
| Latitude: | 39.45° N |
| Longitude: | 74.57° W |
| Elevation: | 20 m |
| PV System Specifications | |
| DC Rating: | 207.0 kW |
| DC to AC Derate Factor: | 0.800 |
| AC Rating: | 165.6 kW |
| Array Type: | Fixed Tilt |
| Array Tilt: | 15.0° |
| Array Azimuth: | 180.0° |
| Energy Specifications | |
| Cost of Electricity: | 0.2 ¢/kWh |

| Results | | | |
|---|---|---|---|
| Month | Solar Radiation (kWh/m²/day) | AC Energy (kWh) | Energy Value ($) |
| 1 | 2.80 | 14598 | 23.50 |
| 2 | 3.53 | 16714 | 26.91 |
| 3 | 4.46 | 22632 | 36.44 |
| 4 | 5.28 | 25291 | 40.72 |
| 5 | 5.86 | 28503 | 45.89 |
| 6 | 6.10 | 27574 | 44.39 |
| 7 | 6.05 | 27964 | 45.02 |
| 8 | 5.60 | 25963 | 41.80 |
| 9 | 4.99 | 22761 | 36.65 |
| 10 | 3.97 | 19117 | 30.78 |
| 11 | 2.86 | 13817 | 22.25 |
| 12 | 2.43 | 12282 | 19.77 |
| Year | 4.50 | 257217 | 414.12 |

.= Proposed PV Layout

Notes:

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