LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

WEYMOUTH TOWNSHIP SCHOOL DISTRICT
1202 ELEVENTH AVENUE
DOROTHY, NJ 08317
ATTN: MR. JONATHAN HOUDART, SCHOOL BUSINESS ADMINISTRATOR / BOARD SECRETARY

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I. EXECUTIVE SUMMARY

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

Weymouth Township Board of Education
Weymouth Township School
1202 Eleventh Avenue
Dorothy, NJ 08317

Municipal Contact Person: Jonathan Houdart, School Business Administrator
Facility Contact Person: Peter J. Gilles, Sr., Buildings and Grounds

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program for the Weymouth Township Board of Education. The purpose of this analysis is to provide the owner insight into the energy savings potential that exists within the facility at the school. Energy Efficiency changes and upgrades requires support from the building occupants, operations personnel and the administrators of the building in order to maximize the savings and overall benefit. The efficiency improvement of public buildings provides a benefit for the environment and the residence of New Jersey. Through this report it has been demonstrated that there is a great potential for energy savings and infrastructure improvements at Weymouth Township School.

The Energy Conservation Measures (ECMs) identified within the report represent the potential annual savings at the facility. It is recommended to consider all ECMs as part of the District's initiative to save energy, reduce emissions, and lower operating costs. Concord Engineering (CE) recommends proceeding with the implementation of all ECM's that provide a calculated simple payback at or under ten (10) years.

The annual energy costs at this facility are as follows:

Electricity	$ 54,678
Fuel Oil	$ 3,425
Total	$ 82,414

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	$21,691	$4,275	5.1	195.6%
ECM #2	Gym Lighting & Controls Upgrade	$16,455	$3,637	4.5	231.5%
ECM #3	Exterior Lighting Upgrade	$1,000	$463	2.2	594.0%
ECM #4	General Lighting Controls Upgrade	$10,905	$3,020	3.6	315.4%
ECM #5	Boiler Replacement - High Efficiency Oil Fired	$72,333	$6,138	11.8	197.0%
ECM #6	Boiler Replacement - Condensing Natural Gas	$99,687	$17,662	5.6	520.1%
ECM #7	NEMA Premium Motor Replacement	$1,647	$144	11.5	57.0%
ECM #8	Rooftop Unit Replacement	$64,150	$4,844	13.2	13.3%
ECM #9	DDC System Controls Upgrade	$147,000	$8,067	18.2	-17.7%
ECM #10	Window Replacement	$137,600	$4,146	33.2	-54.8%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	75.4 kW DC SolarArray System	$408,732	$31,740	12.9	16.5%

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	10.83	29,083	0
ECM #2	Gym Lighting & Controls Upgrade	9.42	24,741	0
ECM #3	Exterior Lighting Upgrade	1.03	3,148	0
ECM #4	General Lighting Controls Upgrade	7.94	20,545	0
ECM #5	Boiler Replacement - High Efficiency Oil Fired	0.00	0	(1900 Gallons)
ECM #6	Boiler Replacement - Condensing Natural Gas	0.00	0	-7973 Therms / (8060 Gallons)
ECM #7	NEMA Premium Motor Replacement	0.26	977	0
ECM #8	Rooftop Unit Replacement	16.50	32,950	0
ECM #9	DDC System Controls Upgrade	0.00	37,168	(806 Gallons)
ECM #10	Window Replacement	1.30	5,504	(1033 Gallons)
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	75.4 kW DC SolarArray System	75.4	93,883	0

Note: ECM #5 and ECM #6 are stand-alone ECMs and associated savings and costs should not be combined. The intention of the scenarios presented are to provide two options to the BOE based on the future installation of a new natural gas service at the Weymouth Township School.

Renewable Energy Conservation Measures:

Renewable Energy Measures (REMs) were also reviewed for implementation at Weymouth Township School. The best fit for the school, appears to be a ground mount solar array to house the PV systems. The facility has a total estimated solar system potential of 75.44 kW DC that could generate 93,883 kilowatt-hours annually offsetting 2.49% of the total energy purchased from the grid. The system's calculated simple payback of 12.9 years is not within the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. Concord Engineering recommends the Owner review all funding options available with the implementation of this renewable energy measure.

Energy Procurement Recommendations:

The Weymouth BOE is currently contracted with a third party supplier for electric and is utilizing a purchasing cooperative for their oil purchases. Concord Engineering recommends the BOE continue to purchase their electric commodity through a third party supplier once the current contract has expired. Additionally, if the BOE moves forward with bringing natural gas to the school Concord Engineering would recommend utilizing a third party supplier for the commodity portion of that utility. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive.

Further recommendations are outlined in the Energy Procurement Section of this report that could assist the District in finding additional savings through their utility bills.

Maintenance and Operational Recommendations:

In addition to the ECMs and REMs, 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 and further recommendations for the building are provided in the building reports:

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 windows and doors.
3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Verify all HVAC control systems are utilizing setback and scheduling capabilities.

Implementation Strategy Moving Forward:

It is recommended the Weymouth BOE strongly consider all projects with a simple payback of ten years and under for implementation. However, consideration should be taken on projects over ten years as they may be necessary capital improvements. The Owner should also consider pursuing any and all additional NJ Clean Energy Programs in order to receive the maximum incentives available. All of the projects noted above are feasible and able to be completed by the BOE. Careful planning and budgeting in unison with energy planning can prove to make the capital cost required for the projects bearable. Utilization of the NJ Clean Energy Programs and also, available funding programs such as ESIP should be the BOE's next step in improving the energy usage of their facility.

Overall Assessment:

Overall, the Weymouth Township School is well maintained and operating fairly efficiently. Through the implementation of measures outlined in this study and improving the overall operational efficiency it is likely the Weymouth BOE has potential to further reduce its total energy cost of $82,414 by approximately 30-40% by implementing the energy conservation measures noted above. This type of energy reduction would be impressive and would continue the already good path the BOE is on as is demonstrated by the above-average ENERGY STAR Portfolio Manager score.

II. INTRODUCTION

The comprehensive energy audit covers the 37,873 square foot Weymouth Township School, which includes the following spaces: offices, classrooms, library, multi-purpose room, kitchen, storage and toilet rooms.

Electrical and fuel oil 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 based on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

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

ECM Calculation Equations:

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage / Tariffs

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

The electric usage profile represents the actual electrical usage for the facility. The facility receives electric distribution service through Atlantic City Electric (ACE) under their Annual General Service (AGS) rate structure. The school has contracted South Jersey Energy, a **Third Party Supplier** (TPS), to provide electric commodity supply (generation) service. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the historical data received for the facility.

The oil usage profile shows the actual oil consumption for the facility. Oil is purchased through Petroleum Traders Corporation to the facility. The oil provider measures consumption in gallons. One Gallon of #2 oil is equivalent to 140,000 BTUs of energy.

It is also pertinent to note that the facility utilizes propane for cooking within the kitchen. The school has provided invoices for review on the propane usage and it appears that during the school year the facility requires approximately 22.2 gallons of propane per month which equals an estimated $86 per month cost at $3.87 / gallon. For the purposes of this report, the propane usage was not included in energy savings calculations.

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

Description	Average
Electricity	14.7¢ / kWh
Fuel Oil	$3.23 / gallon

Table 3
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Atlantic City Electric
Rate: Annual General Service
Meter No: 6104284
Account # 0220 1649 9992
Third Party Utility Provider: South Jersey Energy Co.
TPS Meter / Acct No: 22016499992

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Feb-11	32,400	106.4	$5,069
Mar-11	31,280	104.8	$4,895
Apr-11	29,600	125.6	$4,402
May-11	28,880	132.0	$4,299
Jun-11	31,760	147.2	$4,697
Jul-11	33,200	96.0	$4,778
Aug-11	30,240	79.2	$4,375
Sep-11	31,600	127.2	$4,643
Oct-11	32,400	112.0	$4,538
Nov-11	27,680	111.2	$4,057
Dec-11	29,680	97.6	$4,369
Jan-12	32,960	106.4	$4,556
Totals	**371,680**	**147.2 Max**	**$54,678**

AVERAGE DEMAND **112.1 KW average**
AVERAGE RATE **$0.147** **$/kWh**

Figure 1
Electricity Usage Profile

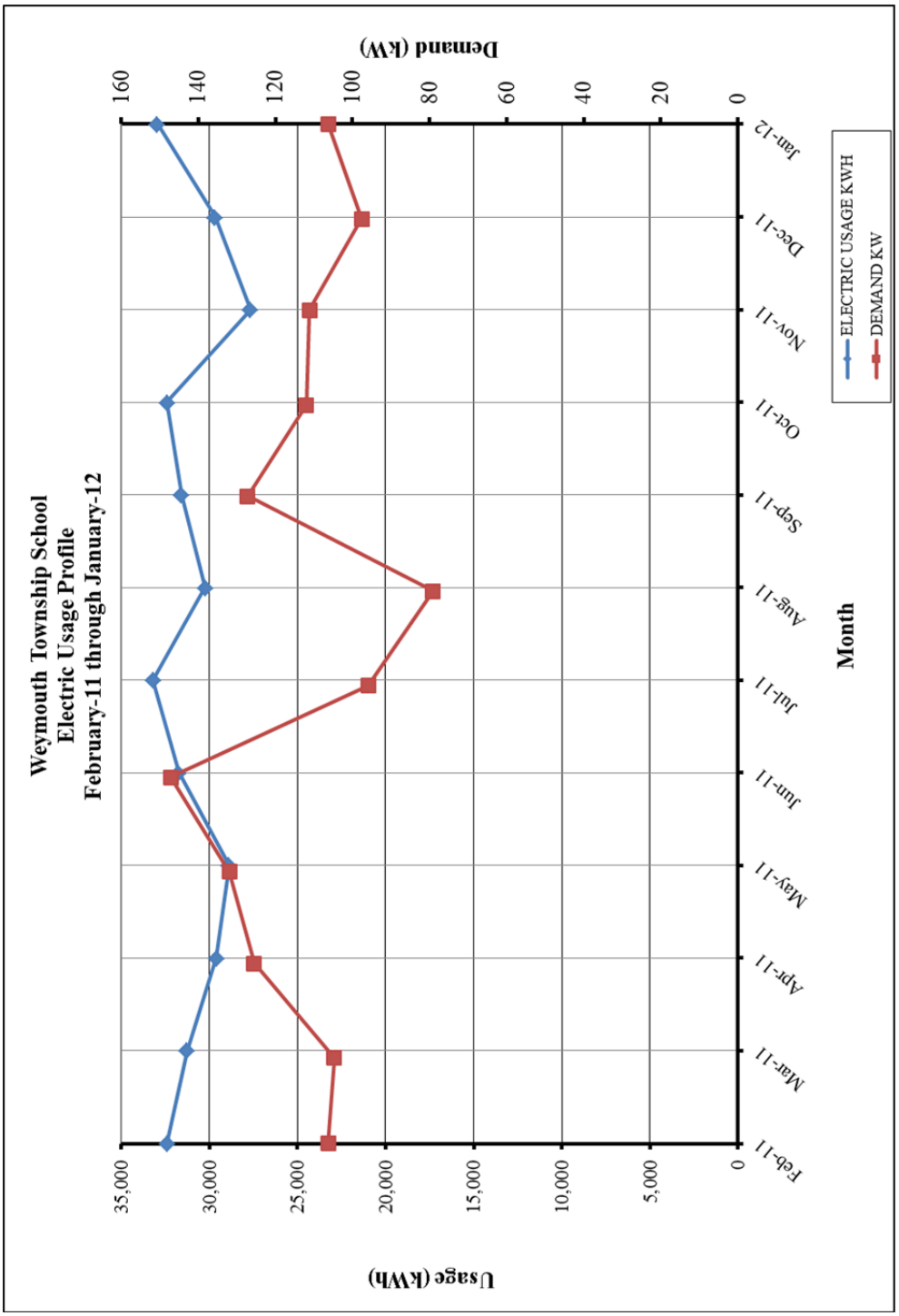


Table 4
Fuel Oil Billing Data

FUEL OIL USAGE SUMMARY		
Utility Provider: Petroleum Traders Corporation/Riggens Point of Delivery ID: 230269/1 Rate: Based on Time of Delivery Price		
MONTH OF USE	**CONSUMPTION (GALLONS)**	**TOTAL BILL**
Mar-11	4,016.70	$13,219.76
Dec-11	4,049.60	$12,536.34
Feb-12	4,021.70	$13,268.39
TOTALS	**12,088.00**	**$39,024.49**
AVERAGE RATE:	**$3.23**	**$/Gallon**

It is pertinent to note, that the facility's total usage for one year is most likely between 8,000 to 10,000 gallons of fuel oil. For the purposes of this study, Concord Engineering is making the assumption that for a typical year, the Weymouth Elementary School consumes the volume of two times the average of the three data points noted above equaling approximately **8,060 gallons**.

B. Energy Use Index (EUI)

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

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

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

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

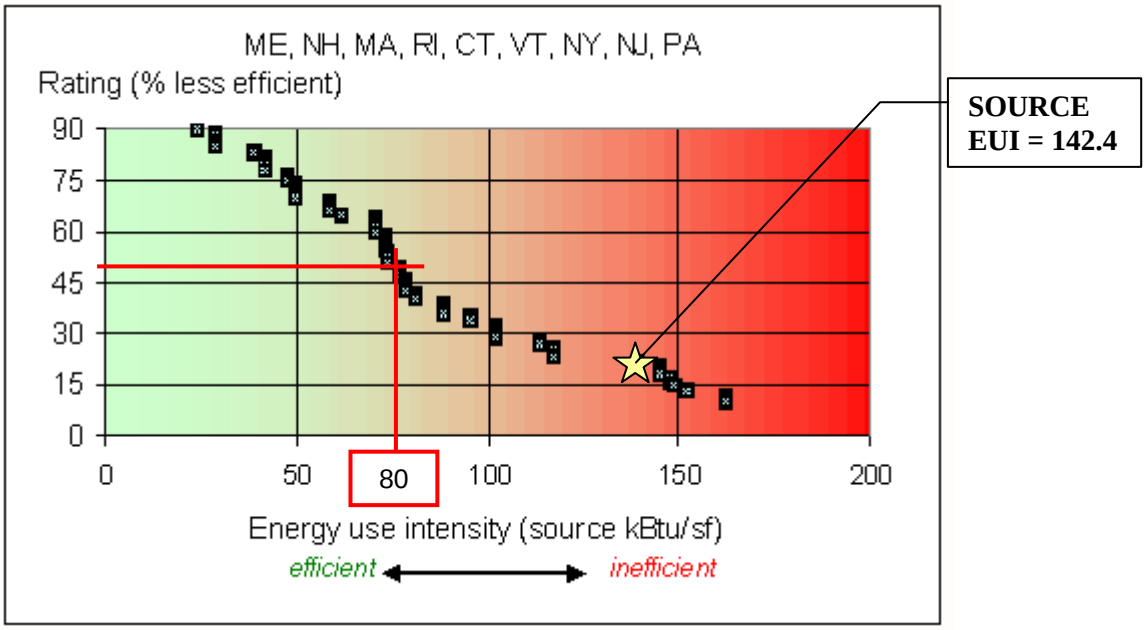
$$Building\ Source\ EUI = \frac{(Electric\ Usage\ in\ kBtu\ X\ SS\ Ratio + Gas\ Usage\ in\ kBtu\ X\ SS\ Ratio)}{Building\ Square\ Footage}$$

Table 5
Facility Energy Use Index (EUI) Calculation

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	371,680.0			1,268,916	3.340	4,238,178
NATURAL GAS		0.0		0	1.047	0
FUEL OIL			8,060.0	1,120,340	1.010	1,131,543
PROPANE			255.0	23,289	1.010	23,522
TOTAL				2,412,545		5,393,243
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document issued Dec 2007.						
BUILDING AREA		37,873	SQUARE FEET			
BUILDING SITE EUI		*63.70*	kBtu/SF/YR			
BUILDING SOURCE EUI		*142.40*	kBtu/SF/YR			

Figure 2 below depicts a national EUI grading for the source use of Elementary Schools.

Figure 2
Source Energy Use Intensity Distributions: Elementary School



Based on Concord Engineering's historical data for elementary schools in New Jersey, the Weymouth Elementary School is operating approximately 30% higher in source energy as compared to its peers. This is primarily due to the fuel types utilized for heating and cooking.

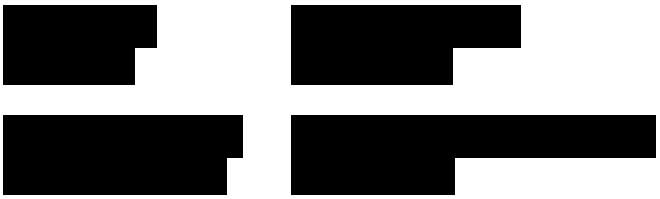
C. EPA Energy Benchmarking System

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, Concord 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



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**
Weymouth Twp School	67	50

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

V. FACILITY DESCRIPTION

The 37,873 SF Weymouth Township School is a single story facility comprised of offices, classrooms, library, multi-purpose room, kitchen, storage and toilet rooms. The facility was built in 1974 with additions constructed in 1984 and 1994. In the construction of both additions, the facility greatly increased its educational space and overall building footprint.

Building Profile

The school hours are between 9:00 AM and 3:00 PM on the weekdays. The teachers start arriving several hours before the classes begin. The school remains open after-hours on an as needed basis for after school activities. On weekends, the school is typically unoccupied.

The student enrollment at the Weymouth Township School is approximately 205 with an estimated total number of staff equaling 35.

Building Envelope

The exterior of the buildings consists of tan colored, split-face block construction. Estimated insulation within the walls is 1". The exterior appears to be in fair condition with some need for weatherization upgrades such as new caulking. The roof consists of a flat built up style roof with an estimated 4 inch rigid insulation below the EPDM roof membrane and appears to be in fair condition. Windows throughout the facility consist of operable, double pane windows with aluminum frames. There are also, areas where there are single pane aluminum frame windows that are in need of replacement. Overall, the windows appear to be in good condition. Throughout the facility, the use of interior shades has been implemented to provide occupant comfort and reduce solar heat gain in cooling months.

Heating Plant

Heating is provided to the facility from the Mechanical Room housing two oil fired section hot water boilers made by Weil McLain. Boiler #1 is original to the school and was installed in 1974. Boiler #1 has an input capacity of 3,500 MBH and output of 2,525 MBH. Boiler #2 was installed during the construction of the 1994 addition and has an input capacity of 2,800 MBH and output of 2,320 MBH. Both boilers appear to be well maintained and in good condition. Combustion tests were not available for review but based on age the assumption is the overall fuel-to-thermal efficiency for the boilers is approximately 65% and 75%, respectively, based on radiation losses and inefficiencies in operation inherent to the older technology. The heating hot water is circulated to three heating zones via individual constant speed inline pumps per zone. The pumps are driven with standard efficiency motors except for the two Amtrol Thrush pumps which contain high efficiency motors. At the time of the survey the stand-by pump was missing its motor but was noted as being replaced in the near future. The hot water heating system provides heating hot water to the unit ventilators, hot water fin-tube radiators, heating and ventilation units and individual classroom duct-mounted heating coils.

HVAC Systems

The original portion of the facility constructed in 1974 consists of office spaces, classrooms, toilet rooms, storage and the mechanical room. The office areas are conditioned by a new packaged cooling only rooftop unit that feeds duct-mounted hot water heating coils above the ceiling and then distributes the conditioned air into the rooms. The typical classrooms in this section are heated by unit ventilators containing hot water heating coils and hot water finned tube-radiation running along the perimeter walls. The majority of the unit ventilator controls are functioning with low accuracy due to older controls, valves, dampers and actuators. As a result of these issues, some of the classrooms suffer overheating. For cooling, the typical classroom contains a window air conditioning unit that were recently purchased and installed in 2007. Each system operates independent of the other so there is the possibility for simultaneous heating and cooling.

The 1984 section of the facility consists of the nurse's office, multiple classrooms, the library, multi-purpose room, kitchen, toilet rooms and storage rooms. The classrooms in this section are heated and cooled in similar fashion to the 1974 vintage rooms. The library is heated by two unit ventilators with hot water heating coils and has poor air distribution. The multi-purpose room is heated via a ceiling-mounted, indoor heating and ventilating unit. The unit appears to be vintage to the construction and based on discussions with the facilities personnel has operational issues. This room also contains a manually controlled exhaust fan that is not interlocked with the operation of the heating and ventilating unit. This occurrence causes times when the exhaust fan can be operated without the correct portion of outside air coming into the building via the heating and ventilating unit. During these periods the room pressure becomes negative and the exhaust fan then begins to pull unconditioned air from any cracks or leakage areas throughout the building.

The 1994 portions of the building consisted primarily of classroom additions. The classrooms in this section have two types of heating and air conditioning systems. The majority of the classrooms are conditioned via older packaged cooling only rooftop units that feed room specific duct-mounted hot water heating coils above the ceiling and then distribute the conditioned air into the rooms. These rooftop units have exceeded their estimated service life. Additionally, there is a control issue that occurs because the rooftop units are controlled via the direct digital control system however the duct-mounted hot water coils are controlled by the room manual wall thermostat. This issue can create simultaneous heating and cooling which wastes energy. There are two classrooms (111 and 112) that are part of the 1994 addition that are heated and cooled via a different method. Classrooms 111 and 112 are heated and cooled utilizing packaged unit ventilators that have self-contained cooling systems and hot water heating coils. Additionally, there is hot water finned tube radiation along the perimeter walls in these rooms.

Exhaust System

The air is exhausted from the corridors and toilet rooms via dedicated exhaust fans located on the roof. The general exhaust fans appear to operate continuously 24 hours per day, 7 days per week. This operation is inefficient and is recommended for correction with the installation of time clocks that can be scheduled to building occupancy. The multi-purpose room, kitchen and area above the refrigerator/freezer walk-ins all have dedicated exhaust fans for their needs. The

multi-purpose room and kitchen fans are switched on manually while the fan serving the area above the refrigerator/freezer walk-ins is operated based on temperature.

HVAC System Controls

The HVAC systems in this facility are controlled via two separate control systems.

The unit ventilators throughout the 1974 and 1984 sections are controlled via the original pneumatic control system. The old and outdated pneumatic controllers and actuators for the unit ventilators are deteriorated due to age and do not function properly. It is recommended to upgrade the original pneumatic controls to a state of the art DDC control system to enhance comfort conditions in the classrooms and increase energy efficiency.

The 1994 section unit ventilators (111 and 112), the packaged rooftop units, the multi-purpose room air-handling units and the Heating Plant are controlled via a DDC Building Management System (BMS) manufactured by Delta Controls. The BMS provides control over the equipment and consists of time of day scheduling and temperature set-points for the spaces. As noted above, although the packaged rooftop units are controlled via the DDC system the duct-mounted hot water heating coils are controlled via the manual thermostats located in each room. Additionally, based on field observation it appears that the rooftop exhaust fans are not running on a set schedule coordinating with the building occupancy.

The BMS currently does not have optimal start/stop controls. Optimal start/stop controls are recommended to be added to the BMS system as they will provide better equipment runtimes and efficiencies. Optimal start / stop controls vary the start times of building heating and cooling systems depending on the weather and the indoor temperature of the building. For instance, if it was a mild day outside in the winter, the BMS would delay the heating start time resulting in energy savings. Typically, these controls will also improve occupant comfort because there will be less likely conditions for over-heating or over-cooling.

Domestic Hot Water

Domestic hot water for the facility is provided by three separate tank type domestic hot water heaters. One unit is located in a storage room in the 1974 section of the facility adjacent to the toilet rooms and is a 40 gallon electric domestic hot water heater with 4.5 kW input capacity. The electric hot water heater is made by Bradford White and was installed in 1999. This domestic hot water heater has recently surpassed it expected service life, however based on varied usage is recommended to not be replaced until it fails. A second unit serving the kitchen area is located in a storage room in the 1984 section of the facility and is a 120 gallon electric domestic hot water heater with 6.0 kW input capacity. The electric hot water heater is made by AO Smith and was installed in 1985. This domestic hot water heater is approximately 15 years past its expected service life, however similar to the first hot water heater should be replaced only upon failure. The third unit is located in a storage room in the 1984 section of the facility adjacent to the toilet rooms and is a 65 gallon electric domestic hot water heater with 4.5 kW input capacity. The electric hot water heater is made by AO Smith and was installed in 2002. This unit appears to be in good condition and is not in need of replacement at this time.

Facility Cooking Equipment

Cooking equipment for the kitchen within the facility is fueled by propane. The facility has a single propane storage tank that is located outside, adjacent to the kitchen. Based on the utility data provided by the Owner, the facility utilized approximately 255 gallons of propane per year. Natural gas is currently not available in the area.

Lighting

Typical lighting throughout the building is fluorescent tube fixtures with T8 lamps and electronic ballasts. There are a number of spaces with older fluorescent fixtures with magnetic ballasts and incandescent lamps. The gymnasium is lit via multiple 400 W metal halide fixtures that provide adequate light but require high input wattage. A space by space breakdown of the lighting throughout the facility is provided in the **Investment Grade Lighting Appendix**.

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 – General

Description:

The majority of the interior lighting throughout Weymouth Township School is provided with fluorescent fixtures with older generation, 700 series and 741/ECO 32W T8 lamps and electronic ballasts. Although these T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. Concord Engineering recommends, re-lamping all of the fixtures with 28W T8 lamps and in some cases removing a lamp from the fixture due to excessive foot candle levels in specific areas. In addition, there are a number of older and outdated fixtures with T12 lamps and magnetic ballasts. It is recommended to replace all of the T12 and 700 series T8 fixtures in these areas with higher efficiency fluorescent T8 fixtures with electronic ballasts.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. The ECM also includes retrofit of all older fluorescent fixtures with T8 or T5 fluorescent 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.

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.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$23,351
NJ Smart Start Equipment Incentive ($):	$1,660
Net Installation Cost ($):	$21,691
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,275
Total Yearly Savings ($/Yr):	$4,275
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.1
Simple Lifetime ROI	195.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$64,129
Internal Rate of Return (IRR)	18%
Net Present Value (NPV)	$29,346.63

ECM #2: Gymnasium Lighting & Controls Upgrade

Description:

The gymnasium at Weymouth Township School is currently lit via twenty-four 400W Metal Halide HID fixtures. The space would be better served with a more efficient, fluorescent lighting system. CE recommends upgrading the lighting to an energy-efficient LED system that includes new 93 watt LED Nue-Tech lamps.

This measure replaces all the HID, 400 W HID MH fixtures with a well-designed LED lighting system. Twenty-four, 93 Watt Nue-Tech LED retrofit lamps will be required in order to meet the mandated 50 foot-candle average within the spaces.

In addition to the lighting upgrade, the gymnasium would also benefit from lighting controls which can be combined with the lighting ECM to further increase the savings which can be attained. Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy 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 mount sensors for the gymnasium. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of general lighting and lighting controls implemented in this ECM and outlines the proposed fixtures, 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:

A detailed Investment Grade Lighting Audit can be found in **Investment Grade Lighting Audit Appendix** that outlines the proposed retrofits, costs, savings, and payback periods.

From the **Smart Start Incentive Appendix**, the installation of a lighting control device warrants the following incentive:

$$\begin{aligned}\text{Smart Start Incentive} &= (\#\ \text{Wall mount sensors} \times \$20\ \text{per sensor}) \\ &+ (\#\ \text{Ceiling mount sensors} \times \$35\ \text{per sensor})\end{aligned}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,485
NJ Smart Start Equipment Incentive ($):	$30
Net Installation Cost ($):	$16,455
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,637
Total Yearly Savings ($/Yr):	$3,637
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.5
Simple Lifetime ROI	231.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$54,555
Internal Rate of Return (IRR)	21%
Net Present Value (NPV)	$26,963.03

ECM #3: Exterior Lighting Upgrade

Description:

The exterior lighting at Weymouth Township School is currently lit via mercury vapor area fixtures. The exterior would be better served with more efficient induction lighting system. CE recommends upgrading the lighting to an energy-efficient induction lighting system that includes new lighting fixtures for flood lights and retrofit lamps for existing area lights.

This measure replaces all the 1000 watt mercury vapor flood lights with 400 Watt induction lighting fixtures and all 175 watt mercury vapor area lights will be retrofit with 80 watt induction lamps.

Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in **Investment Grade Lighting Audit Appendix** that outlines the proposed retrofits, costs, savings, and payback periods.

From the **Smart Start Incentive Appendix**, the installation of a induction lighting warrants the following incentive: $50 per HID (≥100 watts) fixture retrofitted with induction lamp, power coupler and generator; Replacement unit must use 30% less wattage per fixture than existing HID system.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,200
NJ Smart Start Equipment Incentive ($):	$200
Net Installation Cost ($):	$1,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$463
Total Yearly Savings ($/Yr):	$463
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.2
Simple Lifetime ROI	594.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$6,940
Internal Rate of Return (IRR)	46%
Net Present Value (NPV)	$4,523.47

ECM #4: General Lighting Controls Upgrade – Occupancy Sensors

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy 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 or switch mount sensors for individual offices, classrooms, large bathrooms, and Media Centers. 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:

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

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

Rebates and Incentives:

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

Smart Start Incentive
= (# Wall mount sensors × $20 per sensor)
+ (# Ceiling mount sensors × $35 per sensor)

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,550
NJ Smart Start Equipment Incentive ($):	$645
Net Installation Cost ($):	$10,905
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,020
Total Yearly Savings ($/Yr):	$3,020
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.6
Simple Lifetime ROI	315.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$45,302
Internal Rate of Return (IRR)	27%
Net Present Value (NPV)	$25,149.29

ECM #5: Boiler Replacement – High Efficiency Oil Fired

Description:

There are two existing oil fired cast iron sectional boilers which supply hot water for the Weymouth Township School. The one existing boiler is past its life expectancy of a typical cast iron boiler. Based on the premise that a natural gas line cannot be provided for this facility, this ECM is valuable to the facility. With the increased efficiency of a new boiler, the savings becomes substantial. Even though the boiler would still be using fuel oil, the efficiency upgrade would substantiate cost savings gained by burning less fuel oil overall.

This ECM includes installation of one cast iron oil fired boiler to replace the one cast iron oil fired boiler. The basis for this ECM is Bryan Boilers oil-fired boiler; model number HE-CLM300. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Clarification Note: This ECM is stand-alone and does not combine with ECM #6. This ECM is valid only if the BOE **does not** receive a new natural gas service to the facility. If a new natural gas service is installed then the BOE should not consider this ECM and move to ECM #6 for the projected savings from the new natural gas fired hot water heating system.

Energy Savings Calculations:

$$Bldg\ Heat\ \mathrm{Re}quired = Existing\ Oil\ Use\ (Gal) \times Heating\ Eff.(\%) \times Fuel\ HeatValue\left(\frac{BTU}{Gallon}\right)$$

$$\mathrm{Pr}oposed\ Heating\ Gas\ Usage = \frac{Bldg\ Heat\ \mathrm{Re}quired\ (BTU)}{Heating\ Eff.(\%) \times Fuel\ Heat\ Value\left(\frac{BTU}{Therm}\right)}$$

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

Energy savings calculations are summarized in the table below:

BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Sectional Boiler	High Efficiency Oil Fire Boiler	
Total Hot Water Oil Usage per Utility Bills (Gallons)	8,060	-	
Boiler Efficiency (%)	65%	85%	20%
Oil Heat Value (BTU/Gallon)	140,000	140,000	
Equivalent Building Heat Usage (MMBTUs)	733	733	
Fuel Oil Cost ($/Gallon)	$3.23	$3.23	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Fuel Oil Usage (Gallons)	8060	6,160	1,900
Energy Cost ($)	$26,034	$19,896	$6,138
COMMENTS:			

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$72,333
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$72,333
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,138
Total Yearly Savings ($/Yr):	$6,138
Estimated ECM Lifetime (Yr):	35
Simple Payback	11.8
Simple Lifetime ROI	197.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$214,830
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	$59,555.33

ECM #6: Condensing Boiler Installation

Description:

There are two existing oil fired cast iron sectional boilers which supply hot water for the Weymouth Township School. The one existing boiler is past its life expectancy of a typical cast iron boiler. Based on the premise that a natural gas line will be provided for this facility, this ECM is valuable to the facility. Utilization of natural gas as a replacement for #2 oil as the heat source offers a large cost savings based on current fuel prices. With the increased efficiency of the condensing boilers, the savings becomes substantial.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 92%. This is a 27% increase in efficiency over the existing boiler which is estimated to operate at 65% efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of one condensing gas fired boiler to replace the one cast iron oil fired boiler. The basis for this ECM is Aerco Benchmark Series condensing boiler; model number BMK-3.0. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Clarification Note: This ECM is stand-alone and does not combine with ECM #5. This ECM is valid only if the BOE **does** receive a new natural gas service to the facility. If a new natural gas service is not installed then the BOE should not consider this ECM and return to ECM #5 for the projected savings from the new oil fired hot water heating system.

Energy Savings Calculations:

$$Bldg\ Heat\ \mathrm{Re}quired = Existing\ Oil\ Use\ (Gal) \times Heating\ Eff.(\%) \times Fuel\ HeatValue\left(\frac{BTU}{Gallon}\right)$$

$$\mathrm{Pr}oposed\ Heating\ Gas\ Usage = \frac{Bldg\ Heat\ \mathrm{Re}quired\ (BTU)}{Heating\ Eff.(\%) \times Fuel\ Heat\ Value\left(\frac{BTU}{Therm}\right)}$$

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

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Sectional Boiler	New Condensing Boiler	
Total Hot Water Oil Usage per Utility Bills (Gallons)	8,060	0	8,060
Boiler Efficiency (%)	65%	92%	27%
Oil Heat Value (BTU/Gallon)	140,000		
Gas Heat Value (BTU/Therm)		100,000	
Equivalent Building Heat Usage (MMBTUs)	733	733	
Fuel Oil Cost ($/Gallon)	3.23	3.23	
Gas Cost ($/Therm)	1.05	1.05	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Fuel Oil Usage (Gallons)	8,060	0	8,060
Building Natural Gas Usage (Therms)	0	7,973	-7,973
Energy Cost ($)	$26,034	$8,372	$17,662
COMMENTS:			

Project Cost, Incentives and Maintenance Savings

From the **New Jersey Smart Start® Program Incentives Appendix**, installation of a high efficiency hot water boiler falls under the category "Gas Heating" and warrants an incentive based on efficiency at or above 84% for this type of equipment. The program incentives are calculated as follows:

GAS FIRED BOILER REBATE SUMMARY					
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/MBH**	**PROPOSED CAPACITY, MBH**	**NUMBER OF UNITS**	**TOTAL REBATE, $**
< 300 MBH	85% AFUE for Hot Water boilers	$2.00	0	0	$0
≥300-1500 MBH	84% AFUE for Hot Water boilers	$1.75	0	0	$0
>1500 - ≤ 4000 MBH	84% AFUE for Hot Water boilers	$1	3,000	1	$3,000
TOTAL					**$3,000**

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$102,687
NJ Smart Start Equipment Incentive ($):	$3,000
Net Installation Cost ($):	$99,687
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$17,662
Total Yearly Savings ($/Yr):	$17,662
Estimated ECM Lifetime (Yr):	35
Simple Payback	5.6
Simple Lifetime ROI	520.1%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$618,170
Internal Rate of Return (IRR)	18%
Net Present Value (NPV)	$279,820.73

Note: This ECM does not take into account the extra costs that the district would incur installing and maintaining a new gas service. Due to these unknown costs, the simple payback of 5.6 years may increase slightly.

ECM #7: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95 % of its total lifetime operating cost. Because many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot water pumps are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	**FUNCTION**	**MOTOR HP**	**HOURS OF OPERATION**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**
HWP-1	Hot Water Pumps	3	3,776	81.5%	89.5%
HWP-2	Hot Water Pumps	1	3,776	78.5%	87.5%

Energy Savings Calculations:

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

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

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

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

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

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

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
HWP-1	3	75%	81.5%	89.5%	0.18	699	$103
HWP-2	1	75%	78.5%	87.5%	0.07	278	$41
TOTAL					**0.3**	**977**	**$144**

Equipment Cost and Incentives

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

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
3	$60

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

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP-1	3	$1,049	$60	$989	$103	9.6
HWP-2	1	$708	$50	$658	$41	16.1
TOTAL	**Totals:**	**$1,757**	**$110**	**$1,647**	**$144**	**11.5**

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,757
NJ Smart Start Equipment Incentive ($):	$110
Net Installation Cost ($):	$1,647
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$144
Total Yearly Savings ($/Yr):	$144
Estimated ECM Lifetime (Yr):	18
Simple Payback	11.5
Simple Lifetime ROI	57.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,586
Internal Rate of Return (IRR)	5%
Net Present Value (NPV)	$328.58

ECM #8: Rooftop Unit Replacement

Description:

The Weymouth Township School has several packaged rooftop systems throughout the school which condition multiple classrooms. These units are also past their ASHRAE service life and should be considered for replacement.

The units currently installed are lower efficiency compared to modern units. The units can be replaced with new high efficiency units. New units provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and higher efficiency refrigerants such as R410A which would be used in place of R22 that is currently used in the unit.

This ECM includes one-for-one replacement of the older rooftop units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacement for this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	**SERVICE FOR**	**NUMBER OF UNITS**	**COOLING CAPACITY, BTU/HR**	**TOTAL CAPACITY, TONS**	**REPLACE UNIT WITH**
RTU	B1	1	60,000	5.0	Carrier 48HC
RTU	B2	1	90,000	7.5	Carrier 48HC
RTU	C1	1	120,000	10.0	Carrier 48HC
RTU	C2	1	150,000	12.5	Carrier 48HC
Total		**4**	**420,000**	**35**	

The manufacturers used as the basis for the calculation is Carrier. The unit pricing and install cost were estimated based on current rates quotes and labor rates. The payback may change based on actual unit pricing and install costs if the ECM is implemented.

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 EER**	**NEW UNITS EER***	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
RTU	60,000	2,000	9 EER	14.4 EER	1	5,000	2.5
RTU	90,000	2,000	9 EER	14.4 EER	1	7,500	3.8
RTU	120,000	2,000	9.6 EER	13.8 EER	1	7,609	3.8
RTU	150,000	2,000	9 EER	14.64 EER	1	12,842	6.4
Total					1	32,950	16.5

*** Hours have been adjusted to take into account part load operation over the school year.**

**** Unit EERs have been adjusted to take into account part load operation over the school year.**

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start® Program appendix, the replacement of split system AC units and unitary systems with high efficiency AC systems falls under the category "Unitary HVAC Split System" and warrants an incentive based on efficiency (EER/SEER). The program incentives are calculated as follows:

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

AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/TON**	**PROPOSED CAPACITY TONS**	**TOTAL REBATE $**
≥20 to 30 tons	10.5 EER	79	0	$0
≥ 11.25 to < 20 tons	11.5 EER	79	12.5	$988
≥ 5.4 to < 11.25 tons	11.5 EER	73	18	$1,278
5.4 tons or less Unitary AC and Split System	≥14 SEER	$92	5.0	$460
TOTAL			**35**	**$2,725**

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 SAVINGS**	**PAY BACK YEARS**
RTU	$12,500	1	$12,500	$460	$12,040	$735	16.4
RTU	$16,250	1	$16,250	$548	$15,703	$1,103	14.2
RTU	$17,500	1	$17,500	$730	$16,770	$1,118	15.0
RTU	$20,625	1	$20,625	$988	$19,638	$1,888	10.4
Total	$66,875	4	$66,875	$2,725	$64,150	$4,844	13.2

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

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$66,875
NJ Smart Start Equipment Incentive ($):	$2,725
Net Installation Cost ($):	$64,150
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,844
Total Yearly Savings ($/Yr):	$4,844
Estimated ECM Lifetime (Yr):	15
Simple Payback	13.2
Simple Lifetime ROI	13.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$72,660
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($6,322.64)

ECM #9: Direct Digital Control System Controls Upgrade

Description:

The unit ventilators in the 1974 and 1984 sections are controlled locally via central pneumatic control systems. The remainder of the HVAC systems throughout the school is controlled via manual thermostats within rooms which are connected to a BMS system for that area.

The unit ventilator fans throughout the spaces are manually enabled with the hot water control valve and outside air damper controlled by a pneumatic thermostat. The multi-purpose room air-handling units and the Heating Plant are controlled via a DDC Building Management System. The window air conditioners are controlled manually via on board controls or remote controllers.

Concord Engineering recommends installing a DDC system throughout the school to control the entire HVAC system including the unit ventilators in the classrooms, indoor air handling units, rooftop units and roof exhaust fans.

The system will include new temperature sensors and new local thermostats with limited over-ride capability, a front end computer and main controller. The system will also include central controls for lighting. With the communication between the control devices and the front end computer interface, the facility manager will be able to take advantage of scheduling for occupied and unoccupied periods based on the actual occupancy of each space in the facility. Due to the fact that the building may have diverse hours of occupancy, including evening and weekend activities, having supervisory control over all of the equipment makes sense. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

The new DDC system has the potential to provide significant savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, etc. 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 referenced report:

- Energy Management and Control System Savings: 5%-15%.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the electricity and 10% for the fuel oil utility in this building.

The basis for the DDC system expansion is the Automated Logic Energy Management System or similar.

Energy Savings Calculations:

Energy savings for each utility is calculated with the equation below.

$$\text{Energy Savings (Utility)} = \text{Current Energy Consumption} \times \text{Estimated Savings, \%}$$

Following table summarizes energy savings for this facility via implementation of an Energy Management System:

DDC ENERGY MANAGEMENT SYSYEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Fuel Oil Usage (Gallons)	8,060	-	
Existing Electricity Usage (kWh)	371,680	-	
Energy Savings, Fuel Oil	-	10%	
Energy Savings, Electricity	-	10%	
Oil Cost ($/Gallon)	*$3.23*	$3.23	
Electricity Cost ($/kWh)	*$0.147*	$0.147	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Fuel Oil Usage (Gallons)	8,060	7,254	806
Electricity Usage (kWh)	371,680	334,512	37,168
Fuel Oil Cost ($)	$26,034	$23,430	$2,603
Electricity Cost ($)	$54,637	$49,173	$5,464
Energy Cost ($)	$80,671	$72,604	$8,067
COMMENTS:			

Demand savings due to implementation of this ECM is minimal.

Project Cost, Incentives and Maintenance Savings

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc., is approximately $3.75 per SF in accordance with recent Contractor pricing for systems of this magnitude. Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Cost of complete DDC System = ($3.75/SF x 39,200 SF) = $147,000

Currently, there are no prequalified NJ SmartSmart® Incentives for installation of the DDC system.

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$147,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$147,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$8,067
Total Yearly Savings ($/Yr):	$8,067
Estimated ECM Lifetime (Yr):	15
Simple Payback	18.2
Simple Lifetime ROI	-17.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$121,005
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	($50,696.68)

ECM #10: Window Replacement

Description:

The majority of the facility envelope consists of operable double pane windows with aluminum frames. However, there are areas in the 1974 original building that are still single pane glass with aluminum frames. These window assemblies appear to be original to the building and could be upgrades to a much more thermally efficiency window assembly.

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.

This ECM includes the replacement of all remaining older windows single pane glass in the 1974 wing with double pane windows with 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 ASHRAE 90.1-2007 equivalent windows at estimated cost of $100 per SF of window installed. Below is a list of areas with older and inefficient windows:

WINDOW REPLACEMENT SUMMARY			
ECM INPUTS	**NUMBER OF WINDOWS**	**SIZE (in.)**	**AREA (SF)**
214	4	36 x 128	128
212d	5	36 x 128	160
212b	3	36 x 128	96
214	1	36 x 128	32
203	5	36 x 128	160
107	5	36 x 128	160
109	5	36 x 128	160
110	5	36 x 128	160
108	5	36 x 128	160
106	5	36 x 128	160
TOTAL	**43**	**-**	**1,376**

Energy Savings Calculations:

$$\text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min.}}\right) = \text{Window Area}\left(\text{Ft}^2\right) \times \text{Estimated Infiltration per SF of Window}\left(\frac{\text{CFM}}{\text{Ft}^2}\right)$$

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

$$\text{Cooling Load}\left(\text{Ton}\right) = \text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min}}\right) \times \frac{1\,\text{Ton Cooling}}{400\left(\frac{\text{Ft}^3}{\text{Min}}\right)}$$

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

$$\text{Cooling Leakage Energy}\left(\text{kWh}\right) = \frac{\text{Cooling Load}\left(\text{Ton}\right) \times \left(\frac{12{,}000\,\text{Btu}}{\text{Ton Hr.}}\right) \times \text{Full Load Cooling Hours}}{\frac{1000\,\text{W.h}}{\text{kWh}} \times \text{Cooling Efficiency}\left(\text{EER}\right)}$$

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

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

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

WINDOW REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Description:	Existing Single Pane Windows	Double Pane Low-E Windows	-
Window (SF)	1,376	1,376	-
U-Value (BTU/HR/SF*°F)	0.8	0.45	0.35
Estimated Infiltration, CFM per SF Window	3	2	-
Total Infiltration, CFM	4128	2752	1,376
Heating System Efficiency (%)	75%	75%	-
Heating Degree Days (HDD)	3,776	3,776	-
Design Day Temp Diff (°F)	65	65	-
Heating Hrs Per Day (Hrs)	24	24	-
Full Load Cooling Hours	1,200	1,200	-
Average Cooling Efficiency, EER	9.0	9.0	-
Oil Cost ($/Gallon)	3.23	3.23	-
Electric Cost ($/kWh)	0.147	0.147	-
Oil Heat Value (BTU/Gallon)	140,000	140,000	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Heat Load (BTU/Hr)	295,152	196,768	98,384
Leakage Energy (Gallons)	2,351	1,568	784
Conductive Energy (Gallons)	570	321	249
Total Oil Energy (Gallons)	2,922	1,888	1,033
Cooling Load (Ton)	10	7	3
Cooling Demand (kW)	3.9	2.6	1.3
Total Cooling Energy (kWh)	16,512	11,008	5,504
Energy Cost ($)	$11,864	$7,717	$4,146
Comments:	1. Proposed window U-value Based on ASHRAE 90.1 - 2007		

Estimated cost for replacing the inefficient windows at the Weymouth Township School is $137,600.

Energy Savings Summary:

ECM #10 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$137,600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$137,600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,146
Total Yearly Savings ($/Yr):	$4,146
Estimated ECM Lifetime (Yr):	15
Simple Payback	33.2
Simple Lifetime ROI	-54.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$62,190
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	($88,105.32)

REM #1: 75.4 kW DC Solar Array System

Description:

The Weymouth Elementary School has a number of suitable spaces available at grade for a substantial solar PV (photovoltaic) panel installation for generating on-site electricity.

Total installed capacity of the proposed system is 75.4 kW DC. The system will produce approximately 93,884 kilowatt-hours annually, which will reduce the overall electric usage of the facility by 25%.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	75.44
Electric Generation (KWH/Yr):	93,883
Installation Cost ($):	$408,732
SREC Revenue ($/Yr):	$17,940
Energy Savings ($/Yr):	$13,801
Total Yearly Savings ($/Yr):	$31,740
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	12.9
Analysis Period Electric Savings ($):	$256,680
Analysis Period SREC Revenue ($):	$259,877
Net Present Value (NPV)	($24,019.20)

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

Solar Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around $350, this value was used in our financial calculations. This equates to $0.35 per kWh generated.

Concord Engineering has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. Concord Engineering believes a ground mounted system is best suited for this site. A ground area of 10,500 S.F. can be utilized for a PV system. A depiction of the area utilized is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. Using this square footage it was determined that a system size of 75.44 kilowatts DC could be installed. A system of this size has an estimated kilowatt hour production of 93,884 kWh annually, reducing the overall utility bill by approximately 25% 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 Sharp NU-U235F2 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 Sharp and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized on available roof or land space of 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 Weymouth Township Board of Education paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. Based on our calculations the following is the payback period:

Table 7
Financial Summary – Photovoltaic System

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM			
PAYMENT TYPE	**SIMPLE PAYBACK**	**SIMPLE ROI**	**INTERNAL RATE OF RETURN**
Direct Purchase	12.9 Years	16.5%	1.97%

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

Concord Engineering recommends Weymouth Township Board of Education review all options available for installation of solar PV systems at their facility including a Power Purchase Agreement (PPA). This option utilizes providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the BOE at a reduced rate compared to their existing electric rate. It should be noted that current SREC pricing has significantly impacted the PPA market for public entities in addition to the end of the 30% grant in lieu of the investment tax credit. These recent market changes have made it more difficult for public entities to secure low cost power purchase price options.

Wind Generation

In addition to the Solar Analysis, Concord Engineering 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 Concord Engineering'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 fuel oil profiles included within this report to reference the respective usage load profiles.

Electricity:

The Electric Usage Profile demonstrates a fairly consistent, flat load profile. The summer (May-August) demonstrates increased consumption typical to air conditioning load. There is a fairly steady yearlong electric load most likely attributable to the fact that the majority of systems within the facility utilize electricity. The flat load profile demonstrated by the studied data will allow for more competitive energy prices when shopping for alternative suppliers.

Fuel Oil:

The usage of fuel oil does not typically correspond to a profile because the actual data is typically only gathered for tank fills at delivery and not month-to-month consumption.

Tariff Analysis:

Electricity:

The facility receives electric distribution service through Atlantic City Electric (AECO) on rate schedule AGS (Annual General Service). For the electric supply (generation) service only, the client has a choice to either use AECO's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric. The Weymouth BOE has contracted with South Jersey Energy to be their TPS for the electric account at the elementary school.

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

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

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential

customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The current BGS-FP average price to compare for AECO's AGS rate schedule is $0.1182/kWh. Based upon the current BGS-FP electric rate from AECO, this facility has the ability to experience savings by contracting with a Third Party Supplier (TPS) for electric supply service. Should the facility contract with a TPS, the utility, AECO will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity from. AECO's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, Market Transition, Transition Bond Charge, Non-Utility Generation Charge, Societal Benefits Charge (SBC), Infrastructure Investment Charge, System Control Charge, Regulatory Assets Recovery Charge, and Regional Greenhouse Gas Initiative Charge.

Natural Gas:

This facility receives deliveries of #2 oil and propane on an as needed basis. The cost per gallon is determined based on the market driven costs. These utilities do not include tariffs and rate structures.

Natural gas is a utility similar to electric which includes delivery and supply charges based on a rate structure and utility tariff. The Weymouth BOE is reviewing the feasibility of the addition of a natural gas service to the building. In doing so customers of natural gas service may either purchase gas supply from a Third Party (TPS) or from their local utility's Basic Gas Supply Service default service as detailed in the utility rate schedule. Different service rates are available and should be considered for the facility prior to beginning a contract.

When considering a third party supplier for natural gas it is important to understand the costs associated with imbalances. Most natural gas rate schedules have a balancing charge included in their rate structure. Should the TPS not deliver, the customer may receive service from the default delivery utility under their Emergency Sales Service. Emergency Sales Service carries an extremely high penalty cost of service. Should the TPS un-deliver to the utility on behalf of the client, the utility will automatically supply this default service to the client. Imbalances occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, imbalances can occur, jeopardizing economics and scheduling.

Recommendations:

Concord Engineering recommends the Weymouth BOE continue their utility purchasing approach utilizing third party commodity supply procurement strategies for their electricity supply service. Additionally, if the BOE moves forward with bringing natural gas to the school Concord Engineering would recommend utilizing a third party supplier for the commodity portion of that utility. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive.

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, Concord Engineering recommends that if the Weymouth BOE has any concerns they seek advisement of their own from a third party unbiased Energy Consulting Firm. This firm should be experienced in the procurement of electricity commodity, New Jersey procurement laws, aggregation of facilities and energy supply risk and commodity management. In addition, the firm should be able to provide full service advisement over the term of the contract to identify additional opportunities to further reduce costs. Many of these opportunities may include: energy rates; utility bill auditing; energy data analytics; and efficiency improvements.

It is important that a rational, defensible strategy for purchasing commodity in volatile markets is incorporated. Examples include:

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

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 150 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 70% 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.

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

XI. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

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

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.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Weymouth Township School District

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade	$23,351	$0	$1,660	$21,691	$4,275	$0	$4,275	15	$64,129	$0	195.6%	5.1	18.08%	$29,346.63
ECM #2	Gym Lighting & Controls Upgrade	$16,485	$0	$30	$16,455	$3,637	$0	$3,637	15	$54,555	$0	231.5%	4.5	20.80%	$26,963.03
ECM #3	Exterior Lighting Upgrade	$1,200	$0	$200	$1,000	$463	$0	$463	15	$6,940	$0	594.0%	2.2	46.11%	$4,523.47
ECM #4	General Lighting Controls Upgrade	$11,550	$0	$645	$10,905	$3,020	$0	$3,020	15	$45,302	$0	315.4%	3.6	26.92%	$25,149.29
ECM #5	Boiler Replacement - High Efficiency Oil Fired	$39,810	$32,523	$0	$72,333	$6,138	$0	$6,138	35	$214,830	$0	197.0%	11.8	7.89%	$59,555.33
ECM #6	Boiler Replacement - Condensing Natural Gas Conversion	$63,133	$39,554	$3,000	$99,687	$17,662	$0	$17,662	35	$618,170	$0	520.1%	5.6	17.66%	$279,820.73
ECM #7	NEMA Premium Motor Replacement	$1,301	$456	$110	$1,647	$144	$0	$144	18	$2,586	$0	57.0%	11.5	5.25%	$328.58
ECM #8	Rooftop Unit Replacement	$46,875	$20,000	$2,725	$64,150	$4,844	$0	$4,844	15	$72,660	$0	13.3%	13.2	1.60%	($6,322.64)
ECM #9	DDC System Controls Upgrade	$147,000	$0	$0	$147,000	$8,067	$0	$8,067	15	$121,005	$0	-17.7%	18.2	-2.34%	($50,696.68)
ECM #10	Window Replacement	$137,600	$0	$0	$137,600	$4,146	$0	$4,146	15	$62,190	$0	-54.8%	33.2	-8.60%	($88,105.32)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	75.4 kW DC SolarArray System	$408,732	$0	$0	$408,732	$13,801	$17,940	$31,740	15	$476,106	$269,094	16.5%	12.9	1.97%	($29,817.25)

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* .

APPENDIX B

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 15, 2011:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2007

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 - $92 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 90.1-2007

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%

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per VFD rated hp
Compressors	$5,250 to $12,500 per drive
Cooling Towers ≥ 10 hp	$60 per VFD rated hp

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons, 0.67 energy factor or better	$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 (1-4 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 Including Parking Lot	$25 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $200 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

Prescriptive Lighting - LED

LED New Exit Sign Fixture Existing Facility < 75 kw Existing Facility > 75 kw	 $20 per fixture $10 per fixture
LED Display Case Lighting	$30 per display case
LED Shelf-Mtd. Display & Task Lights	$15 per linear foot
LED Portable Desk Lamp	$20 per fixture
LED Wall-wash Lights	$30 per fixture
LED Recessed Down Lights	$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	$100 per fixture
LED Parking Garage Luminaries	$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	$150 per fixture
LED High-Bay-Aisle Lighting	$150 per fixture
LED Bollard Fixtures	$50 per fixture
LED Linear Panels (2x2 Troffers only)	$100 per fixture
LED Fuel Pump Canopy	$100 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	$75 per fixture controlled
Daylight Dimming	$75 per fixture controlled
Daylight Dimming - office	$50 per fixture controlled

Premium Motors

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

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2007 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%

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Weymouth Township School

Building ID: 3160704
For 12-month Period Ending: January 31, 2012[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: May 16, 2012

Facility
Weymouth Township School
1202 Eleventh Avenue
Dorothy, NJ 08317

Facility Owner
Weymouth Township BOE
1202 Eleventh Avenue
Dorothy, NJ 08317

Primary Contact for this Facility
Jonathan Houdart
1202 Eleventh Avenue
Dorothy, NJ 08317

Year Built: 1974
Gross Floor Area (ft²): 37,873

Energy Performance Rating[2] (1-100) 67

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,268,172
Fuel Oil (No. 2) (kBtu)	1,676,485
Propane (kBtu)	24,415
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	2,969,072

Energy Intensity[4]

Site (kBtu/ft²/yr)	78
Source (kBtu/ft²/yr)	157

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	304

Electric Distribution Utility
Atlantic City Electric Co [Pepco Holdings Inc]

National Median Comparison

National Median Site EUI	92
National Median Source EUI	184
% Difference from National Median Source EUI	-15%
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[5] **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 South Burnt Mill Road
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. Values represent energy intensity, annualized to a 12-month period.
5. 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	Weymouth Township 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	1202 Eleventh Avenue, Dorothy, NJ 08317	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 a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Weymouth Township School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	37,873 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	92	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	80 %	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: Atlantic City Electric Co [Pepco Holdings Inc]

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/01/2012	01/31/2012	32,960.00
12/01/2011	12/31/2011	29,680.00
11/01/2011	11/30/2011	27,680.00
10/01/2011	10/31/2011	32,400.00
09/01/2011	09/30/2011	31,600.00
08/01/2011	08/31/2011	30,240.00
07/01/2011	07/31/2011	33,200.00
06/01/2011	06/30/2011	31,760.00
05/01/2011	05/31/2011	28,880.00
04/01/2011	04/30/2011	29,600.00
03/01/2011	03/31/2011	31,280.00
02/01/2011	02/28/2011	32,400.00
Electric Consumption (kWh (thousand Watt-hours))		**371,680.00**
Electric Consumption (kBtu (thousand Btu))		**1,268,172.16**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,268,172.16**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)

Meter: Fuel Oil (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
01/01/2012	01/31/2012	1,007.33
12/01/2011	12/31/2011	1,007.33
11/01/2011	11/30/2011	1,007.33
10/01/2011	10/31/2011	1,007.33
09/01/2011	09/30/2011	1,007.33
08/01/2011	08/31/2011	1,007.33
07/01/2011	07/31/2011	1,007.33
06/01/2011	06/30/2011	1,007.33
05/01/2011	05/31/2011	1,007.33
04/01/2011	04/30/2011	1,007.33

03/01/2011	03/31/2011	1,007.33
02/01/2011	02/28/2011	1,007.33
Fuel Oil Consumption (Gallons)		**12,087.96**
Fuel Oil Consumption (kBtu (thousand Btu))		**1,676,485.22**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))		**1,676,485.22**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		☐

Fuel Type: Propane

Meter: Propane cooking (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
01/01/2012	01/31/2012	22.20
12/01/2011	12/31/2011	22.20
11/01/2011	11/30/2011	22.20
10/01/2011	10/31/2011	22.20
09/01/2011	09/30/2011	22.20
08/01/2011	08/31/2011	22.20
07/01/2011	07/31/2011	22.20
06/01/2011	06/30/2011	22.20
05/01/2011	05/31/2011	22.20
04/01/2011	04/30/2011	22.20
03/01/2011	03/31/2011	22.20
02/01/2011	02/28/2011	22.20
Propane cooking Consumption (Gallons)		**266.40**
Propane cooking Consumption (kBtu (thousand Btu))		**24,414.92**
Total Propane Consumption (kBtu (thousand Btu))		**24,414.92**
Is this the total Propane consumption at this building including all Propane 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
Weymouth Township School
1202 Eleventh Avenue
Dorothy, NJ 08317

Facility Owner
Weymouth Township BOE
1202 Eleventh Avenue
Dorothy, NJ 08317

Primary Contact for this Facility
Jonathan Houdart
1202 Eleventh Avenue
Dorothy, NJ 08317

General Information

Weymouth Township School	
Gross Floor Area Excluding Parking: (ft^2)	37,873
Year Built	1974
For 12-month Evaluation Period Ending Date:	January 31, 2012

Facility Space Use Summary

Weymouth Township School	
Space Type	K-12 School
Gross Floor Area (ft^2)	37,873
Open Weekends?	No
Number of PCs	92
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	80
Percent Heated	100
Months °	10
High School?	No
School District °	Weymouth

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 01/31/2012)	**Baseline** (Ending Date 01/31/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	67	67	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	78	78	72	N/A	92
Source ($kBtu/ft^2$)	157	157	144	N/A	184
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	304	304	279	N/A	357
$kgCO_2e/ft^2$/year	8	8	7	N/A	9

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

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

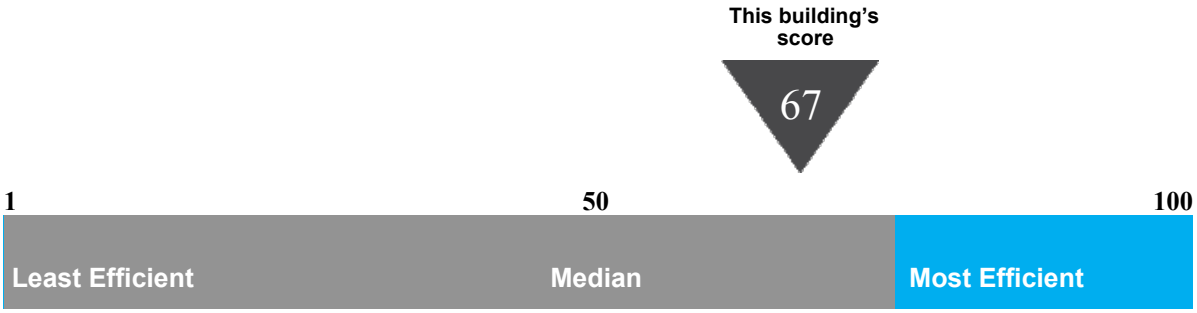
Statement of Energy Performance

2012

Weymouth Township School
1202 Eleventh Avenue
Dorothy, NJ 08317

Portfolio Manager Building ID: 3160704

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 157 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2012

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: 05/16/2012

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Boilers

Tag	B-1	B-2	
Unit Type	Oil Fired, Sectional Hot Water Boiler	Oil Fired, Sectional Hot Water Boiler	
Qty	1	1	
Location	Boiler Room	Boiler Room	
Area Served	Heating Zones	Heating Zones	
Manufacturer	Weil McLain	Weil McLain	
Model #	BL-1194-WF	BL-994-W	
Serial #	-	-	
Input Capacity (Btu/Hr)	3,500,000	2,800,000	
Rated Output Capacity (Btu/Hr)	2,525,000	2,320,000	
Approx. Efficiency %	72.1%	82.9%	
Est. Fuel to Thermal Efficiency %	65.0%	75.0%	
Fuel	#2 Oil	#2 Oil	
Approx Age	38	18	
ASHRAE Service Life	35	35	
Remaining Life	(3)	17	
Comments	3HP Burner Motor, 1.5HP Blower Motor, OA Reset based on 60F OA/125F HWS	3HP Burner Motor, 1.5HP Blower Motor, OA Reset based on 60F OA/125F HWS	

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Domestic Water Heaters

Tag	HWH-1	HWH-2	HWH-3
Unit Type	Electric, Storage Type	Electric, Storage Type	Electric, Storage Type
Qty	1	1	1
Location	1974 Storage Rm 204	1984 Storage Rm next to 316	1984 Storage Rm 311B
Area Served	1974 Section	1984 Section	Kitchen
Manufacturer	Bradford White	AO Smith	Bradford White
Model #	BL-1194-WF	PEC 120	MI65R6DS13
Serial #	TB4828382	ML85-51489-912	YJ2001510
Size (Gallons)	3,500,000	120	65
Input Capacity (MBH/KW)	2525000	6 KW	4.5 KW
Recovery (Gal/Hr)	-	-	
Efficiency %	65%	-	-
Fuel	Electric	Electric	Electric
Approx Age	38	27	10
ASHRAE Service Life	12	12	12
Remaining Life	(26)	(15)	2
Comments	240V/60Hz	208V/60Hz	240V/60Hz

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Pumps

Tag	HWP-1	HWP-2	HWP-3&4
Unit Type	Inline, Pipe Mounted	Inline, Pipe Mounted	Inline, Pipe Mounted
Qty	1	1	2
Location	Mechanical Room	Mechanical Room	Mechanical Room
Area Served	Heating Zone	Heating Zone	Heating Zone
Manufacturer	Bell & Gossett	Bell & Gossett	Amtrol
Model #	2x2 Inline	2x2 Inline, Part # P57179	2x2x7 TV26BF
Serial #	-	-	-
Horse Power	3 HP	1 HP	1-1/2 HP
Flow	-	-	74 GPM, 46 FT HD
Motor Info	Marathon Electric	Baldor	Baldor
Electrical Power	208-230V/3PH/60Hz	200-208V/3PH/60Hz	200-208V/3PH/60Hz
RPM	1730	1725	1750
Motor Efficiency %	81.5%	~78.5%	78.5%
Approx Age	38	38	18
ASHRAE Service Life	20	20	20
Remaining Life	(18)	(18)	2
Comments	Frame 182JMV, PF = 77.7%	Frame 143TZ	Frame 145JM, PF = 72%

Pumps

Tag	FOP1&2		
Unit Type	Base Mounted		
Qty	2		
Location	Mechanical Room		
Area Served	Boiler Burners		
Manufacturer	Preferred Utilities Mfg		
Model #	LO-103		
Serial #	-		
Horse Power	1/4		
Flow	-		
Motor Info	Baldor		
Electrical Power	115V/1PH/60Hz		
RPM	1725		
Motor Efficiency %	55.0%		
Approx Age	18		
ASHRAE Service Life	20		
Remaining Life	2		
Comments	Frame 48, PF = 57%		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

HVAC Units

Tag	RTU-Office	RTU-B1	RTU-B2
Unit Type	Outdoor Packaged, Cooling Only	Outdoor Packaged, Cooling Only	Outdoor Packaged, Cooling Only
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	Office	CR 102 & 102A	CR 101, 103 & 105
Manufacturer	Trane	Lennox	McQuay
Model #	BL-1194-WF	CHA16-653-5Y	CUR075GYYY
Serial #	112810147L	5694E10258	-
Cooling Type	3,500,000	DX R-22	DX R-22
Cooling Capacity (Tons)	2,525,000.0	5.0	7.5
Cooling Efficiency (SEER/EER)	11.2 EER	9.0 EER	
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	1	18	19
ASHRAE Service Life	15	15	15
Remaining Life	14	(3)	(4)
Comments	208-230V/3PH/60Hz, Dry Bulb Econ w Bar Relief	208-230V/3PH/60Hz	208-230V/3PH/60Hz

HVAC Units

Tag	RTU-C1	RTU-C2	Window AC
Unit Type	Outdoor Packaged, Cooling Only	Outdoor Packaged, Cooling Only	Window AC Units
Qty	1	1	9
Location	Roof	Roof	Various Classrooms
Area Served	CR 302, 302A, 304 & 304A	CR 301, 303, 305, 307 & 307A	CR 104, 106, 107, 108, 109, 110, 205, 207, 310
Manufacturer	McQuay	McQuay	Frigidaire
Model #	CUR110GYYY	CUR125GYYY	FAM186R2A
Serial #	-	-	-
Cooling Type	DX R-22	DX R-22	DX R-22
Cooling Capacity (Tons)	10.1	12.5	1.5
Cooling Efficiency (SEER/EER)	9.6 EER	9.0 EER	10.7 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	19	19	5
ASHRAE Service Life	15	15	10
Remaining Life	(4)	(4)	5
Comments	208-230V/3PH/60Hz	208-230V/3PH/60Hz	208-230V/1PH/60Hz

HVAC Units

Tag	HV-1	HV-2	UV
Unit Type	Indoor, Heating &Ventilation	Indoor, Heating &Ventilation	Vertical, Heating & Ventilation
Qty	1	1	11
Location	Multi-Purpose Room	Room 313A	Varies
Area Served	Multi-Purpose Room	Multi-Purpose Room	Varies
Manufacturer	Unable to see tag	Unable to see tag	Unable to see tag
Model #	Unable to see tag	Unable to see tag	Unable to see tag
Serial #	-	-	-
Cooling Type	N/A	N/A	N/A
Cooling Capacity (Tons)	N/A	N/A	N/A
Cooling Efficiency (SEER/EER)	N/A	N/A	N/A
Heating Type	HW Coil, 3W Valve	HW Coil, 3W Valve	HW Coil, 3W Valve
Heating Input (MBH)	-	-	35 (est.)
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	28	28	38
ASHRAE Service Life	20	20	20
Remaining Life	(8)	(8)	(18)
Comments			

HVAC Units

Tag	UV	Window AC	
Unit Type	Vertical Packaged, Heating and Cooling	Window AC Units	
Qty	2	2	
Location	Roof	Various Classrooms	
Area Served	CR 111 & 112	CR 306 & 308	
Manufacturer	McQuay	Frigidaire	
Model #	EDBEVLEAAZ51725010X	-	
Serial #	-	-	
Cooling Type	DX R-22	DX R-22	
Cooling Capacity (Tons)	3.0	0.8	
Cooling Efficiency (SEER/EER)	9.0 EER	9.7 EER	
Heating Type	HW Coil, 3W Valve	N/A	
Heating Input (MBH)	35 MBH	N/A	
Efficiency	N/A	N/A	
Fuel	N/A	N/A	
Approx Age	18	5	
ASHRAE Service Life	20	10	
Remaining Life	2	5	
Comments	208-230V/3PH/60Hz	-	

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Exhaust Fans

Tag	EF-	DBI EF1	EF-02
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	Board Office Area	Toilet Rooms 202 & 206	1974 Corridor Exhaust
Manufacturer	Penn Barry	Penn Vent	Acme CentriMaster
Model #	DX11B	DX24B	PNN100E3
Serial #	BL-1194-WF	-	TSF693401
CFM	1500 (est.)	4000 (est.)	500 (est.)
Motor HP	3,500,000	1/2 (est.)	1/4
V/Ph/Hz	2,525,000	-	115V/1PH/60Hz
Fan RPM	1092	540 (est.)	
Motor RPM	1	1275	1275
Approx Age	-	-	-
ASHRAE Service Life	38	20	20
Remaining Life	-	18	-
Comments	ON	ON	ON

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Exhaust Fans

Tag	EF-	EF-	EF-(small)
Qty	1	2	1
Location	Roof	Roof	Roof
Area Served	CR 104 Area	CR 102 & 102A Area & CR 101,103,105 Area	1994 CR101 Adj Corridor
Manufacturer	Acme CentriMaster	Acme CentriMaster	No info
Model #	PRN100	PRN100	-
Serial #	TSF693405	-	-
CFM	210 (est.)	-	-
Motor HP	1/10	-	-
V/Ph/Hz	115V/1PH/60Hz	-	-
Fan RPM	1050 (est.)	-	-
Motor RPM	1275	-	-
Approx Age	-	-	-
ASHRAE Service Life	20	20	20
Remaining Life	-	-	-
Comments	OFF	ON	

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Exhaust Fans

Tag	EF-	EF-	EF-
Qty	2	1	1
Location	Roof	Roof	Roof
Area Served	1994 CR 111 & 112	1974 over CR 110	MPR 311 & 311A
Manufacturer	-	-	-
Model #	-	40"dia upblast fan	-
Serial #	-	36x36 Curb	-
CFM	-	-	-
Motor HP	-	-	-
V/Ph/Hz	-	-	-
Fan RPM	-	-	-
Motor RPM	-	-	-
Approx Age	-	-	-
ASHRAE Service Life	20	20	20
Remaining Life	-	-	-
Comments			

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Weymouth Township School

Exhaust Fans

Tag	EF-4	EF-	EF-
Qty	1	1	1
Location	Roof	Exterior Wall	Roof
Area Served	Kitchen	ABV Walk in boxes	CR 302 &304 Area / CR 301,303,305, 307
Manufacturer	Greenheck	-	-
Model #	Cube-24-20	-	-
Serial #	861303196	-	-
CFM	-	-	-
Motor HP	-	-	-
V/Ph/Hz	-	-	-
Fan RPM	-	-	-
Motor RPM	-	-	-
Approx Age	-	-	-
ASHRAE Service Life	20	20	20
Remaining Life	-	-	-
Comments			

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

APPENDIX E

Investment Grade Lighting Audit

CEG Job #: 9C12014

Project: Weymouth Township School District — **Weymouth Elementary School** — **KWH COST:** $0.147

1202 Eleventh Ave.

Dorothy, NJ 08317

Bldg. Sq. Ft. 37,873

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	Classroom 107	2600	3	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$122.69	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$112.37	$28.00	$84.00	0.03	70.2	$10.32	8.14
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	$357.74	6	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.58	1513.2	$222.44	$100.00	$600.00	0.35	920.4	$135.30	4.43
242.21	Classroom 109	2600	7	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1,947.4	$286.27	7	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.69	1783.6	$262.19	$28.00	$196.00	0.06	163.8	$24.08	8.14
142.21		2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.19	504.4	$74.15	$100.00	$200.00	0.12	306.8	$45.10	4.43
242.21	Classroom 111	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3,338.4	$490.74	12	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.18	3057.6	$449.47	$28.00	$336.00	0.11	280.8	$41.28	8.14
242.21	Classroom 112	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3,338.4	$490.74	12	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.18	3057.6	$449.47	$28.00	$336.00	0.11	280.8	$41.28	8.14
242.21	Classroom 110	2600	3	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$122.69	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	764.4	$112.37	$28.00	$84.00	0.03	70.2	$10.32	8.14
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	$357.74	6	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.58	1513.2	$222.44	$100.00	$600.00	0.35	920.4	$135.30	4.43
242.21	Classroom 108	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$163.58	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$149.82	$28.00	$112.00	0.04	93.6	$13.76	8.14
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	$298.12	5	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.49	1261	$185.37	$100.00	$500.00	0.30	767	$112.75	4.43
242.21	Classroom 106	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$163.58	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$149.82	$28.00	$112.00	0.04	93.6	$13.76	8.14
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	$298.12	5	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.49	1261	$185.37	$100.00	$500.00	0.30	767	$112.75	4.43

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	Classroom 104	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$163.58	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$149.82	$28.00	$112.00	0.04	93.6	$13.76	8.14
142.21		2600	7	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2,839.2	$417.36	7	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.68	1765.4	$259.51	$100.00	$700.00	0.41	1073.8	$157.85	4.43
242.21	Classroom 102B	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$163.58	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$149.82	$28.00	$112.00	0.04	93.6	$13.76	8.14
242.21	Classroom 102A	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2,225.6	$327.16	8	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.78	2038.4	$299.64	$28.00	$224.00	0.07	187.2	$27.52	8.14
242.21	Classroom 101	2600	11	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.18	3,060.2	$449.85	11	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.08	2802.8	$412.01	$28.00	$308.00	0.10	257.4	$37.84	8.14
227.21	101 Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	$24.84	1	2	Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	127.4	$18.73	$24.00	$24.00	0.02	41.6	$6.12	3.92
232.21	Classroom 103	2600	8	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,788.8	$262.95	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$220.15	$21.00	$168.00	0.11	291.2	$42.81	3.92
232.21	Classroom 105	2600	8	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,788.8	$262.95	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$220.15	$21.00	$168.00	0.11	291.2	$42.81	3.92
142.21	Boy's Restroom	2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.19	504.4	$74.15	$100.00	$200.00	0.12	306.8	$45.10	4.43
142.21	Girl's Restroom	2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.19	504.4	$74.15	$100.00	$200.00	0.12	306.8	$45.10	4.43
231.34	Electrical Closet	1800	2	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Pendant Mnt., Direct/ Indirect	86	0.17	309.6	$45.51	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	49	0.10	176.4	$25.93	$14.00	$28.00	0.07	133.2	$19.58	1.43
227.21	Women's Restroom	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78.0	$11.47	1	2	Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	58.8	$8.64	$24.00	$24.00	0.02	19.2	$2.82	8.50
227.21	Men's Restroom	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78.0	$11.47	1	2	Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.05	58.8	$8.64	$24.00	$24.00	0.02	19.2	$2.82	8.50
242.21	Main Office	2600	6	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	1,669.2	$245.37	6	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.59	1528.8	$224.73	$28.00	$168.00	0.05	140.4	$20.64	8.14

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	Server Room	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed	107	0.21	556.4	$81.79	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$74.91	$28.00	$56.00	0.02	46.8	$6.88	8.14
242.21	VP Office	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$74.91	$28.00	$56.00	0.02	46.8	$6.88	8.14
242.21	Principal's Office	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$74.91	$28.00	$56.00	0.02	46.8	$6.88	8.14
242.21	Conference Room	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	$74.91	$28.00	$56.00	0.02	46.8	$6.88	8.14
142.21	201 Staff Lounge	2600	3	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1,216.8	$178.87	3	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.29	756.6	$111.22	$100.00	$300.00	0.18	460.2	$67.65	4.43
142.21	203 Office	2600	3	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1,216.8	$178.87	3	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.29	756.6	$111.22	$100.00	$300.00	0.18	460.2	$67.65	4.43
242.21		2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	$37.46	$28.00	$28.00	0.01	23.4	$3.44	8.14
231.34	214 Boiler Room	3000	6	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Pendant Mnt., Direct/ Indirect	86	0.52	1,548.0	$227.56	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	49	0.29	882	$129.65	$14.00	$84.00	0.22	666	$97.90	0.86
142.21	Classroom 205	2600	15	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6,084.0	$894.35	15	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	1.46	3783	$556.10	$100.00	$1,500.00	0.89	2301	$338.25	4.43
142.21	Classroom 207	2600	15	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6,084.0	$894.35	15	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	1.46	3783	$556.10	$100.00	$1,500.00	0.89	2301	$338.25	4.43
142.21	Library	2600	16	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.50	6,489.6	$953.97	16	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	1.55	4035.2	$593.17	$100.00	$1,600.00	0.94	2454.4	$360.80	4.43
242.21		2600	9	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	2,503.8	$368.06	9	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.88	2293.2	$337.10	$28.00	$252.00	0.08	210.6	$30.96	8.14
142.21	Library Office	2600	4	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1,622.4	$238.49	4	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.39	1008.8	$148.29	$100.00	$400.00	0.24	613.6	$90.20	4.43

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
142.21	Kitchen	2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	$357.74	6	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.58	1513.2	$222.44	$100.00	$600.00	0.35	920.4	$135.30	4.43
242.21		2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1,112.8	$163.58	4	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.39	1019.2	$149.82	$28.00	$112.00	0.04	93.6	$13.76	8.14
121.16	Food Storage	2600	6	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.47	1,216.8	$178.87	6	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.29	764.4	$112.37	$100.00	$600.00	0.17	452.4	$66.50	9.02
242.21	Kitchen Receiving	2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	$37.46	$28.00	$28.00	0.01	23.4	$3.44	8.14
142.21		2600	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	405.6	$59.62	1	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.10	252.2	$37.07	$100.00	$100.00	0.06	153.4	$22.55	4.43
142.21	Kit. Office	1800	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	280.8	$41.28	1	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.10	174.6	$25.67	$100.00	$100.00	0.06	106.2	$15.61	6.41
142.21	Kit. Restroom	1800	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	280.8	$41.28	1	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.10	174.6	$25.67	$100.00	$100.00	0.06	106.2	$15.61	6.41
121.16	311 Gym Storage	1200	2	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.16	187.2	$27.52	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.10	117.6	$17.29	$100.00	$200.00	0.06	69.6	$10.23	19.55
121.16	309 Custodial Closet	1200	1	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.08	93.6	$13.76	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.05	58.8	$8.64	$100.00	$100.00	0.03	34.8	$5.12	19.55
242.21	Classroom 301	2600	16	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.71	4,451.2	$654.33	16	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.57	4076.8	$599.29	$28.00	$448.00	0.14	374.4	$55.04	8.14
242.21	Classroom 302	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3,338.4	$490.74	12	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.18	3057.6	$449.47	$28.00	$336.00	0.11	280.8	$41.28	8.14
242.21	Classroom 303	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2,225.6	$327.16	8	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.78	2038.4	$299.64	$28.00	$224.00	0.07	187.2	$27.52	8.14
242.21	Classroom 304	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3,338.4	$490.74	12	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.18	3057.6	$449.47	$28.00	$336.00	0.11	280.8	$41.28	8.14

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	Classroom 305	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2,225.6	$327.16	8	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.78	2038.4	$299.64	$28.00	$224.00	0.07	187.2	$27.52	8.14
242.21	Classroom 307	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3,338.4	$490.74	12	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.18	3057.6	$449.47	$28.00	$336.00	0.11	280.8	$41.28	8.14
242.21	Classroom 306	2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	254.8	$37.46	$28.00	$28.00	0.01	23.4	$3.44	8.14
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2,028.0	$298.12	5	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.49	1261	$185.37	$100.00	$500.00	0.30	767	$112.75	4.43
142.21	Classroom 308	2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	$357.74	6	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.58	1513.2	$222.44	$100.00	$600.00	0.35	920.4	$135.30	4.43
242.21	Classroom 310	2600	9	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	2,503.8	$368.06	9	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.88	2293.2	$337.10	$28.00	$252.00	0.08	210.6	$30.96	8.14
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	$357.74	6	4	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	97	0.58	1513.2	$222.44	$100.00	$600.00	0.35	920.4	$135.30	4.43
242.21	Nurse	2600	7	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1,947.4	$286.27	7	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.69	1783.6	$262.19	$28.00	$196.00	0.06	163.8	$24.08	8.14
127.21	Boy's Restroom	2600	3	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.22	561.6	$82.56	3	2	Reballast & Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.15	382.2	$56.18	$100.00	$300.00	0.07	179.4	$26.37	11.38
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	$49.69	2	2	Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.10	254.8	$37.46	$24.00	$48.00	0.03	83.2	$12.23	3.92
127.21	Girl's Restroom	2600	3	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.22	561.6	$82.56	3	2	Reballast & Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.15	382.2	$56.18	$100.00	$300.00	0.07	179.4	$26.37	11.38
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	$49.69	2	2	Relamp; Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.10	254.8	$37.46	$24.00	$48.00	0.03	83.2	$12.23	3.92
121.14	Custodial Closet	1200	1	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.08	93.6	$13.76	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.05	58.8	$8.64	$100.00	$100.00	0.03	34.8	$5.12	19.55

Investment Grade Lighting Audit

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
121.14	Room 216	1200	4	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.31	374.4	$55.04	4	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.20	235.2	$34.57	$100.00	$400.00	0.12	139.2	$20.46	19.55
122.21	Corridors	3000	20	2	2x4, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	1.56	4,680.0	$687.96	20	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.98	2940	$432.18	$100.00	$2,000.00	0.58	1740	$255.78	7.82
222.21		3000	28	2	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.62	4,872.0	$716.18	28	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	49	1.37	4116	$605.05	$14.00	$392.00	0.25	756	$111.13	3.53
601		8760	13	2	(2) 7w CFL Exit Sign	16	0.21	1,822.1	$267.85	13	1	LED Exit Sign	2	0.03	227.76	$33.48	$95.00	$1,235.00	0.18	1594.32	$234.37	5.27
121.14	Elect. Room/Storage - Access From Exterior By Boiler Room	1200	2	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.16	187.2	$27.52	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	49	0.10	117.6	$17.29	$100.00	$200.00	0.06	69.6	$10.23	19.55
	Totals		417	244				120,037	17,645	417	241			34.9	90,954	$13,370		$23,351	10.8	29,083	$4,275	5.46

Investment Grade Lighting Audit

CEG Job #: 9C12014

Project: Weymouth Township School District — Weymouth Elementary School

1202 Eleventh Ave.

Dorothy, NJ 08317

Bldg. Sq. Ft. 37,873

KWH COST: $0.147

ECM #2: Gym Lighting Upgrade

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
769	Gym	2600	24	1	400w MH, Clear Lens	465	11.16	29,016.0	$4,265.35	24	1	93 Watt LED Replacement Lamp, Nue-Tech Model 4293/yoke/mogul adaptor/120-277V Driver	93	2.23	5803.2	$853.07	$650.00	$15,600.00	8.93	23212.8	$3,412.28	4.57
601		8760	3	2	(2) 7w CFL Exit Sign	16	0.05	420.5	$61.81	3	1	LED Exit Sign	2	0.01	52.56	$7.73	$95.00	$285.00	0.04	367.92	$54.08	5.27
	Totals		27	3				29,436	$4,327	27	2			2.2	5,856	$861		$15,885	9.0	23,581	$3,466	4.58

CEG Job #: 9C12014
Project: Weymouth Township School District
Address: 1202 Eleventh Ave.
Dorothy, NJ 08317
Building SF: 37,873

Weymouth Elementary School

KWH COST: $0.147

ECM #2: Gym 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
769	Gym	2600	24	1	93 Watt LED Replacement Lamp, Nue-Tech Model 4293/yoke/mogul adaptor/120-277V Driver	93	2.23	5803.2	$853.07	24	2	Dual Technology Occupancy Sensor - Remote Mnt.	93	1.79	20%	4642.56	$682.46	$300.00	$600.00	0.45	1160.64	$170.61	3.52
601		8760	3	1	LED Exit Sign	2	0.01	52.56	$7.73	3	0	No Change	2	0.01	0%	52.56	$7.73	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		27	2			2.2	5,855.8	$861	27	2			1.8		4,695.1	$690.18		$600	0.45	1,161	$171	3.52

Investment Grade Lighting Audit

CEG Job #: 9C12014

Project: Weymouth Township School District — **Weymouth Elementary School**

1202 Eleventh Ave.

Dorothy, NJ 08317

Bldg. Sq. Ft. 37,873

KWH COST: $0.147

ECM #3: Exterior Lighting Upgrade

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
750	Exterior	4000	6	1	250w HPS Wallpack	295	1.77	7,080.0	$1,040.76	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
799		2500	1	1	1000w Merc Vapor	1075	1.08	2,687.5	$395.06	1	1	400w Induction Flood	440	0.44	1100	$161.70	$600.00	$600.00	0.64	1587.5	$233.36	2.57
738		4000	3	1	175w Mercury Vapor Area Light	210	0.63	2,520.0	$370.44	3	1	80 Watt Inducton Light; retrofit	80	0.24	960	$141.12	$200.00	$600.00	0.39	1560	$229.32	2.62
767		4000	2	1	400w MH Flood	460	0.92	3,680.0	$540.96	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
800		4000	4	1	4' "Sign Lighter", 60w T12HO	82	0.33	1,312.0	$192.86	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		16	5				17,280	$2,540	16	2			0.7	2,060	$303		$1,200	1.0	3,148	$463	2.59

CEG Job #: 9C12014
Project: Weymouth Township School District
Address: 1202 Eleventh Ave.
Dorothy, NJ 08317
Building SF: 37,873

Weymouth Elementary School

KWH COST: $0.147

ECM #4: 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
242.21	Classroom 107	2600	3	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$122.69	3	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.26	20%	667.68	$98.15	$450.00	$450.00	0.06	166.92	$24.54	4.68
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	$357.74	6			156	0.75	20%	1946.88	$286.19			0.19	486.72	$71.55	
242.21	Classroom 109	2600	7	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1947.4	$286.27	7	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.60	20%	1557.92	$229.01	$450.00	$450.00	0.15	389.48	$57.25	2.05
142.21		2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2			156	0.25	20%	648.96	$95.40			0.06	162.24	$23.85	
242.21	Classroom 111	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3338.4	$490.74	12	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.03	20%	2670.72	$392.60	$450.00	$450.00	0.26	667.68	$98.15	4.58
242.21	Classroom 112	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3338.4	$490.74	12	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.03	20%	2670.72	$392.60	$450.00	$450.00	0.26	667.68	$98.15	4.58
242.21	Classroom 110	2600	3	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.32	834.6	$122.69	3	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.26	20%	667.68	$98.15	$450.00	$450.00	0.06	166.92	$24.54	4.68
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	$357.74	6			156	0.75	20%	1946.88	$286.19			0.19	486.72	$71.55	
242.21	Classroom 108	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1112.8	$163.58	4	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.34	20%	890.24	$130.87	$450.00	$450.00	0.09	222.56	$32.72	4.87
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	$298.12	5			156	0.62	20%	1622.4	$238.49			0.16	405.6	$59.62	
242.21	Classroom 106	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1112.8	$163.58	4	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.34	20%	890.24	$130.87	$450.00	$450.00	0.09	222.56	$32.72	4.87
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	$298.12	5			156	0.62	20%	1622.4	$238.49			0.16	405.6	$59.62	

ECM #4: 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
242.21	Classroom 104	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1112.8	$163.58	4	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.34	20%	890.24	$130.87	$450.00	$450.00	0.09	222.56	$32.72	3.87
142.21		2600	7	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.09	2839.2	$417.36	7			156	0.87	20%	2271.36	$333.89			0.22	567.84	$83.47	
242.21	Classroom 102B	2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1112.8	$163.58	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.34	20%	890.24	$130.87	$150.00	$150.00	0.09	222.56	$32.72	4.58
242.21	Classroom 102A	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2225.6	$327.16	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.68	20%	1780.48	$261.73	$150.00	$150.00	0.17	445.12	$65.43	2.29
242.21	Classroom 101	2600	11	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.18	3060.2	$449.85	11	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.94	20%	2448.16	$359.88	$450.00	$450.00	0.24	612.04	$89.97	5.00
227.21	101 Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169	$24.84	1	0	No Change	65	0.07	0%	169	$24.84	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Classroom 103	2600	8	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1788.8	$262.95	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	86	0.55	20%	1431.04	$210.36	$150.00	$150.00	0.14	357.76	$52.59	2.85
232.21	Classroom 105	2600	8	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1788.8	$262.95	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	86	0.55	20%	1431.04	$210.36	$150.00	$150.00	0.14	357.76	$52.59	2.85
142.21	Boy's Restroom	2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.25	20%	648.96	$95.40	$150.00	$150.00	0.06	162.24	$23.85	6.29
142.21	Girl's Restroom	2600	2	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	811.2	$119.25	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.25	20%	648.96	$95.40	$150.00	$150.00	0.06	162.24	$23.85	6.29
231.34	Electrical Closet	1800	2	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Pendant Mnt., Direct/ Indirect	86	0.17	309.6	$45.51	2	0	No Change	86	0.17	0%	309.6	$45.51	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Women's Restroom	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78	$11.47	1	0	No Change	65	0.07	0%	78	$11.47	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Men's Restroom	1200	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	78	$11.47	1	0	No Change	65	0.07	0%	78	$11.47	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Main Office	2600	6	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	1669.2	$245.37	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.51	20%	1335.36	$196.30	$150.00	$150.00	0.13	333.84	$49.07	3.06
242.21	Server Room	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.17	20%	445.12	$65.43	$150.00	$150.00	0.04	111.28	$16.36	9.17

ECM #4: 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
242.21	VP Office	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.17	20%	445.12	$65.43	$150.00	$150.00	0.04	111.28	$16.36	9.17
242.21	Principal's Office	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.17	20%	445.12	$65.43	$150.00	$150.00	0.04	111.28	$16.36	9.17
242.21	Conference Room	2600	2	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	$81.79	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.17	20%	445.12	$65.43	$150.00	$150.00	0.04	111.28	$16.36	9.17
142.21	201 Staff Lounge	2600	3	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1216.8	$178.87	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.37	20%	973.44	$143.10	$150.00	$150.00	0.09	243.36	$35.77	4.19
142.21	203 Office	2600	3	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.47	1216.8	$178.87	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.37	20%	973.44	$143.10	$150.00	$150.00	0.09	243.36	$35.77	3.41
242.21		2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1			107	0.09	20%	222.56	$32.72			0.02	55.64	$8.18	
231.34	214 Boiler Room	3000	6	3	2x4, 3 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Pendant Mnt., Direct/ Indirect	86	0.52	1548	$227.56	6	0	No Change	86	0.52	0%	1548	$227.56	$0.00	$0.00	0.00	0	$0.00	0.00
142.21	Classroom 205	2600	15	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6084	$894.35	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	156	1.87	20%	4867.2	$715.48	$450.00	$450.00	0.47	1216.8	$178.87	2.52
142.21	Classroom 207	2600	15	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.34	6084	$894.35	15	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	156	1.87	20%	4867.2	$715.48	$450.00	$450.00	0.47	1216.8	$178.87	2.52
142.21	Library	2600	16	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	2.50	6489.6	$953.97	16	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	156	2.00	20%	5191.68	$763.18	$450.00	$450.00	0.50	1297.92	$190.79	1.70
242.21		2600	9	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	2503.8	$368.06	9			107	0.77	20%	2003.04	$294.45			0.19	500.76	$73.61	
142.21	Library Office	2600	4	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	1622.4	$238.49	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.50	20%	1297.92	$190.79	$150.00	$150.00	0.12	324.48	$47.70	3.14
142.21	Kitchen	2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	$357.74	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.75	20%	1946.88	$286.19	$300.00	$300.00	0.19	486.72	$71.55	2.88
242.21		2600	4	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	1112.8	$163.58	4			107	0.34	20%	890.24	$130.87			0.09	222.56	$32.72	
121.16	Food Storage	2600	6	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.47	1216.8	$178.87	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.37	20%	973.44	$143.10	$150.00	$150.00	0.09	243.36	$35.77	4.19
242.21	Kitchen Receiving	2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1	0	No Change	107	0.11	0%	278.2	$40.90	$0.00	$0.00	0.00	0	$0.00	0.00

ECM #4: 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
142.21	Kitchen Receiving	2600	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	405.6	$59.62	1	0	No Change	156	0.16	0%	405.6	$59.62	$0.00	$0.00	0.00	0	$0.00	0.00
142.21	Kit. Office	1800	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	280.8	$41.28	1	0	No Change	156	0.16	0%	280.8	$41.28	$0.00	$0.00	0.00	0	$0.00	0.00
142.21	Kit. Restroom	1800	1	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	280.8	$41.28	1	0	No Change	156	0.16	0%	280.8	$41.28	$0.00	$0.00	0.00	0	$0.00	0.00
121.16	311 Gym Storage	1200	2	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.16	187.2	$27.52	2	0	No Change	78	0.16	0%	187.2	$27.52	$0.00	$0.00	0.00	0	$0.00	0.00
121.16	309 Custodial Closet	1200	1	2	1x4 VaporTite, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., Acrylic Lens	78	0.08	93.6	$13.76	1	0	No Change	78	0.08	0%	93.6	$13.76	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Classroom 301	2600	16	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.71	4451.2	$654.33	16	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.37	20%	3560.96	$523.46	$450.00	$450.00	0.34	890.24	$130.87	3.44
242.21	Classroom 302	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3338.4	$490.74	12	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.03	20%	2670.72	$392.60	$450.00	$450.00	0.26	667.68	$98.15	4.58
242.21	Classroom 303	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2225.6	$327.16	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.68	20%	1780.48	$261.73	$150.00	$150.00	0.17	445.12	$65.43	2.29
242.21	Classroom 304	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3338.4	$490.74	12	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.03	20%	2670.72	$392.60	$450.00	$450.00	0.26	667.68	$98.15	4.58
242.21	Classroom 305	2600	8	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	2225.6	$327.16	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.68	20%	1780.48	$261.73	$150.00	$150.00	0.17	445.12	$65.43	2.29
242.21	Classroom 307	2600	12	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	3338.4	$490.74	12	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	1.03	20%	2670.72	$392.60	$450.00	$450.00	0.26	667.68	$98.15	4.58
242.21	Classroom 306	2600	1	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.11	278.2	$40.90	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.09	20%	222.56	$32.72	$150.00	$150.00	0.02	55.64	$8.18	2.21
142.21		2600	5	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.78	2028	$298.12	5			156	0.62	20%	1622.4	$238.49			0.16	405.6	$59.62	
142.21	Classroom 308	2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	$357.74	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.75	20%	1946.88	$286.19	$150.00	$150.00	0.19	486.72	$71.55	2.10
242.21	Classroom 310	2600	9	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	2503.8	$368.06	9	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	107	0.77	20%	2003.04	$294.45	$450.00	$450.00	0.19	500.76	$73.61	3.10
142.21		2600	6	4	2x4, 4 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2433.6	$357.74	6			156	0.75	20%	1946.88	$286.19			0.19	486.72	$71.55	

ECM #4: 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
242.21	Nurse	2600	7	4	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.75	1947.4	$286.27	7	0	No Change	107	0.75	0%	1947.4	$286.27	$0.00	$0.00	0.00	0	$0.00	0.00
127.21	Boy's Restroom	2600	3	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.22	561.6	$82.56	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	72	0.17	20%	449.28	$66.04	$300.00	$300.00	0.04	112.32	$16.51	3.57
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	$49.69	2			65	0.10	20%	270.4	$39.75			0.03	67.6	$9.94	
127.21	Girl's Restroom	2600	3	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.22	561.6	$82.56	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	72	0.17	20%	449.28	$66.04	$300.00	$300.00	0.04	112.32	$16.51	11.34
227.21		2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	$49.69	2			65	0.10	20%	270.4	$39.75			0.03	67.6	$9.94	
121.14	Custodial Closet	1200	1	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.08	93.6	$13.76	1	0	No Change	78	0.08	0%	93.6	$13.76	$0.00	$0.00	0.00	0	$0.00	0.00
121.14	Room 216	1200	4	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.31	374.4	$55.04	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.25	20%	299.52	$44.03	$150.00	$150.00	0.06	74.88	$11.01	13.63
122.21	Corridors	3000	20	2	2x4, 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	1.56	4680	$687.96	20	0	No Change	78	1.56	0%	4680	$687.96	$0.00	$0.00	0.00	0	$0.00	0.00
222.21		3000	28	2	2x4, 4 Lamp, 32w T8 Syl. Octron FO32/741/ECO, Elect. Ballast, Recessed Mnt., Prismatic Lens	58	1.62	4872	$716.18	28	0	No Change	58	1.62	0%	4872	$716.18	$0.00	$0.00	0.00	0	$0.00	0.00
601		8760	13	2	(2) 7w CFL Exit Sign	16	0.21	1822.08	$267.85	13	0	No Change	16	0.21	0%	1822.08	$267.85	$0.00	$0.00	0.00	0	$0.00	0.00
121.14	Elect. Room/Storage - Access From Exterior By Boiler Room	1200	2	2	1x4 , 2 Lamp, 34w T12 Syl. SuperSaver F34CW/SS/ECO, Mag. Ballast, Surface Mnt., No Lens	78	0.16	187.2	$27.52	2	0	No Change	78	0.16	0%	187.2	$27.52	$0.00	$0.00	0.00	0	$0.00	0.00
750	Exterior	4000	6	1	250w HPS Wallpack	295	1.77	7080	$1,040.76	6	0	No Change	295	1.77	0%	7080	$1,040.76	$0.00	$0.00	0.00	0	$0.00	0.00
799		2500	1	1	1000w Merc Vapor	1075	1.08	2687.5	$395.06	1	0	No Change	1075	1.08	0%	2687.5	$395.06	$0.00	$0.00	0.00	0	$0.00	0.00
738		4000	3	1	175w Mercury Vapor Area Light	210	0.63	2520	$370.44	3	0	No Change	210	0.63	0%	2520	$370.44	$0.00	$0.00	0.00	0	$0.00	0.00
767		4000	2	1	400w MH Flood	460	0.92	3680	$540.96	2	0	No Change	460	0.92	0%	3680	$540.96	$0.00	$0.00	0.00	0	$0.00	0.00
800		4000	4	1	4' "Sign Lighter", 60w T12HO	82	0.33	1312	$192.86	4	0	No Change	82	0.33	0%	1312	$192.86	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		417	244			61.7	166,753.1	$24,513	460	42			42.5		116,771	$17,165		$11,550	7.9	20,545	$3,020	3.82

ECM #4: 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

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Total KW_{AC}	Panel Weight (41.9 lbs)	W/SQFT
Weymouth School	10500	SHARP NU-U235F2	321	17.5	5,631	75.44	93,883	398.6	13,450	13.40

= Proposed Ground Mount PV Layout

Notes:

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

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	75.4 kW
DC to AC Derate Factor:	0.810
AC Rating:	61.1 kW
Array Type:	Fixed Tilt
Array Tilt:	30.0°
Array Azimuth:	135.0°
Energy Specifications	
Cost of Electricity:	14.7 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	2.97	5770	848.19
2	3.62	6348	933.16
3	4.45	8310	1221.57
4	5.12	9003	1323.44
5	5.56	9889	1453.68
6	5.80	9616	1413.55
7	5.76	9715	1428.10
8	5.42	9221	1355.49
9	4.94	8333	1224.95
10	4.10	7295	1072.36
11	3.04	5488	806.74
12	2.60	4895	719.56
Year	4.45	93884	13800.95

Project Name: **LGEA Solar PV Project - Weymouth ES**
Location: **Dorothy, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$408,732
Annual kWh Production	93,883
Annual Energy Cost Reduction	$13,801
Average Annual SREC Revenue	$17,940

Simple Payback: **12.88** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.147**
Financing Rate: 4.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	93,883	$13,801	$0	$23,471	$15,980	$20,300	$991	$991
2	$0	93,414	$14,215	$0	$23,353	$15,153	$21,127	$1,288	$2,280
3	$0	92,947	$14,641	$0	$23,237	$14,292	$21,988	$1,598	$3,877
4	$0	92,482	$15,081	$0	$23,120	$13,396	$22,884	$1,921	$5,798
5	$0	92,019	$15,533	$948	$23,005	$12,464	$23,816	$1,310	$7,108
6	$0	91,559	$15,999	$943	$18,312	$11,493	$24,787	($2,912)	$4,196
7	$0	91,101	$16,479	$938	$18,220	$10,484	$25,796	($2,519)	$1,676
8	$0	90,646	$16,973	$934	$18,129	$9,433	$26,847	($2,111)	($435)
9	$0	90,193	$17,482	$929	$18,039	$8,339	$27,941	($1,688)	($2,123)
10	$0	89,742	$18,007	$924	$13,461	$7,200	$29,080	($5,736)	($7,859)
11	$0	89,293	$18,547	$920	$13,394	$6,016	$30,264	($5,259)	($13,118)
12	$0	88,847	$19,104	$915	$13,327	$4,783	$31,497	($4,765)	($17,883)
13	$0	88,402	$19,677	$911	$13,260	$3,499	$32,781	($4,254)	($22,136)
14	$0	87,960	$20,267	$906	$8,796	$2,164	$34,116	($8,123)	($30,259)
15	$0	87,521	$20,875	$901	$8,752	$774	$35,506	($7,555)	($37,814)
	Totals:	1,360,009	$256,680	$10,169	$259,877	$135,469	$408,732	($37,814)	($105,700)

Net Present Value (NPV) **($24,019)**