VOORHEES TOWNSHIP
BOARD OF EDUCATION
OSAGE ELEMENTARY SCHOOL

128 E CHEWS LANDING RD,
VOORHEES, NJ, 08043

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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.

Electric Utility Provider:	Atlantic City Electric
Electric Utility Rate Structure:	Large Power and Light Secondary (LPLS)
Third Party Supplier:	Reliant Energy (Effective June 1, 2011) GDF Suez (Prior to June 1, 2011)
Natural Gas Utility Provider:	South Jersey Gas
Utility Rate Structure:	General Service Gas (GSG) Firm Transportation
Third Party Supplier:	HESS (Effective April 29, 2010) PEPCO (Prior to April 29, 2010)

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

The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: LPLS			
Meter No: 778002370			
Account # 42 003 110 03			
Third Party Utility Provider: GDF Suez (during this study period)			
TPS Meter / Acct No: - / 88278-07007			
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND KW**	**TOTAL BILL**
Mar-10	61,600	176.0	$8,426
Apr-10	53,600	240.0	$7,619
May-10	74,400	240.0	$12,094
Jun-10	81,600	240.0	$12,083
Jul-10	68,000	160.0	$9,749
Aug-10	76,800	224.0	$11,488
Sep-10	72,800	232.0	$9,248
Oct-10	82,400	208.0	$10,112
Nov-10	55,200	192.0	$6,890
Dec-10	120,000	256.0	$14,520
Jan-11	126,400	280.0	$15,137
Feb-11	*132,800*	*304.0*	*$15,754*
Totals	**1,005,600**	**304.0 Max**	**$133,120**
	AVERAGE DEMAND	**229.3 KW average**	
	AVERAGE RATE	**$0.132 $/kWh**	
Feb-2011 was estimated			

Figure 1
Electricity Usage Profile

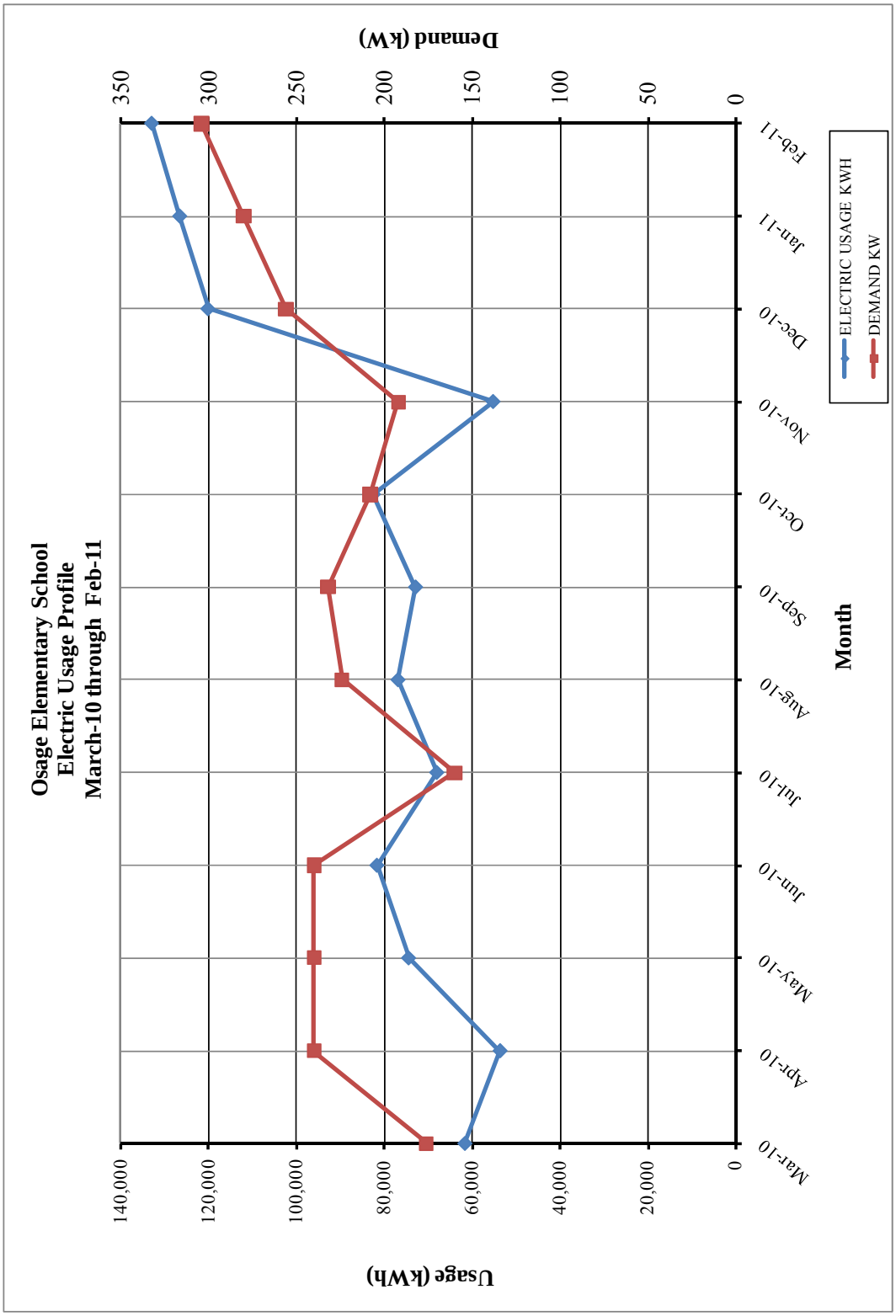
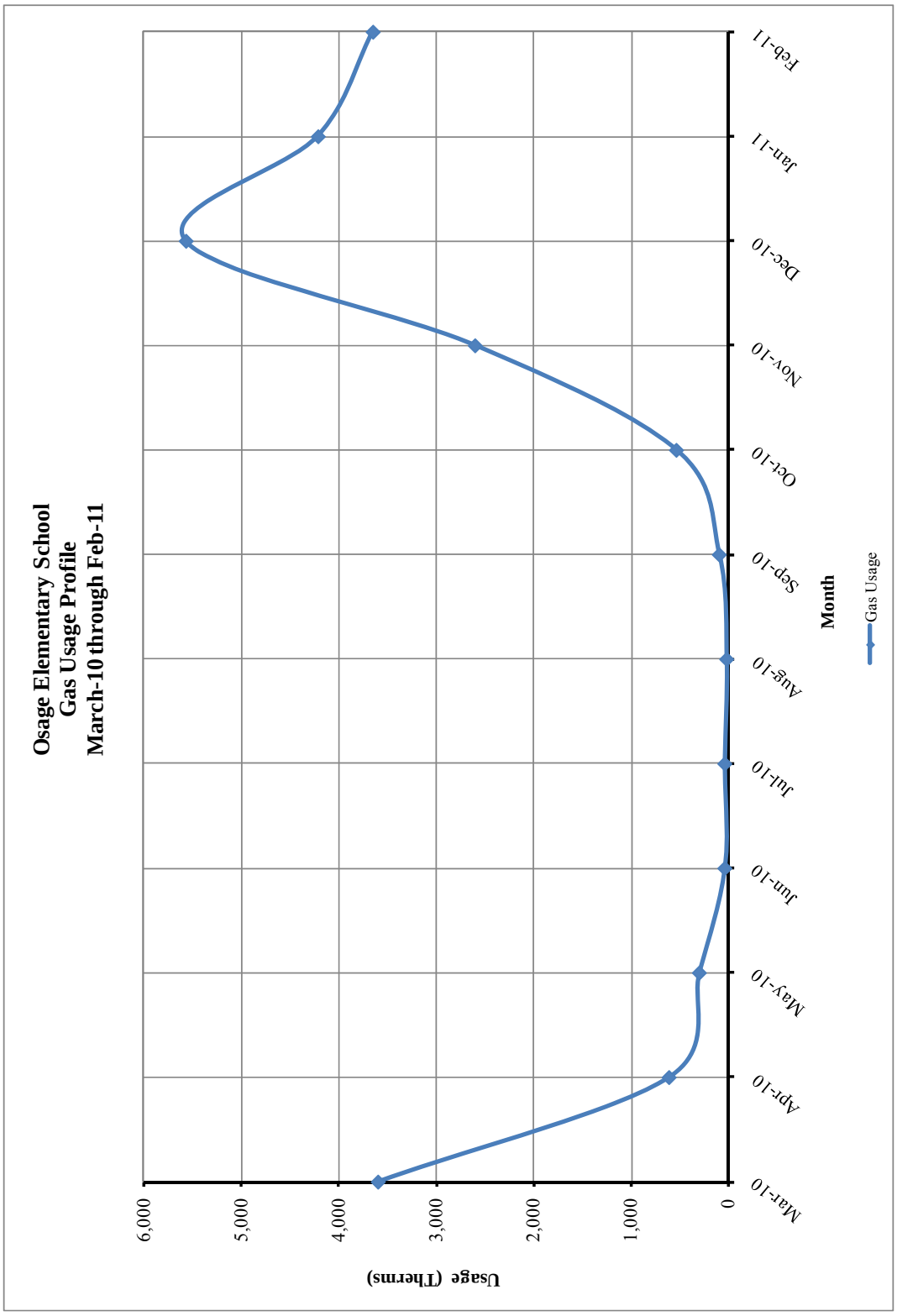


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG - Firm Transportation		
Meter No: 0430968		
Point of Delivery ID: 2 01 32 2560 0 7		
Third Party Utility Provider: PEPCO/HESS		
TPS Meter No: 20132256007 / 564353/564402		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-10	3,598.18	$4,759.79
Apr-10	613.12	$854.78
May-10	303.26	$433.71
Jun-10	42.07	$62.05
Jul-10	42.07	$62.06
Aug-10	22.53	$44.09
Sep-10	98.50	$119.17
Oct-10	538.13	$615.23
Nov-10	2,603.03	$2,870.93
Dec-10	5,568.51	$6,219.03
Jan-11	4,212.71	$4,687.11
Feb-11	3,649.96	$4,068.21
TOTALS	**21,292.07**	**$24,796.16**
AVERAGE RATE:	**$1.16**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

Osage Elementary School is located at 112 Somerdale Road in Voorhees, New Jersey. The 78,797 square foot elementary school was built in 1957. And eight classroom addition was built in 1961 and another six classroom addition was built in 1967.In 1981 the Art Room, Music Room, Library and Gymnasium were added to the facility. In 1988 a five classroom addition was added to the north end of the building. In 1992, a five classroom addition was constructed on the west end of the school. Finally, in 2002 the Cafetorium, stage and kitchen were built on the north end of the school.

Occupancy Profile

The typical hours of operation for the elementary school are Monday through Friday between 7:00 am and 4:00 pm during the school year (September through June). In addition, the school is limited in occupancy over the summer months, with the administrative office open Monday through Thursday 9:00 am to 4:00 pm and summer camps being held in the gymnasium and multipurpose room.

Building Envelope

The exterior walls of the school are brick faced with a concrete block interior construction. According to building construction documents, the amount of insulation within the walls is 2" rigid foam insulation. Typical windows throughout the school are double pane, operable ¼" tinted glass with aluminum frames. The windows throughout the facility are in good condition and appear to be well maintained. Blinds are utilized throughout the classrooms of the school for occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat gain in the summer. The roof of the school (with the exception of the 1981 section) is a flat, built up rubber EPDM roof on 2" rigid insulation and a metal deck. The roof over the 1981 addition is a sloped, blue, standing seam metal roof on approximately 2" of rigid insulation and a metal deck.

HVAC Systems

The HVAC systems of the elementary school is a water source heat pump system with gas fired hot water boilers, cooling tower, circulating pumps and individual classroom heat pump units. There are also individual classroom unit ventilators that utilize hot water heating coils, air to air split system heat pumps and packaged rooftop D/X units with gas fired heat that serve portions of the school.

The boilers of the facility are Weil McLain PFG modular boilers. There are a total of six (6) boilers all rated for 390 MBH input capacity with an estimated operating efficiency of 76%. Each boiler is equipped with its own, in-line fractional horsepower circulating pump.

The cooling tower is a Baltimore Air Coil closed circuit, induced draft, counter-flow type, rated for 390 GPM. The cooling tower loop is connected to a heat exchanger in the mechanical room. This heat exchanger transfers heat from the heat pump loop to the cooling tower loop in cooling

season. The cooling tower loop pump is a base mounted end suction pump, rated for 390 GPM at 108 feet of head.

Classrooms 101 through 108

These classrooms are served by closet mounted, upright water source heat pumps. These units are served by the main heat pump loop. Ventilation air is provided via wall louvers inside of the closet.

Classrooms 110 through 126

These classrooms are served by through the wall, unit ventilators. These units provide heating and ventilation only. Heating is provided by hot water heating coils in the unit

Classrooms 225 through 230 (1992 Addition)

These classrooms are served by McQuay above the ceiling water source heat pumps. Air from the units is ducted directly to each space. These units are approximately 4 Tons in capacity and have energy efficiency ratios (EER) of approximately 10.5.

Classrooms 165 through 169

The original building design indicated that these rooms were all served by water source heat pumps; however, based on field observations, these classrooms are served by split system heat pump units. The remote condensing units for these systems are located on the roof. These units are all 3-Ton York units, with EERs of approximately 10.4.

Faculty Lounge, Music Room, Art Room and Computer Lab

These rooms are all served by through the wall, console type air to air heat pumps. These units are 3-1/2 Ton American Air Filter units with supplementary electric heating coils.

Library and Gymnasium

These rooms are served by split system, air to air heat pumps. The indoor units are mounted above the ceiling with air ducted directly to the spaces. The remote condensing units are mounted on the roof. The library unit is 16 Tons with 20 kW supplementary electric heat. The gymnasium unit is 16 Tons with 30 kW supplementary electric heat.

Classrooms 160 through 164

These classrooms are served by American Air Filter above the ceiling water source heat pumps. Air from the units is ducted directly to each space. These units are approximately 3-1/2 Tons in capacity and have energy efficiency ratios (EER) of approximately 11.5.

Cafetorium, Kitchen, Faculity Dining Area and Locker room/Office/Corridor

The Cafetorium and stage area are served by three (3) Trane packaged rooftop units with D/X cooling and gas fired heating. There are two 11 Ton units and a 5 Ton unit that serves this area. The Kitchen staff locker room, office, and corridor are served by a single 4-Ton D/X unit with gas fired heating. The Faculty Dining Area is served by a 3-Ton D/X unit with gas fired heating. The remaining corridors around the Cafetorium are served by a 3-Ton D/X unit with gas fired heating.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. These fans are controlled by wall switches located in the toilet rooms. General ventilation fans are also provided throughout the corridors of the school. These fans are controlled by the occupied/unoccupied schedule of the facility.

HVAC System Controls

The control systems of the school are a mix of pneumatic controls and stand-alone unit DDC controls. The water source heat pumps in the building are controlled by an AAF Enercon system controller. This system monitors the heat pump loop water temperature and allows for manual operation of the system pumps.

The boilers are controlled by a Weil McLain Energy Management Control System. This system operates the boilers and energizes them to meet the building heating load.

The classroom thermostats are a mix of pneumatic and digital programmable.

Domestic Hot Water

Domestic hot water for the restrooms is provided by an 80 gallon Bradford White electric hot water heater, with a capacity of 4500 Watts. This hot water heater is located in the main mechanical room. Domestic Hot Water for the kitchen is provided by a 75 gallon Bradford White gas fired hot water heater with an input capacity of 76 MBH and a recovery rate of 74 gallons per hour.

Lighting

Refer to the **Investment Grade Lighting Audit Appendix** for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. 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.

IV. ENERGY CONSERVATION MEASURES

Energy Conservation Measures are developed specifically for this facility. The energy savings and calculations are highly dependent on the information received from the site survey and interviews with operations personnel. The assumptions and calculations should be reviewed by the owner to ensure accurate representation of this facility. The following ECMs were analyzed:

Table 1
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	General Lighting Upgrades	$9,075	$1,848	4.9	205.5%
ECM #2	Lighting Controls	$11,920	$2,227	5.4	180.2%
ECM #3	Condensing Boiler Installation	$205,233	$4,182	49.1	-38.9%
ECM #4	Split System Heat Pump Upgrades	$101,573	$16,005	6.3	136.4%
ECM #5	Tankless Hot Water Heater	$3,983	$109	36.5	-59.0%
ECM #6	Rooftop Unit Replacement	$77,027	$1,730	44.5	-66.3%
ECM #7	NEMA Premium Efficiency Motors	$11,451	$1,005	11.4	31.6%
ECM #8	Water Conservation	$69,476	$3,899	17.8	-15.8%
ECM #9	Geothermal Heat Pump System	$1,537,573	$69,505	22.1	13.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	Rooftop Solar Array	$871,819	$94,808	9.2	63.1%

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

Table 2
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	General Lighting Upgrades	7.3	13,794	0
ECM #2	Lighting Controls	9.3	16,618	0
ECM #3	Condensing Boiler Installation	0.0	0	3,591
ECM #4	Split System Heat Pump Upgrades	39.8	119,439	0
ECM #5	Tankless Hot Water Heater	0.0	0	94
ECM #6	Rooftop Unit Replacement	4.3	12,910	0
ECM #7	NEMA Premium Efficiency Motors	1.6	6,834	0
ECM #8	Water Conservation	-	15,023	-
ECM #9	Geothermal Heat Pump System	-	365,598	18,316
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	Rooftop Solar Array	116.5	175,669	-

Table 3
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrades	$1,848	$9,075	$0	$9,075	4.9
Lighting Controls	$2,227	$12,900	$980	$11,920	5.4
Condensing Boiler Installation	***$4,182***	***$210,000***	***$4,767***	***$205,233***	***49.1***
Split System Heat Pump Upgrades	$16,005	$104,962	$3,389	$101,573	6.3
Tankless Hot Water Heater	$109	$4,283	$300	$3,983	36.5
Rooftop Unit Replacement	$1,730	$80,125	$3,098	$77,027	44.5
NEMA Premium Efficiency Motors	$1,005	$11,861	$410	$11,451	11.4
Water Conservation	$3,899	$69,476	$0	$69,476	17.8
Geothermal Heat Pump System	***$69,505***	***$1,704,073***	***$166,500***	***$1,537,573***	***22.1***
Design / Construction Extras (15%)		$43,902		$43,902	
Total Project	**$26,823**	**$336,584**	**$8,177**	**$328,407**	**12.2**

*

Highlighted ECMs are not included in the Total Project costs

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade – Interior spaces

Description:

The majority of the interior lighting throughout Osage Elementary School is provided with 32W T8 lamps with electronic ballasts. There are still a limited number of areas that utilize fluorescent fixtures with 32W T8 lamps and magnetic ballasts. In addition, the Gymnasium utilizes T5HO fixtures with reflective lenses. CEG recommends replacing the magnetic ballasts with new, more efficient electronic ballasts

The ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. In some locations the bulb replacement will need to be tested to make sure the larger base of the CFL will fit into the existing fixture. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

Energy Savings Calculations:

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

Rebates and Incentives:

There are no Smart Start Rebates or Incentives for this ECM.

Replacement and Maintenance Savings:

There are no replacement or maintenance savings for this ECM.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$9,075
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$9,075
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,848
Total Yearly Savings ($/Yr):	$1,848
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.9
Simple Lifetime ROI	205.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$27,720
Internal Rate of Return (IRR)	19%
Net Present Value (NPV)	$12,986.30

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

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

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

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors and daylight sensors (The majority of the savings is expected to be after school hours when rooms are left with lights on)

This ECM includes installation of ceiling or switch mount sensors for individual offices, classrooms, large bathrooms, and libraries. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

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 #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$12,900
NJ Smart Start Equipment Incentive ($):	$980
Net Installation Cost ($):	$11,920
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,227
Total Yearly Savings ($/Yr):	$2,227
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.4
Simple Lifetime ROI	180.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$33,405
Internal Rate of Return (IRR)	17%
Net Present Value (NPV)	$14,665.78

ECM #3: Condensing Boiler Installation

Description:

Space heating for the majority of the school is provided by a heating hot water loop provided by the combustion of natural gas. The sources of hot water for these equipments are six gas fired modular boiler which are located in the main boiler room.

The six boilers are Weil McLain modular gas fired boilers which heat water that feeds the heating hot water loop of the building. The boilers which are model PFG-7-P1 have a factory input capacity of 390 MBH and an output of 308 MBH. These capacities may be reduced due to the age and condition of the boilers. The boilers are an estimated 15 years old; they are still within their ASHRAE defined service life of 20 years. Due to the age and condition the boilers should be replaced within a reasonable timeframe to a more efficient and newer unit.

Typically, standard (non-condensing) boilers provide lower than nominal efficiency compared to condensing boilers. Standard boilers suffer further efficiency losses at part load operating conditions mainly due to limitations in the reduction of the flue gas temperature. Current average combustion efficiency of the boilers is estimated to be 76% due to standard non-condensing boiler technology, limited turn down ratio, cycling losses and outdated design and controls. 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.

CEG recommends replacing the six Weil McLain boilers with high efficiency condensing hot water boilers to provide building with heating throughout the year. The annual average operating efficiency of the proposed boiler set is expected to be 92%, which gives the heating system a 16% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of six new high efficiency condensing gas fired boilers to replace the existing Weil McLain boilers located in the mechanical room. The following is a summary of the boiler replacement recommendations.

BOILER REPLACEMENT SUMMARY		
EXISTING UNIT	**LOCATION**	**PROPOSED UNITS**
(6) Weil McLain Modular Boilers	Boiler Room	(6) Aerco MLX

The basis for this ECM is Aerco MLX454H condensing hot water boiler or equivalent. New boilers shall be setup and programmed to be the primary source of heating for the building during entire year. In addition to the boiler replacement, consideration was given to the costs

associated with converting the existing steam boilers to hot water. The owner is recommended to retain a professional engineer to confirm equipment sizing and finalize design.

Energy Savings Calculations:

Currently, the only gas consuming equipment connected to the building gas meter is the boilers and a domestic hot water heater located in the kitchen. Therefore, annual energy consumption of the boilers has to be estimated. In this calculation, it is assumed that the majority gas usage of the building is for the boilers due to the limited usage of the kitchen hot water throughout the year. Usage of the kitchen domestic hot water heater was estimated using utility information during months that room heating is not required.

Below calculation is performed to estimate annual gas usage of the cast iron boilers:

Total facility heating capacity (Heating equipment output capacity):

(6) Weil McLain boilers	= 20,650 Therms
(1) Domestic Hot Water Heater	= 624 Therms
Total Output Capacity	= 21,292 Therms

Total facility heating capacity:	21,292 Therms
Total Capacity – Weil McLain Boilers:	**20,650 Therms**

$$\text{Bldg Heat Required} = \text{Heating Nat. Gas (Therm)} \times \text{Heating Eff (\%)} \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}}\right)$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg. Heat Required (BTU)}}{\text{New Heating Eff (\%)} \times \text{Fuel Heat Value} \left(\frac{\text{BTU}}{\text{Therm}}\right)}$$

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

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Hot Water Boilers	New Condensing Boilers	-
Existing Nat Gas (Therms)	20,650	-	-
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	1,569	1,569	-
Ave. Gas Cost ($/Therm) (Heating season only)	1.16	1.16	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	20,650	17,059	3,591
Energy Cost ($)	$24,048	$19,866	$4,182
COMMENTS:			

Project Cost, Incentives and Maintenance Savings

Estimated cost for removing the existing boilers, piping and steam to hot water heat exchangers and installing six 434 MBH condensing hot water boilers with advanced controls is $210,000.

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 - 1500 MBH	84% AFUE for Hot Water boilers	$1.75	454	6	$4,767
TOTAL					**$4,767**

Maintenance savings associated with this ECM is estimated to be minimal.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$210,000
NJ Smart Start Equipment Incentive ($):	$4,767
Net Installation Cost ($):	$205,233
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,182
Total Yearly Savings ($/Yr):	$4,182
Estimated ECM Lifetime (Yr):	30
Simple Payback	49.1
Simple Lifetime ROI	-38.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$125,460
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($123,263.95)

ECM #4: Split System Heat Pump Upgrades

Description:

Osage Elementary School is air conditioned by split system heat pump units. There are a total of nine (9) units that are in poor condition and have reached the end of their useful service life of 15 years, as defined by ASHRAE. The units currently installed are inefficient compared to modern equipment and can be replaced with new high efficiency units. New heat pumps provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-for-one replacement of the older split system heat pump 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 replacements for this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
SYSTEM TYPE	**UNIT NO.**	**NUMBER OF UNITS**	**COOLING CAPACITY, BTU/HR**	**TOTAL CAPACITY, TONS**	**REPLACE UNIT WITH**
SS	CU-1,2,3,4&5	5	36,000	3.0	Carrier - 25HNA936 Infinity Series
SS	CU-6	1	18,000	1.5	Carrier - 25HNA918 Infinity Series
SS	CU-7	1	18,000	1.5	Carrier - 25HNA918 Infinity Series
SS	CU-8	1	180,000	15.0	Carrier - 38AQS016
SS	CU-9	1	90,000	7.5	Carrier - 38ARQ008

The manufacturers used as the basis for design are Carrier. All units are one for one style replacements with matching capacity of the new units to the old units.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

$$\text{Heating Energy Savings, kWh} = \text{Heating Capacity,} \frac{\text{MBH}}{293.07 \frac{MBH}{kW}} \times \text{Operation Hours} \times \left(\frac{1}{\text{COP}_{\text{Old}}} - \frac{1}{\text{COP}_{\text{New}}}\right)$$

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

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

ENERGY SAVINGS CALCULATIONS											
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	ANNUAL HEATING HOURS	EXISTING UNITS EER	NEW UNITS EER	EXISTING UNITS COP	SPLIT UNITS COP	# OF UNITS	ENERGY SAVINGS COOLING KWH	ENERGY SAVINGS HEATING KWH	DEMAND SAVINGS kW
SS	36,000	1,800	1,200	10.4 EER	13.5 EER	2.2 COP	2.92 COP	5	7,154	16,521	7.9
SS	18,000	1,800	1,200	11 EER	14.1 EER	2.5 COP	3.04 COP	1	648	5,237	2.0
SS	18,000	1,800	1,200	9 EER	14.1 EER	2.5 COP	3.04 COP	1	1,302	5,237	2.2
SS	180,000	1,800	1,200	9 EER	11.5 EER	2.55 COP	3.1 COP	1	7,826	51,279	19.7
SS	90,000	1,800	1,200	9 EER	11.5 EER	2.72 COP	3.2 COP	1	3,913	20,322	8.1
Total								9	20,843	98,596	39.8

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:

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

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/TON**	**PROPOSED CAPACITY TONS (TOTAL)**	**TOTAL REBATE $**
5.4 tons or less Unitary AC and Split System	≥14 SEER	$92	18.0	$1,656
≥ 5.4 to < 11.25 tons	11.5 EER	73	7.5	$548
TOTAL			**25.5**	**$2,204**

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

COST & SAVINGS SUMMARY							
ECM INPUTS	**INSTALLED COST**	**# OF UNITS**	**TOTAL COST**	**REBATES**	**NET COST**	**ENERGY SAVING**	**PAY BACK YEARS**
SS	$8,338	5	$47,941	$1,380	$46,561	$3,172	14.7
SS	$4,667	1	$5,367	$138	$5,229	$789	6.6
SS	$4,667	1	$5,367	$138	$5,229	$876	6.0
SS	$23,288	1	$26,781	$1,185	$25,596	$7,920	3.2
SS	$16,963	1	$19,507	$548	$18,959	$3,248	5.8
Total	**$57,922**	**9**	**$104,962**	**$3,389**	**$101,574**	**$16,005**	**6.3**

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$104,962
NJ Smart Start Equipment Incentive ($):	$3,389
Net Installation Cost ($):	$101,573
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$16,005
Total Yearly Savings ($/Yr):	$16,005
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.3
Simple Lifetime ROI	136.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$240,075
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	$89,493.65

ECM #5: Tankless Hot Water Heater

Description:
Domestic hot water for Osage Elementary School kitchen is provided by a Gas Fired Hot Water Heater. The gas hot water heater is currently at an estimated efficiency of 80% is nearing the end of its useful service life defined by ASHRAE.

This ECM will replace the older gas domestic water heater with a high efficiency instant gas water heater. The storage tank is eliminated in an instant heater which provides hot water only when needed. A conversion to an instant hot water heater will reduce losses, when not in use, and maintenance costs. Voorhees Township Public Schools should retain a professional engineer to finalize the sizing and design of the system.

The usage of the gas domestic hot water heater was based on a site survey and provided utility bill information. The utility information was used to determine the site usage during months when the hot water boilers are in not in operation. By averaging this amount a usage of gas for each month was estimated for the gas hot water heater.

Energy Savings Calculations:

CONDENSING DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Boiler	High Efficiency Hot Water Heater	-
Building Type	Education	Education	-
Area Served	Kitchen	Kitchen	-
DHW Heating Fuel Type	Gas	Gas	-
Heating Efficiency	80%	95%	15%
Nat Gas Cost ($/Therm)	$1.16	$1.16	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Consumption (Therms)	624	530	94
Energy Cost ($)	$724	$615	$109
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Cost, Rebates and Incentives:

The total installed cost with gas piping is estimated to be **$4,283.**

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

Smart Start ® Incentive: Tankless Hot Water Heaters: $300 per Unit

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,283
NJ Smart Start Equipment Incentive ($):	$300
Net Installation Cost ($):	$3,983
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$109
Total Yearly Savings ($/Yr):	$109
Estimated ECM Lifetime (Yr):	15
Simple Payback	36.5
Simple Lifetime ROI	-59.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$1,635
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	($2,681.77)

ECM #6: Rooftop Unit Replacement

Description:

Osage Elementary School is provided room conditioning for a series of rooftop air condition and gas heating units. A number of units at the school are in poor condition and they have surpassed the end of their useful life of 15 years, which is defined by ASHRAE. Information on the units was gathered from existing plans and drawings and field surveys, estimations were made for incomplete information. The units currently installed are inefficient compared to modern equipment and can be replaced with new high efficiency units. New rooftop units provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

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 replacements 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	Cafetorium	1	150,000	12.5	Carrier - Weathermaster - 48HCD14
RTU	Cafetorium	1	120,000	10.0	Carrier - Weathermaster - 48HCD12
RTU	Stage	1	60,000	5.0	Carrier - Weathermaster - 48HCA06
RTU	Foyer,Office,Storage	1	48,000	4.0	Carrier - Weathermaster - 48HCA05
RTU	Faculty and Toilet	1	36,000	3.0	Carrier - Weathermaster - 48HCA04
RTU	Corridors	1	36,000	3.0	Carrier - Weathermaster - 48HCA04
Total		**6**	**414,000**	**34.5**	

The manufacturers used as the basis for design are Carrier. All units are one for one style replacements with matching capacity of the new units to the old units.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS								
ECM INPUTS	**COOLING CAPACITY, BTU/Hr**	**ANNUAL COOLING HOURS**	**ANNUAL HEATING HOURS**	**EXISTING UNITS EER**	**RTU UNITS EER**	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
RTU	150,000	1,800	1,200	9.7 EER	12.2 EER	1	5,704	1.9
RTU	120,000	1,800	1,200	10.3 EER	11.5 EER	1	2,188	0.7
RTU	60,000	1,800	1,200	10.5 EER	12.45 EER	1	1,611	0.5
RTU	48,000	1,800	1,200	10.4 EER	13 EER	1	1,662	0.6
RTU	36,000	1,800	1,200	10.6 EER	12.5 EER	1	929	0.3
RTU	36,000	1,800	1,200	10.8 EER	12.5 EER	1	816	0.3
Total						6	12,910	4.3

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:

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

RTU AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/TON**	**PROPOSED CAPACITY TONS**	**TOTAL REBATE $**
≥ 11.25 to < 20 tons	11.5 EER	79	12.5	$988
≥ 5.4 to < 11.25 tons	11.5 EER	73	10	$730
5.4 tons or less Unitary AC and Split System	≥14 SEER	$92	15.0	$1,380
TOTAL			**37.5**	**$3,098**

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

COST & SAVINGS SUMMARY							
ECM INPUTS	**INSTALLED COST**	**# OF UNITS**	**TOTAL COST**	**REBATES**	**NET COST**	**ENERGY SAVING**	**PAY BACK YEARS**
RTU	$20,625	1	$22,688	$988	$21,700	$764	28.4
RTU	$17,500	1	$19,250	$730	$18,520	$293	63.2
RTU	$12,500	1	$13,750	$460	$13,290	$216	61.6
RTU	$11,000	1	$12,100	$368	$11,732	$223	52.7
RTU	$9,250	1	$10,175	$276	$9,899	$125	79.5
RTU	$9,250	1	$10,175	$276	$9,899	$109	1.0
Total	$80,125	$6	$88,138	$3,098	$85,040	$1,730	49.2

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

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$80,125
NJ Smart Start Equipment Incentive ($):	$3,098
Net Installation Cost ($):	$77,027
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,730
Total Yearly Savings ($/Yr):	$1,730
Estimated ECM Lifetime (Yr):	15
Simple Payback	44.5
Simple Lifetime ROI	-66.3%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$25,950
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	($56,374.37)

ECM #7: 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. Due to the fact that 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 and supply fans in some of the HVAC equipment 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	Main Heating Loop	5	4,300	85.5%	90.2%
HWP-2	Main Heating Loop	5	4,300	85.5%	90.2%
HP-1	Heat Pump Loop	15	4,300	88.5%	92.4%
HP-2	Heat Pump Loop	15	4,300	88.5%	92.4%
CWP-1	Condensor Water Pump	5	4,300	85.5%	90.2%

Energy Savings Calculations:

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

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

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

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

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

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

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
HWP-1	5	90%	85.5%	90.2%	0.20	884	$130
HWP-2	5	90%	85.5%	90.2%	0.20	884	$130
HP-1	15	90%	88.5%	92.4%	0.48	2,076	$305
HP-2	15	90%	88.5%	92.4%	0.49	2,104	$309
CWP-1	5	90%	85.5%	90.2%	0.20	884	$130
TOTAL					**1.6**	**6,834**	**$1,005**

Equipment Cost and Incentives

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

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

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

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP-1	5	$1,519	$60	$1,459	$130	11.2
HWP-2	5	$1,519	$60	$1,459	$130	11.2
HP-1	15	$3,652	$115	$3,537	$305	11.6
HP-2	15	$3,652	$115	$3,537	$309	11.4
CWP-1	5	$1,519	$60	$1,459	$130	11.2
TOTAL	**Totals:**	**$11,861**	**$410**	**$11,451**	**$1,005**	**11.4**

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,861
NJ Smart Start Equipment Incentive ($):	$410
Net Installation Cost ($):	$11,451
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,005
Total Yearly Savings ($/Yr):	$1,005
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.4
Simple Lifetime ROI	31.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$15,075
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	$546.62

ECM #8: Water Conservation

Description:

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

This ECM includes the replacement of the existing sink faucets within the bathrooms. The estimated usage of the plumbing fixtures is based on the total population of the facility. The number of plumbing fixtures to be replaced is based on site survey of the facilities.

The proposed retrofit includes installation of auto flow sink faucets and low flow aerators. For the basis of this calculation the LEED rating system was used to estimate the occupancy usage for students within the school. When water consumption information was not available, the GPF values were estimated for the existing fixtures.

Energy Savings Calculations:

Faucets:

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

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

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

WATER CONSERVATION CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Fixtures	Low Flow / Auto Flow Fixtures	-
Total Number of Students	588	588	-
% Male to Female	50%	50%	-
Estimated % Floor Area Served by Older Bathrooms	100%	100%	-
Occupied Days Per Year	250	250	-
Lavatory Uses per Day per Person	3	3	-
Sink flow time per use, sec	15	12	-
Sink Aerator Flow, GPM	1.5	0.5	-
WC Uses per Day per Person	2.0	2.0	-
Urinal Uses per Day per Person	1.0	1.0	-
Total Urinal Flushes Per Day	294	294	-
Total WC Flushes Per Day	588	588	-
Urinal Gallons Per Flush (GPF)	1.0	0.125	0.875
WC Gallons Per Flush (GPF)	1.6	1.28	0.32
**** Water Cost ($/1000 Gal)**	$8.00	$8.00	-
Gas Cost ($/Therm)	$1.16	$1.16	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Water Consumption, Urinal and WC (Gal)	308,700	197,348	111,353
Water Consumption, Faucets (Gal)	165,375	44,100	121,275
Total Water Consumption, (Gal)	474,075	241,448	232,628
Water Cost ($)	$3,793	$1,932	$1,861
Gas Consumption (Therms)	690	184	506
Gas Cost ($/Year)	$800	$213	$587
TOTAL SAVINGS			**$2,448**
COMMENTS:	*Savings are based on LEED Reference Guide for Green Building Design and Construction - 2009 Edition for WC and Urinal water usage. ** Cost of Water estimated.		

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

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$69,476
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$69,476
Maintenance Savings ($/Yr):	$69,476
Energy Savings ($/Yr):	$69,476
Total Yearly Savings ($/Yr):	$3,899
Estimated ECM Lifetime (Yr):	15
Simple Payback	17.8
Simple Lifetime ROI	-15.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$58,485
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	($22,929.99)

ECM #9: Geothermal Heat Pump System Installation

Description:

The HVAC Systems at Osage Elementary School are a combination of split system heat pump units, packaged rooftop units with gas fired heat exchangers, hot water unit ventilators and water source heat pumps. Hot water for heating and the heat pump loop is supplied via gas fired boilers. Heat is removed from the heat pump loop through a cooling tower, outside of the main mechanical room.

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

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

1. 370-Ton (Heating Dominant) bore field located Southwest end of the building. (123 bores, 450 ft deep each). Bore field sizing is based on 150 linear feet of bore per ton of cooling. A complete geotechnical analysis will have to be performed in order to confirm the actual soil thermal conductivity at the site.
2. (3) Loop condenser water pumps.
3. Condenser water piping distribution system from the well field to the roof top units and indoor heat pumps. Additional piping was estimated since not all areas of the building are currently served by the water source heat pump loop.
4. Installation of high-efficiency (16 EER) geothermal rooftop units to provide heated and cooled ventilation air and (18 EER) geothermal indoor heat pumps to replace the classroom unit ventilators.

5. Removal all existing AC units, air handlers and air to air heat pumps.

This ECM is based on Climate Master Tranquility Series water source heat pumps model TRE for the rooftop units, and model TS or TV for the horizontal / vertical units or equal. **Note:** Sizing indicated within the calculation of this ECM is based on a one for one replacement of the existing equipment. Owner should have a Professional Engineer verify heating and cooling loads prior to moving forward with this ECM.

Energy Savings Calculations:

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

ECM #9 GEOTHERMAL SYSTEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Energy Consumption	Proposed Energy Consumption	
Elec Usage (KWH)	1,005,600	640,002	365,598
Natural Gas Usage (Therms)	21,292	2,976	18,316
Electric Cost ($/KWH)	$0.132	$0.132	
Natural Gas Cost ($/Therm)	$1.16	$1.16	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy Cost ($)	$132,739	$84,480	$48,259
Natural Gas Energy Cost ($)	24698.72	$3,452	$21,247
Total Energy Cost ($)	$157,438	$87,932	$69,505
COMMENTS:	This ECM is based on energy models performed on energy analysis software by Trane (Trace 700).		

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,704,073
NJ Smart Start Equipment Incentive ($):	$166,500
Net Installation Cost ($):	$1,537,573
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$69,505
Total Yearly Savings ($/Yr):	$69,505
Estimated ECM Lifetime (Yr):	25
Simple Payback	22.1
Simple Lifetime ROI	13.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$1,737,625
Internal Rate of Return (IRR)	1%
Net Present Value (NPV)	($327,271.67)

***Note:** ECM #9 – Geothermal System Installation is an alternate ECM. Implementation of ECM #9 would eliminate the potential for ECM #s – 3, 4, 6 & 7.

REM #1: Rooftop Solar Array

Description:

Osage Elementary School has approximately 14,985 square-foot of available roof space that can accommodate a 116.5 KW solar array, assuming the existing roof structure is capable of supporting such an array.

The array will produce approximately 175,669 kilowatt-hours annually that will reduce the overall electric usage of the facility by 20.13%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix F** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$871,819
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$871,819
Maintenance Savings ($/Yr):	$67,750
Energy Savings ($/Yr):	$27,058
Total Yearly Savings ($/Yr):	$94,808
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.2
Simple Lifetime ROI	63.1%
Simple Lifetime Maintenance Savings	$1,016,250
Simple Lifetime Savings	$1,422,120
Internal Rate of Return (IRR)	7%
Net Present Value (NPV)	$259,992.75

V. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

E. Turn off computers when not in use. Ensure computers are not running in screen saver mode which saves the monitor screen not energy.

F. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Voorhees Township Public Schools - Osage Elementary School

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	General Lighting Upgrades	$3,630	$5,445	$0	$9,075	$1,848	$0	$1,848	15	$27,720	$0	205.5%	4.9	18.83%	$12,986.30
ECM #2	Lighting Controls	$5,160	$7,740	$980	$11,920	$2,227	$0	$2,227	15	$33,405	$0	180.2%	5.4	16.88%	$14,665.78
ECM #3	Condensing Boiler Installation	$84,000	$126,000	$4,767	$205,233	$4,182	$0	$4,182	30	$125,460	$0	-38.9%	49.1	-2.92%	($123,263.95)
ECM #4	Split System Heat Pump Upgrades	$52,481	$52,481	$3,389	$101,573	$16,005	$0	$16,005	15	$240,075	$0	136.4%	6.3	13.35%	$89,493.65
ECM #5	Tankless Hot Water Heater	$1,500	$2,783	$300	$3,983	$109	$0	$109	15	$1,635	$0	-59.0%	36.5	-9.50%	($2,681.77)
ECM #6	Rooftop Unit Replacement	$32,050	$48,075	$3,098	$77,027	$1,730	$0	$1,730	15	$25,950	$0	-66.3%	44.5	-11.28%	($56,374.37)
ECM #7	NEMA Premium Efficiency Motors	$7,117	$4,744	$410	$11,451	$1,005	$0	$1,005	15	$15,075	$0	31.6%	11.4	3.65%	$546.62
ECM #8	Water Conservation	$34,738	$34,738	$0	$69,476	$3,899	$0	$3,899	15	$58,485	$0	-15.8%	17.8	54662.48%	$0.00
ECM #9	Geothermal Heat Pump System	$755,021	$949,052	$166,500	$1,537,573	$69,505	$0	$69,505	25	$1,737,625	$0	13.0%	22.1	-2.08%	($22,929.99)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	Rooftop Solar Array	$871,819	$0	$0	$871,819	$27,058	$67,750	$94,808	15	$1,422,120	$1,016,250	63.1%	9.2	6.85%	$259,992.75

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, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $93 per ton
Air-to-Air Heat Pumps	$73 - $92 per ton
Water-Source Heat Pumps	$81 per ton
Packaged Terminal AC & HP	$65 per ton
Central DX AC Systems	$40- $72 per ton
Dual Enthalpy Economizer Controls	$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

Gas Fired Boilers < 300 MBH	$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	$300 - $400 per unit, AFUE ≥ 92%

Variable Frequency Drives

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

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	$50 per unit
Gas-Fired Water Heaters > 50 gallons	$1.00 - $2.00 per MBH
Gas-Fired Booster Water Heaters	$17 - $35 per MBH
Gas Fired Tankless Water Heaters	$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	$25 per fixture (1-2 lamps) $30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	$10 per fixture
Hard-Wired Compact Fluorescent	$25 - $30 per fixture
Metal Halide w/Pulse Start	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Osage Elementary School

Building ID: 2820747
For 12-month Period Ending: February 28, 2011[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 03, 2011

Facility
Osage Elementary School
112 Somerdale Road
Voorhees, NJ 08043

Facility Owner
Voorhees Township Board of Education
329 Route 73
Voorhees, NJ 08043

Primary Contact for this Facility
Frank DeBerardinis
329 Route 73
Voorhees, NJ 08043

Year Built: 1957
Gross Floor Area (ft²): 78,797

Energy Performance Rating[2] (1-100) 49

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	3,328,293
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	3,328,293

Energy Intensity[5]

Site (kBtu/ft²/yr)	42
Source (kBtu/ft²/yr)	141

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	471

Electric Distribution Utility
Public Service Electric & Gas Co

National Average Comparison

National Average Site EUI	42
National Average Source EUI	140
% Difference from National Average Source EUI	1%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

Certifying Professional
Michael Fischette
520 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	Osage Elementary 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	112 Somerdale Road, Voorhees, NJ 08043	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Osage Elementary School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	78,797 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	138 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	1 (Default)	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	90 %	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: Public Service Electric & Gas Co

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))**
02/01/2011	02/28/2011	102,667.00
01/01/2011	01/31/2011	126,400.00
12/01/2010	12/31/2010	120,000.00
11/01/2010	11/30/2010	55,200.00
10/01/2010	10/31/2010	82,400.00
09/01/2010	09/30/2010	72,800.00
08/01/2010	08/31/2010	76,800.00
07/01/2010	07/31/2010	68,000.00
06/01/2010	06/30/2010	81,600.00
05/01/2010	05/31/2010	74,400.00
04/01/2010	04/30/2010	53,600.00
03/01/2010	03/31/2010	61,600.00
Electric Consumption (kWh (thousand Watt-hours))		**975,467.00**
Electric Consumption (kBtu (thousand Btu))		**3,328,293.40**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**3,328,293.40**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

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

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

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Osage Elementary School
112 Somerdale Road
Voorhees, NJ 08043

Facility Owner
Voorhees Township Board of Education
329 Route 73
Voorhees, NJ 08043

Primary Contact for this Facility
Frank DeBerardinis
329 Route 73
Voorhees, NJ 08043

General Information

Osage Elementary School	
Gross Floor Area Excluding Parking: (ft^2)	78,797
Year Built	1957
For 12-month Evaluation Period Ending Date:	February 28, 2011

Facility Space Use Summary

Osage Elementary School	
Space Type	K-12 School
Gross Floor Area(ft^2)	78,797
Open Weekends?	No
Number of PCs[d]	138
Number of walk-in refrigeration/freezer units[d]	1
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	90
Months[o]	10
High School?	No
School District[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 02/28/2011)	**Baseline** (Ending Date 02/28/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	49	49	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	42	42	33	N/A	42
Source (kBtu/ft^2)	141	141	110	N/A	140
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	471	471	366	N/A	468
$kgCO_2e/ft^2$/year	6	6	5	N/A	6

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

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

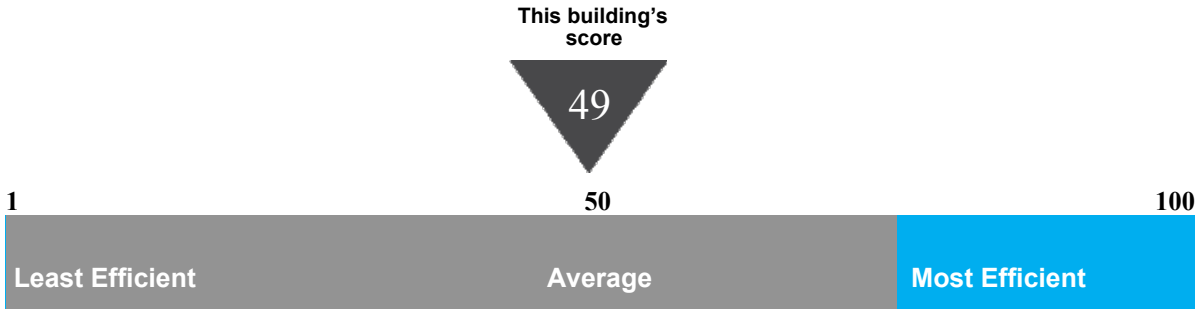
Statement of Energy Performance

2011

Osage Elementary School
112 Somerdale Road
Voorhees, NJ 08043

Portfolio Manager Building ID: 2820747

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 141 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending February 2011

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: 08/03/2011

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

AC Units

Tag	CU-1,2,3,4&5	HP-1	CU-6
Unit Type	Split System Heat Pump	Packaged Heat Pump	Split System Heat Pump
Qty	5	1	1
Location	Original Building Roof	Roof over SGI & Speech	Roof
Area Served	Indoor Heat Pumps	SGI/Speech/Corridor	-
Manufacturer	York	York	Payne
Model #	E1RC036S060	B1HH060A06B	PH13NR018
Serial #	WBMM049047/WDMM053173/WLLM04644/WKLM049346/WBMM049073	SNFMM070343	3206X68533
Cooling Type	R-22, DX	R-22, DX	R-22, DX
Cooling Capacity (Tons)	3	5	1.5
Cooling Efficiency (SEER/EER)	10.4 EER	10.2 EER	11.0 EER
Heating Type	Heat Pump	Heat Pump	Heat Pump
Heating Input (MBH)	35 MBH	60MBH	16MBH
Efficiency	2.2 COP (est)	2.2 COP (est)	2.125 COP
Fuel	Heat Pump	Heat Pump	Heat Pump
Approx Age	8	8	5
ASHRAE Service Life	15	15	15
Remaining Life	7	7	10
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

AC Units

Tag	CU-7	CU-8	CU-9
Unit Type	Split System Heat Pump	Split System Heat Pump	Split System Heat Pump
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	-	Gym Heat Pump	Library Heat Pump
Manufacturer	Carrier	Carrier	Carrier
Model #	3NR018-C	38AQ016500	38BQ008530
Serial #	68533	U290595	3581G2765
Cooling Type	R-22, DX	R-22, DX	R-22, DX
Cooling Capacity (Tons)	1.5	15	7.5
Cooling Efficiency (SEER/EER)	9.0 EER (est)	9.0 EER (est)	9.0 EER (est)
Heating Type	Heat Pump	Heat Pump	Heat Pump
Heating Input (MBH)	16 MBH (est)	172 MBH	76MBH
Efficiency	2.5 COP @ High Temp (est)	2.5 COP @ High Temp	2.72 COP @ High Temp
Fuel	Heat Pump	Heat Pump	Heat Pump
Approx Age	26	19	20
ASHRAE Service Life	15	15	15
Remaining Life	(11)	(4)	(5)
Comments	*Derated Efficiency 15% due to age	*Derated Efficiency 15% due to age	*Derated Efficiency 15% due to age

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Boilers

Tag	B-1/2/3/4/5/6		
Unit Type	Modular Boiler		
Qty	6		
Location	Boiler Room		
Area Served	Heating Hot Water Loop		
Manufacturer	Weil McLain		
Model #	PFG-7-P1		
Serial #	Varies		
Input Capacity (Btu/Hr)	390 MBH		
Rated Output Capacity (Btu/Hr)	308 MBH		
Approx. Efficiency %	76% (est)		
Fuel	Natural Gas		
Approx Age	15		
ASHRAE Service Life	20		
Remaining Life	15		
Comments	*Boiler 1 was installed in 1990, estimated 21 years old		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Heat Exchanger

Tag	HX-1		
Unit Type	Heat Exchanger		
Qty	1		
Location	Boiler Room		
Area Served	Cooling Tower Loop		
Manufacturer	Baltimore Air Coil		
Model #	HK10-7-2-1B		
Serial #	87100818		
Input Capacity (MBH)	-		
Flow Hot Side (GPM)	390		
Flow Cold Side (GPM)	390		
Approx. Efficiency %	-		
Fuel	-		
Approx Age			
ASHRAE Service Life			
Remaining Life			
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Cooling Tower

Tag	CT-1		
Unit Type	Cooling Tower		
Qty	1		
Location	Outside, at grade		
Area Served	HX-1, Heat pump loop		
Manufacturer	Baltimore Air Coil		
Model #	-		
Serial #	-		
Rated Flow GPM	390 GPM		
EWT / LWT	95 / 85		
Motor HP	-		
Electrical	-		
Approx Age	-		
ASHRAE Service Life	22		
Remaining Life			
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Domestic Water Heaters

Tag			
Unit Type	Electric Domestic Hot Water Heater	Gas Fired Domestic Hot Water Heater	
Qty	1	1	
Location	Main Boiler Room	Kitchen	
Area Served	Domestic Hot Water	Kitchen	
Manufacturer	Bradford White	Bradford White	
Model #	M2810126DS2	TW-75S-75E-3W	
Serial #	AH5037543	-	
Size (Gallons)	80	75	
Input Capacity (MBH/KW)	4,500 Watts	76 MBH	
Recovery (Gal/Hr)	31	74	
Efficiency %	100%	80.00%	
Fuel	Electricity	Natural Gas	
Approx Age	7	10 (est)	
ASHRAE Service Life	12	12	
Remaining Life	5	2	
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Pumps

Tag	HWP-1	HWP-2	BP-1/3/4
Unit Type	Base Mounted Pump	Base Mounted Pump	In-Line Circulating Pump
Qty	1	1	3
Location	Boiler Room	Boiler Room	Boiler Room
Area Served	Main Heating Loop	Main Heating Loop	Boiler Circulation Pump
Manufacturer	Armstrong Pumps	Armstrong Pumps	Armstrong Pumps
Model #	TVA184T	-	H-32-BF
Serial #	-	-	-
Horse Power	5	5	1/6
Flow	100 GPM	100 GPM	15 GPM
Motor Info	Marathon	Baldor	-
Electrical Power	208-230V	208V/12.7	115V/10
RPM	1725	1800	1725
Motor Efficiency %	85.5%	87.5%	85% (est)
Approx Age	21	21	21
ASHRAE Service Life	20	20	10
Remaining Life	(1)	(1)	(11)
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Pumps

Tag	BP-2	BP-5/6	HP-1
Unit Type	In-Line Circulating Pump	In-Line Circulating Pump	Base Mounted Pump
Qty	1	2	2
Location	Boiler Room	Boiler Room	Boiler Room
Area Served	Boiler Circulation Pump	Boiler Circulation Pump	Heat Pump Loop
Manufacturer	-	-	Armstrong Pumps
Model #	SA55JXFSN-3748	5KH39QN9725BT	-
Serial #	-	-	-
Horse Power	1/8	1/4	15
Flow	-	-	390 GPM @ 70Ft Head
Motor Info	Emerson Motor	GE Motor	Marathon Motors
Electrical Power	-	-	-
RPM	1725	1725	1800
Motor Efficiency %	85% (est)	85% (est)	88.5%
Approx Age	21	21	21
ASHRAE Service Life	10	10	20
Remaining Life	(11)	(11)	(1)
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Osage Elementary School

Pumps

Tag	CWP-1		
Unit Type	Base Mounted Pump		
Qty	1		
Location	Boiler Room		
Area Served	Cooling Transfer Pump		
Manufacturer	-		
Model #	-		
Serial #	-		
Horse Power	5		
Flow	390 GPM		
Motor Info	Marathon Motors		
Electrical Power	-		
RPM	1800 (VFD)		
Motor Efficiency %	85.5%		
Approx Age	21		
ASHRAE Service Life	20		
Remaining Life	(1)		
Comments			

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

APPENDIX E

Investment Grade Lighting Audit

CEG Job #: 9C11026
Project: Voorhees Township BOE LGEA — Osage Elementary School
112 Somerdale Road
Voorhees, NJ 08043
Bldg. Sq. Ft. 78,797

KWH COST: $0.134

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
221.11	102	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	101	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	Stock Room	500	2	1	Surface Mnt., 100w A19 Lamp	100	0.20	100.0	$13.40	2	1	(1) 26w CFL Lamp	26	0.05	26	$3.48	$20.00	$40.00	0.15	74	$9.92	4.03
222.21	Boys Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	104	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	103	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	106	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	105	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	Stock Room	500	2	1	Surface Mnt., 100w A19 Lamp	100	0.20	100.0	$13.40	2	1	(1) 26w CFL Lamp	26	0.05	26	$3.48	$20.00	$40.00	0.15	74	$9.92	4.03
221.11	108	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	107	1800	12	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,339.2	$179.45	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Copy Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.22		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.06	104.4	$13.99	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	P-6 Storage	500	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	93.0	$12.46	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	135	1800	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	385.2	$51.62	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Nurse's Room	1800	7	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.43	781.2	$104.68	7	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
612	Nurse's Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1	1	(1) 26w CFL Lamp	26	0.03	46.8	$6.27	$20.00	$20.00	0.07	133.2	$17.85	1.12
221.11	Staff Men's	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	JC	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
221.11	Staff Women's	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
211.37	Boiler Room	800	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	30	0.12	96.0	$12.86	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Principal Conference Room	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Main Office	1800	12	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	1,404.0	$188.14	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Corridor M0 - 102	3600	13	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.12	4,024.8	$539.32	13	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.22		3600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.17	626.4	$83.94	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	169	1800	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.86	1,548.0	$207.43	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	167	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	172	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	170	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	168	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	166	1800	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,238.4	$165.95	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	171	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Corridor 171 - 167	3600	9	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	3,466.8	$464.55	9	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	Building Foreman	2000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	124.0	$16.62	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Reading	1800	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	928.8	$124.46	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
232.22	ESL	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Library	1800	30	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	2.58	4,644.0	$622.30	30	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Library Office	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	128	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22		1800	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.43	774.0	$103.72	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.22		1800	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.17	313.2	$41.97	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Girl's Room	1800	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	385.2	$51.62	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.21		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.21	P-8 JC	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	31.0	$4.15	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Boy's Room	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Music	1800	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	2,476.8	$331.89	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Music Storage	500	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	86.0	$11.52	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
362.34	GYM	1800	17	6	2x4, 4 Lamp, 54w T5HO Fixture	354	6.02	10,832.4	$1,451.54	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Gym Office	1800	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	309.6	$41.49	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	Office Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1	1	(1) 26w CFL Lamp	26	0.03	46.8	$6.27	$20.00	$20.00	0.07	133.2	$17.85	1.12
221.13	Sprinkler Room	500	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.23	116.0	$15.54	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.13	Sprinkler Room Closet	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.06	29.0	$3.89	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		1800	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	234.0	$31.36	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
221.11		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Boy's Room	1800	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	334.8	$44.86	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Art	1800	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	2,476.8	$331.89	16	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Art Storage	500	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.09	43.0	$5.76	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.13	Art Office	1800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.12	208.8	$27.98	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	172	1800	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	334.8	$44.86	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11		1800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	164	1800	23	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.46	4,429.8	$593.59	23	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	164 Server	500	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	107.0	$14.34	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	160	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	161	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Storage	500	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	31.0	$4.15	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	162	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	163	1800	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	1,540.8	$206.47	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	163 Closet	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	163 Toilet	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Corridor 160 - 163	3600	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	2,311.2	$309.70	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Corridor 164 - Library	3600	15	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	3,348.0	$448.63	15	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
227.21	Corridor 104 - Library	3600	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	468.0	$62.71	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Cafeteria	1800	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.57	4,622.4	$619.40	24	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.31	Stage	1800	17	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	107	1.82	3,274.2	$438.74	17	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Women's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Men's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Faculty Room	1800	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,238.4	$165.95	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Kitchen	1800	19	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.63	2,941.2	$394.12	19	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Kitchen Office	1800	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	309.6	$41.49	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Kitchen Toilet	1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Kitchen JC	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Kitchen	500	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	97.5	$13.07	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	Kitchen Electrical Room	500	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	86.0	$11.52	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Boy's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	JC	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Corridor Boys - Café	3600	5	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	1,116.0	$149.54	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Storage Room	500	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	62.0	$8.31	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
222.21	Corridor - Café	3600	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	669.6	$89.73	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Kitchen Corridor	3600	4	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	892.8	$119.64	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
142.21	229	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	1857.6	$248.92	$100.00	$1,200.00	0.84	1512	$202.61	5.92
621	229 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
142.21	228	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	1857.6	$248.92	$100.00	$1,200.00	0.84	1512	$202.61	5.92
621	228 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
142.21	227	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	1857.6	$248.92	$100.00	$1,200.00	0.84	1512	$202.61	5.92
621	227 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
142.21	226	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	1857.6	$248.92	$100.00	$1,200.00	0.84	1512	$202.61	5.92
621	226 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
142.21	225	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	1.03	1857.6	$248.92	$100.00	$1,200.00	0.84	1512	$202.61	5.92
621	225 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
142.21	230	1800	6	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	1,684.8	$225.76	6	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	928.8	$124.46	$100.00	$600.00	0.42	756	$101.30	5.92
132.21	Girl's Room	1800	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	228.6	$30.63	1	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.06	104.4	$13.99	$100.00	$100.00	0.07	124.2	$16.64	6.01
242.22		1800	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	187.2	$25.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
241.11		1800	2	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.21	374.4	$50.17	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
132.21	Boy's Room	1800	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	228.6	$30.63	1	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.06	104.4	$13.99	$100.00	$100.00	0.07	124.2	$16.64	6.01
242.22		1800	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	187.2	$25.08	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
127.21		1800	1	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.07	129.6	$17.37	1	2	2x2, 2 Lamp, 14w T5, Indirect; Fixture	31	0.03	55.8	$7.48	$215.00	$215.00	0.04	73.8	$9.89	21.74

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
132.21	JC	500	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	63.5	$8.51	1	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.06	29	$3.89	$100.00	$100.00	0.07	34.5	$4.62	21.63
132.21	Corridor 229 - 230	3600	6	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.76	2,743.2	$367.59	6	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.35	1252.8	$167.88	$100.00	$600.00	0.41	1490.4	$199.71	3.00
35		3600	2	2	Recessed Down Light, 2 Lamp, 42w	84	0.17	604.8	$81.04	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
132.21	Corridor Entry	3600	10	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	1.27	4,572.0	$612.65	10	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.58	2088	$279.79	$100.00	$1,000.00	0.69	2484	$332.86	3.00
221.31	123	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	124	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	122	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	121	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	119	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	117	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	120	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
621	120 Toilet	1800	1	1	Recessed Light, 100w A Lamp	100	0.10	180.0	$24.12	1	1	(1) 26w CFL Lamp	26	0.03	46.8	$6.27	$20.00	$20.00	0.07	133.2	$17.85	1.12
612	120 Closet	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
221.31	118	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.31	125	1800	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	892.8	$119.64	8	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
222.21	Boy's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	JC	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
222.21	Girl's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
241.11	P-2 Storage	500	1	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.10	52.0	$6.97	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00

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
222.21	Corridor 123 - 125	3600	12	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	2,678.4	$358.91	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		3600	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	234.0	$31.36	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	115	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	116	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	116 Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1	1	(1) 26w CFL Lamp	26	0.03	46.8	$6.27	$20.00	$20.00	0.07	133.2	$17.85	1.12
612	P-3 Storage	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1	1	(1) 26w CFL Lamp	26	0.03	13	$1.74	$20.00	$20.00	0.07	37	$4.96	4.03
221.11	113	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
221.11	114	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612	114 Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1	1	(1) 26w CFL Lamp	26	0.03	46.8	$6.27	$20.00	$20.00	0.07	133.2	$17.85	1.12
221.11	111	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
242.21	Corridor 116 - 110	3600	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	2,311.2	$309.70	6	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21		3600	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	468.0	$62.71	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
227.21	Main Office Corridor	3600	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	234.0	$31.36	1	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		920	353				156,522	$20,974	920	46			7.3	14,254	$1,910		$9,075	7.3	13,794	$1,848	4.91

CEG Job #: 9C11026
Project: Voorhees Township BOE LGEA
Address: 112 Somerdale Road
Voorhees, NJ 08043
Building SF: 78,797

KWH COST: $0.134

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
221.11	102	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
221.11	101	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
612	Stock Room	500	2	1	Surface Mnt., 100w A19 Lamp	100	0.20	100.0	$13.40	2		No Change	100	0.20	0%	100	$13.40		$0.00	0.00	0	$0.00	0.00
222.21	Boys Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		Existing Occupancy Sensor - Remote Mnt.	62	0.10	20%	178.56	$23.93		$0.00	0.02	44.64	$5.98	0.00
221.11	104	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
221.11	103	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
221.11	106	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
221.11	105	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
222.21	Girl's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		Existing Occupancy Sensor - Remote Mnt.	62	0.10	20%	178.56	$23.93		$0.00	0.02	44.64	$5.98	0.00
612	Stock Room	500	2	1	Surface Mnt., 100w A19 Lamp	100	0.20	100.0	$13.40	2		No Change	100	0.20	0%	100	$13.40		$0.00	0.00	0	$0.00	0.00
221.11	108	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14		Existing Occupancy Sensor - Remote Mnt.	62	0.69	20%	1249.92	$167.49		$0.00	0.17	312.48	$41.87	0.00
221.11	107	1800	12	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.74	1,339.2	$179.45	12		Existing Occupancy Sensor - Remote Mnt.	62	0.60	20%	1071.36	$143.56		$0.00	0.15	267.84	$35.89	0.00
222.21	Copy Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		No Change	62	0.12	0%	223.2	$29.91		$0.00	0.00	0	$0.00	0.00
227.22		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.06	104.4	$13.99	1		No Change	58	0.06	0%	104.4	$13.99		$0.00	0.00	0	$0.00	0.00
222.21	P-6 Storage	500	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	93.0	$12.46	3		Existing Occupancy Sensor - Remote Mnt.	62	0.15	20%	74.4	$9.97		$0.00	0.04	18.6	$2.49	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	135	1800	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	385.2	$51.62	2		No Change	107	0.21	0%	385.2	$51.62		$0.00	0.00	0	$0.00	0.00
222.21	Nurse's Room	1800	7	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.43	781.2	$104.68	7		No Change	62	0.43	0%	781.2	$104.68		$0.00	0.00	0	$0.00	0.00
612	Nurse's Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1		No Change	100	0.10	0%	180	$24.12		$0.00	0.00	0	$0.00	0.00
221.11	Staff Men's	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
612	JC	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
221.11	Staff Women's	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
211.37	Boiler Room	800	4	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	30	0.12	96.0	$12.86	4		No Change	30	0.12	0%	96	$12.86		$0.00	0.00	0	$0.00	0.00
232.22	Principal Conference Room	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	86	0.28	20%	495.36	$66.38	$450.00	$450.00	0.07	123.84	$16.59	27.12
227.21	Main Office	1800	12	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	1,404.0	$188.14	12		No Change	65	0.78	0%	1404	$188.14		$0.00	0.00	0	$0.00	0.00
232.22	Corridor M0 - 102	3600	13	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.12	4,024.8	$539.32	13		No Change	86	1.12	0%	4024.8	$539.32		$0.00	0.00	0	$0.00	0.00
227.22		3600	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.17	626.4	$83.94	3		No Change	58	0.17	0%	626.4	$83.94		$0.00	0.00	0	$0.00	0.00
232.21	169	1800	10	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.86	1,548.0	$207.43	10		Existing Occupancy Sensor - Remote Mnt.	86	0.69	20%	1238.4	$165.95		$0.00	0.17	309.6	$41.49	0.00
242.21	167	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4		No Change	107	0.43	0%	770.4	$103.23		$0.00	0.00	0	$0.00	0.00
222.21	172	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		Existing Occupancy Sensor - Remote Mnt.	62	0.10	20%	178.56	$23.93		$0.00	0.02	44.64	$5.98	0.00
232.21	170	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4		Existing Occupancy Sensor - Remote Mnt.	86	0.28	20%	495.36	$66.38		$0.00	0.07	123.84	$16.59	0.00
242.21	168	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4		Existing Occupancy Sensor - Remote Mnt.	107	0.34	20%	616.32	$82.59		$0.00	0.09	154.08	$20.65	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.21	166	1800	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,238.4	$165.95	8		Existing Occupancy Sensor - Remote Mnt.	86	0.55	20%	990.72	$132.76		$0.00	0.14	247.68	$33.19	0.00
232.21	171	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4		Existing Occupancy Sensor - Remote Mnt.	86	0.28	20%	495.36	$66.38		$0.00	0.07	123.84	$16.59	0.00
242.21	Corridor 171 - 167	3600	9	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.96	3,466.8	$464.55	9		No Change	107	0.96	0%	3466.8	$464.55		$0.00	0.00	0	$0.00	0.00
221.11	Building Foreman	2000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	124.0	$16.62	1		No Change	62	0.06	0%	124	$16.62		$0.00	0.00	0	$0.00	0.00
232.22	Reading	1800	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	928.8	$124.46	6		Existing Occupancy Sensor - Remote Mnt.	86	0.41	20%	743.04	$99.57		$0.00	0.10	185.76	$24.89	0.00
232.22	ESL	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4		Existing Occupancy Sensor - Remote Mnt.	86	0.28	20%	495.36	$66.38		$0.00	0.07	123.84	$16.59	0.00
232.22	Library	1800	30	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	2.58	4,644.0	$622.30	30		No Change	86	2.58	0%	4644	$622.30		$0.00	0.00	0	$0.00	0.00
232.22	Library Office	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	619.2	$82.97	4		No Change	86	0.34	0%	619.2	$82.97		$0.00	0.00	0	$0.00	0.00
232.21	128	1800	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.34	619.2	$82.97	4		No Change	86	0.34	0%	619.2	$82.97		$0.00	0.00	0	$0.00	0.00
232.22		1800	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.43	774.0	$103.72	5		No Change	86	0.43	0%	774	$103.72		$0.00	0.00	0	$0.00	0.00
227.22		1800	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.17	313.2	$41.97	3		No Change	58	0.17	0%	313.2	$41.97		$0.00	0.00	0	$0.00	0.00
242.21	Girl's Room	1800	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	385.2	$51.62	2		Existing Occupancy Sensor - Remote Mnt.	107	0.17	20%	308.16	$41.29		$0.00	0.04	77.04	$10.32	0.00
221.21		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
221.21	P-8 JC	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	31.0	$4.15	1		No Change	62	0.06	0%	31	$4.15		$0.00	0.00	0	$0.00	0.00
242.21	Boy's Room	1800	4	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.43	770.4	$103.23	4		Existing Occupancy Sensor - Remote Mnt.	107	0.34	20%	616.32	$82.59		$0.00	0.09	154.08	$20.65	0.00
232.22	Music	1800	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	2,476.8	$331.89	16		Existing Occupancy Sensor - Remote Mnt.	86	1.10	20%	1981.44	$265.51		$0.00	0.28	495.36	$66.38	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.22	Music Storage	500	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	86.0	$11.52	2		Existing Occupancy Sensor - Remote Mnt.	86	0.14	20%	68.8	$9.22		$0.00	0.03	17.2	$2.30	0.00
362.34	GYM	1800	17	6	2x4, 4 Lamp, 54w T5HO Fixture	354	6.02	10,832.4	$1,451.54	17		No Change	354	6.02	0%	10832.4	$1,451.54		$0.00	0.00	0	$0.00	0.00
232.22	Gym Office	1800	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	309.6	$41.49	2		No Change	86	0.17	0%	309.6	$41.49		$0.00	0.00	0	$0.00	0.00
612	Office Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1		No Change	100	0.10	0%	180	$24.12		$0.00	0.00	0	$0.00	0.00
221.13	Sprinkler Room	500	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.23	116.0	$15.54	4		No Change	58	0.23	0%	116	$15.54		$0.00	0.00	0	$0.00	0.00
221.13	Sprinkler Room Closet	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.06	29.0	$3.89	1		No Change	58	0.06	0%	29	$3.89		$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		Existing Occupancy Sensor - Remote Mnt.	62	0.05	20%	89.28	$11.96		$0.00	0.01	22.32	$2.99	0.00
227.21		1800	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	234.0	$31.36	2		No Change	65	0.13	0%	234	$31.36		$0.00	0.00	0	$0.00	0.00
221.11		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
222.21	Boy's Room	1800	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	334.8	$44.86	3		Existing Occupancy Sensor - Remote Mnt.	62	0.15	20%	267.84	$35.89		$0.00	0.04	66.96	$8.97	0.00
221.11		1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
232.22	Art	1800	16	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.38	2,476.8	$331.89	16	1	Existing Occupancy Sensor - Remote Mnt.	86	1.10	20%	1981.44	$265.51		$0.00	0.28	495.36	$66.38	0.00
232.22	Art Storage	500	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.09	43.0	$5.76	1		No Change	86	0.09	0%	43	$5.76		$0.00	0.00	0	$0.00	0.00
221.13	Art Office	1800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	58	0.12	208.8	$27.98	2		No Change	58	0.12	0%	208.8	$27.98		$0.00	0.00	0	$0.00	0.00
222.21	172	1800	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	334.8	$44.86	3		No Change	62	0.19	0%	334.8	$44.86		$0.00	0.00	0	$0.00	0.00
221.11		1800	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		No Change	62	0.12	0%	223.2	$29.91		$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
242.21	164	1800	23	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.46	4,429.8	$593.59	23		No Change	107	2.46	0%	4429.8	$593.59		$0.00	0.00	0	$0.00	0.00
242.21	164 Server	500	2	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	107.0	$14.34	2		No Change	107	0.21	0%	107	$14.34		$0.00	0.00	0	$0.00	0.00
242.21	160	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12		Existing Occupancy Sensor - Remote Mnt.	107	1.03	20%	1848.96	$247.76		$0.00	0.26	462.24	$61.94	0.00
242.21	161	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12		Existing Occupancy Sensor - Remote Mnt.	107	1.03	20%	1848.96	$247.76		$0.00	0.26	462.24	$61.94	0.00
222.21	Storage	500	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	31.0	$4.15	1		No Change	62	0.06	0%	31	$4.15		$0.00	0.00	0	$0.00	0.00
242.21	162	1800	12	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.28	2,311.2	$309.70	12		Existing Occupancy Sensor - Remote Mnt.	107	1.03	20%	1848.96	$247.76		$0.00	0.26	462.24	$61.94	0.00
242.21	163	1800	8	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.86	1,540.8	$206.47	8		Existing Occupancy Sensor - Remote Mnt.	107	0.68	20%	1232.64	$165.17		$0.00	0.17	308.16	$41.29	0.00
227.21	163 Closet	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1		No Change	65	0.07	0%	32.5	$4.36		$0.00	0.00	0	$0.00	0.00
221.11	163 Toilet	1800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		No Change	62	0.06	0%	111.6	$14.95		$0.00	0.00	0	$0.00	0.00
242.21	Corridor 160 - 163	3600	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	2,311.2	$309.70	6		No Change	107	0.64	0%	2311.2	$309.70		$0.00	0.00	0	$0.00	0.00
222.21	Corridor 164 - Library	3600	15	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	3,348.0	$448.63	15		No Change	62	0.93	0%	3348	$448.63		$0.00	0.00	0	$0.00	0.00
227.21		3600	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	468.0	$62.71	2		No Change	65	0.13	0%	468	$62.71		$0.00	0.00	0	$0.00	0.00
242.21	Cafeteria	1800	24	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.57	4,622.4	$619.40	24		No Change	107	2.57	0%	4622.4	$619.40		$0.00	0.00	0	$0.00	0.00
242.31	Stage	1800	17	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic	107	1.82	3,274.2	$438.74	17		No Change	107	1.82	0%	3274.2	$438.74		$0.00	0.00	0	$0.00	0.00
222.21	Women's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	62	0.05	20%	89.28	$11.96	$450.00	$450.00	0.01	22.32	$2.99	150.46
222.21	Men's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	62	0.05	20%	89.28	$11.96	$450.00	$450.00	0.01	22.32	$2.99	150.46

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
232.21	Faculty Room	1800	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,238.4	$165.95	8	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	86	0.55	20%	990.72	$132.76	$450.00	$450.00	0.14	247.68	$33.19	13.56
232.21	Kitchen	1800	19	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	1.63	2,941.2	$394.12	19		No Change	86	1.63	0%	2941.2	$394.12		$0.00	0.00	0	$0.00	0.00
232.21	Kitchen Office	1800	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	309.6	$41.49	2		No Change	86	0.17	0%	309.6	$41.49		$0.00	0.00	0	$0.00	0.00
227.21	Kitchen Toilet	1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1		No Change	65	0.07	0%	117	$15.68		$0.00	0.00	0	$0.00	0.00
227.21	Kitchen JC	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1		No Change	65	0.07	0%	32.5	$4.36		$0.00	0.00	0	$0.00	0.00
227.21	Kitchen	500	3	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	97.5	$13.07	3		No Change	65	0.20	0%	97.5	$13.07		$0.00	0.00	0	$0.00	0.00
232.21	Kitchen Electrical Room	500	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	86.0	$11.52	2		No Change	86	0.17	0%	86	$11.52		$0.00	0.00	0	$0.00	0.00
222.21	Boy's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	62	0.10	20%	178.56	$23.93	$450.00	$450.00	0.02	44.64	$5.98	75.23
227.21		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1		No Change	65	0.07	0%	117	$15.68		$0.00	0.00	0	$0.00	0.00
227.21	JC	500	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	32.5	$4.36	1		No Change	65	0.07	0%	32.5	$4.36		$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	62	0.10	20%	178.56	$23.93	$450.00	$450.00	0.02	44.64	$5.98	75.23
227.21		1800	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	117.0	$15.68	1		No Change	65	0.07	0%	117	$15.68		$0.00	0.00	0	$0.00	0.00
222.21	Corridor Boys - Café	3600	5	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	1,116.0	$149.54	5		No Change	62	0.31	0%	1116	$149.54		$0.00	0.00	0	$0.00	0.00
222.21	Storage Room	500	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	62.0	$8.31	2		No Change	62	0.12	0%	62	$8.31		$0.00	0.00	0	$0.00	0.00
222.21	Corridor - Café	3600	3	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	669.6	$89.73	3		No Change	62	0.19	0%	669.6	$89.73		$0.00	0.00	0	$0.00	0.00
222.21	Kitchen Corridor	3600	4	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	892.8	$119.64	4		No Change	62	0.25	0%	892.8	$119.64		$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
142.21	229	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	156	1.50	20%	2695.68	$361.22	$600.00	$600.00	0.37	673.92	$90.31	6.64
621	229 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
142.21	228	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	156	1.50	20%	2695.68	$361.22	$600.00	$600.00	0.37	673.92	$90.31	6.64
621	228 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
142.21	227	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	156	1.50	20%	2695.68	$361.22	$600.00	$600.00	0.37	673.92	$90.31	6.64
621	227 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
142.21	226	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	156	1.50	20%	2695.68	$361.22	$600.00	$600.00	0.37	673.92	$90.31	6.64
621	226 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
142.21	225	1800	12	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	1.87	3,369.6	$451.53	12	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole & (1) 1 Pole Powerpacks - Remote Mnt.	156	1.50	20%	2695.68	$361.22	$600.00	$600.00	0.37	673.92	$90.31	6.64
621	225 Closet	500	1	1	Recessed Light, 100w A Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
142.21	230	1800	6	4	2x4, 4 Lamp, 34w T8, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	1,684.8	$225.76	6	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	156	0.75	20%	1347.84	$180.61	$450.00	$450.00	0.19	336.96	$45.15	9.97
132.21		1800	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	228.6	$30.63	1		Existing Occupancy Sensor - Remote Mnt.	127	0.10	20%	182.88	$24.51		$0.00	0.03	45.72	$6.13	0.00
242.22	Girl's Room	1800	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	187.2	$25.08	1		No Change	104	0.10	0%	187.2	$25.08		$0.00	0.00	0	$0.00	0.00
241.11		1800	2	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.21	374.4	$50.17	2		No Change	104	0.21	0%	374.4	$50.17		$0.00	0.00	0	$0.00	0.00
132.21		1800	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	228.6	$30.63	1		Existing Occupancy Sensor - Remote Mnt.	127	0.10	20%	182.88	$24.51		$0.00	0.03	45.72	$6.13	0.00
242.22	Boy's Room	1800	1	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	104	0.10	187.2	$25.08	1		No Change	104	0.10	0%	187.2	$25.08		$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
127.21		1800	1	2	2x2, 2 Lamp, 34w T12 U-Tube, Mag. Ballast, Recessed Mnt., Prismatic Lens	72	0.07	129.6	$17.37	1		No Change	72	0.07	0%	129.6	$17.37		$0.00	0.00	0	$0.00	0.00
132.21	JC	500	1	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.13	63.5	$8.51	1		No Change	127	0.13	0%	63.5	$8.51		$0.00	0.00	0	$0.00	0.00
132.21	Corridor 229 - 230	3600	6	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.76	2,743.2	$367.59	6		No Change	127	0.76	0%	2743.2	$367.59		$0.00	0.00	0	$0.00	0.00
35		3600	2	2	Recessed Down Light, 2 Lamp, 42w	84	0.17	604.8	$81.04	2		No Change	84	0.17	0%	604.8	$81.04		$0.00	0.00	0	$0.00	0.00
132.21	Corridor Entry	3600	10	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	1.27	4,572.0	$612.65	10		No Change	127	1.27	0%	4572	$612.65		$0.00	0.00	0	$0.00	0.00
221.31	123	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	124	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	122	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	121	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	119	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	117	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	120	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
621	120 Toilet	1800	1	1	Recessed Light, 100w A Lamp	100	0.10	180.0	$24.12	1	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	100	0.08	20%	144	$19.30	$450.00	$450.00	0.02	36	$4.82	93.28
612	120 Closet	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
221.31	118	1800	20	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	1.24	2,232.0	$299.09	20	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.99	20%	1785.6	$239.27	$450.00	$450.00	0.25	446.4	$59.82	7.52
221.31	125	1800	8	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	62	0.50	892.8	$119.64	8	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.40	20%	714.24	$95.71	$450.00	$450.00	0.10	178.56	$23.93	18.81

ECM #2: Lighting Controls

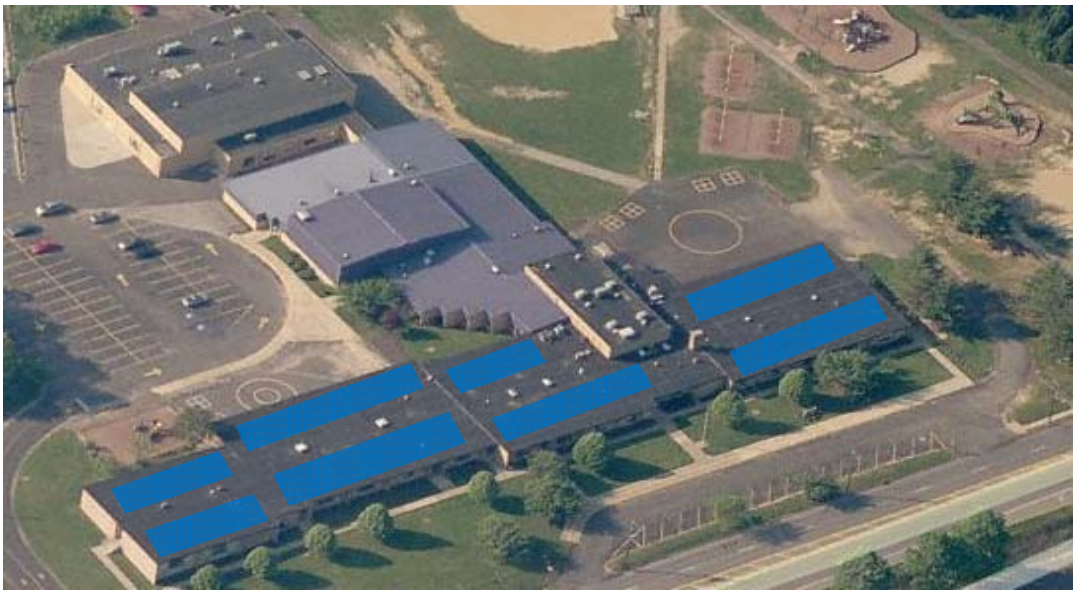
EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
222.21	Boy's Room	1800	2	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	223.2	$29.91	2		Existing Occupancy Sensor - Remote Mnt.	62	0.10	20%	178.56	$23.93		$0.00	0.02	44.64	$5.98	0.00
612	JC	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
222.21	Girl's Room	1800	1	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	111.6	$14.95	1		Existing Occupancy Sensor - Remote Mnt.	62	0.05	20%	89.28	$11.96		$0.00	0.01	22.32	$2.99	0.00
241.11	P-2 Storage	500	1	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.10	52.0	$6.97	1		No Change	104	0.10	0%	52	$6.97		$0.00	0.00	0	$0.00	0.00
222.21	Corridor 123 - 125	3600	12	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	2,678.4	$358.91	12		No Change	62	0.74	0%	2678.4	$358.91		$0.00	0.00	0	$0.00	0.00
227.21		3600	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	234.0	$31.36	1		No Change	65	0.07	0%	234	$31.36		$0.00	0.00	0	$0.00	0.00
221.11	115	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.69	20%	1249.92	$167.49	$450.00	$450.00	0.17	312.48	$41.87	10.75
221.11	116	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.69	20%	1249.92	$167.49	$450.00	$450.00	0.17	312.48	$41.87	10.75
612	116 Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1		No Change	100	0.10	0%	180	$24.12		$0.00	0.00	0	$0.00	0.00
612	P-3 Storage	500	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	50.0	$6.70	1		No Change	100	0.10	0%	50	$6.70		$0.00	0.00	0	$0.00	0.00
221.11	113	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.69	20%	1249.92	$167.49	$450.00	$450.00	0.17	312.48	$41.87	10.75
221.11	114	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.69	20%	1249.92	$167.49	$450.00	$450.00	0.17	312.48	$41.87	10.75
612	114 Toilet	1800	1	1	Surface Mnt., 100w A19 Lamp	100	0.10	180.0	$24.12	1		No Change	100	0.10	0%	180	$24.12		$0.00	0.00	0	$0.00	0.00
221.11	111	1800	14	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.87	1,562.4	$209.36	14	1	Dual Tech. Occupancy Sensor w/ (1) 2 Pole Powerpack - Remote Mnt.	62	0.69	20%	1249.92	$167.49	$450.00	$450.00	0.17	312.48	$41.87	10.75
242.21	Corridor 116 - 110	3600	6	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.64	2,311.2	$309.70	6		No Change	107	0.64	0%	2311.2	$309.70		$0.00	0.00	0	$0.00	0.00
227.21		3600	2	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	468.0	$62.71	2		No Change	65	0.13	0%	468	$62.71		$0.00	0.00	0	$0.00	0.00

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
227.21	Main Office Corridor	3600	1	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	234.0	$31.36	1		No Change	65	0.07	0%	234	$31.36		$0.00	0.00	0	$0.00	0.00
0	Totals		920	353			80.8	156,522.3	$20,974	920	28			71.6		139,904.2	$18,747.16		$12,900	9.28	16,618	$2,227	5.79

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
Osage Elementary School	14985	SHARP NU-U235F2	612	17.5	10,735	143.82	175,699	116.5	25,643	13.40



.= Proposed 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:	143.8 kW
DC to AC Derate Factor:	0.810
AC Rating:	116.5 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.7 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.58	9342	1373.27
2	3.33	11032	1621.70
3	4.31	15407	2264.83
4	5.20	17549	2579.70
5	5.85	20043	2946.32
6	6.14	19509	2867.82
7	6.06	19708	2897.08
8	5.54	18111	2662.32
9	4.85	15572	2289.08
10	3.76	12716	1869.25
11	2.65	8909	1309.62
12	2.23	7802	1146.89
Year	4.38	175699	25827.75

Project Name: **Osage Elementary School**
Location: **Voorhees, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$871,819
Annual kWh Production	175,699
Annual Energy Cost Reduction	$23,192
Average Annual SREC Revenue	$67,750

Simple Payback: **9.59** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.132**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	175,699	$23,192	$0	$96,634	$51,303	$36,980	$31,544	$31,544
2	$0	174,821	$23,888	$0	$96,151	$49,022	$39,261	$31,756	$63,300
3	$0	173,946	$24,605	$0	$86,973	$46,601	$41,682	$23,295	$86,595
4	$0	173,077	$25,343	$0	$77,885	$44,030	$44,253	$14,944	$101,540
5	$0	172,211	$26,103	$1,774	$77,495	$41,301	$46,982	$13,542	$115,081
6	$0	171,350	$26,886	$1,765	$77,108	$38,403	$49,880	$13,946	$129,027
7	$0	170,493	$27,693	$1,756	$68,197	$35,326	$52,957	$5,851	$134,878
8	$0	169,641	$28,524	$1,747	$67,856	$32,060	$56,223	$6,350	$141,228
9	$0	168,793	$29,379	$1,739	$59,077	$28,592	$59,690	($1,565)	$139,664
10	$0	167,949	$30,261	$1,730	$58,782	$24,911	$63,372	($970)	$138,694
11	$0	167,109	$31,168	$1,721	$50,133	$21,002	$67,281	($8,703)	$129,991
12	$0	166,274	$32,104	$1,713	$49,882	$16,852	$71,430	($8,010)	$121,981
13	$0	165,442	$33,067	$1,704	$41,361	$12,447	$75,836	($15,560)	$106,421
14	$0	164,615	$34,059	$1,696	$41,154	$7,769	$80,514	($14,766)	$91,655
15	$0	163,792	$35,080	$1,687	$32,758	$2,803	$85,479	($22,131)	$69,524
	Totals:	2,545,212	$431,351	$19,031	$981,447	$452,424	$871,819	$69,524	$1,601,122

Net Present Value (NPV) **$75,325**

APPENDIX G

MONTHLY ENERGY CONSUMPTION

By CONCORD ENGINEERING GROUP

------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1	**Osage ES**												
Electric													
On-Pk Cons. (kWh)	114,024	119,299	113,391	70,691	71,932	57,624	86,990	99,887	77,508	76,231	88,363	110,967	1,086,908
On-Pk Demand (kW)	491	480	598	536	489	726	916	921	702	545	576	507	921
Gas													
On-Pk Cons. (therms)	3,729	6,399	3,382	822	328	11	10	11	45	757	2,128	3,602	21,223
On-Pk Demand (therms/hr)	62	69	55	15	13	0	0	0	1	14	50	59	69
Water													
Cons. (1000gal)	0	0	0	1	8	21	51	61	18	0	0	0	160

Energy Consumption

Building	73,732	Btu/(ft2-year)
Source	168,959	Btu/(ft2-year)
Floor Area	79,096	ft2

Environmental Impact Analysis

CO2	1,217,983 lbm/year
SO2	3,310 gm/year
NOX	1,707 gm/year

MONTHLY ENERGY CONSUMPTION

By CONCORD ENGINEERING GROUP

------- Monthly Energy Consumption -------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 2	**Osage ES**												
Electric													
On-Pk Cons. (kWh)	78,095	81,780	73,506	38,157	40,530	30,477	38,218	42,210	39,924	42,425	59,985	74,695	640,002
On-Pk Demand (kW)	436	436	439	436	446	384	409	416	382	436	436	436	446
Gas													
On-Pk Cons. (therms)	777	1,005	292	51	31	11	10	11	28	33	155	573	2,976
On-Pk Demand (therms/hr)	12	12	11	5	0	0	0	0	0	1	11	12	12

Energy Consumption

Building	31,379	Btu/(ft2-year)
Source	86,817	Btu/(ft2-year)
Floor Area	79,096	ft2

Environmental Impact Analysis

CO2	518,346 lbm/year
SO2	1,409 gm/year
NOX	726 gm/year