WOODBURY CITY PUBLIC SCHOOLS

WEST END MEMORIAL ELEMENTARY

215 QUEEN STREET
WOODBURY, NJ 08096

FACILITY ENERGY REPORT

TABLE OF CONTENTS

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:	Public Service Electric & Gas
Electric Utility Rate Structure:	Large Power & Lighting Service (LPLS)
Third Party Supplier:	South Jersey Energy

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

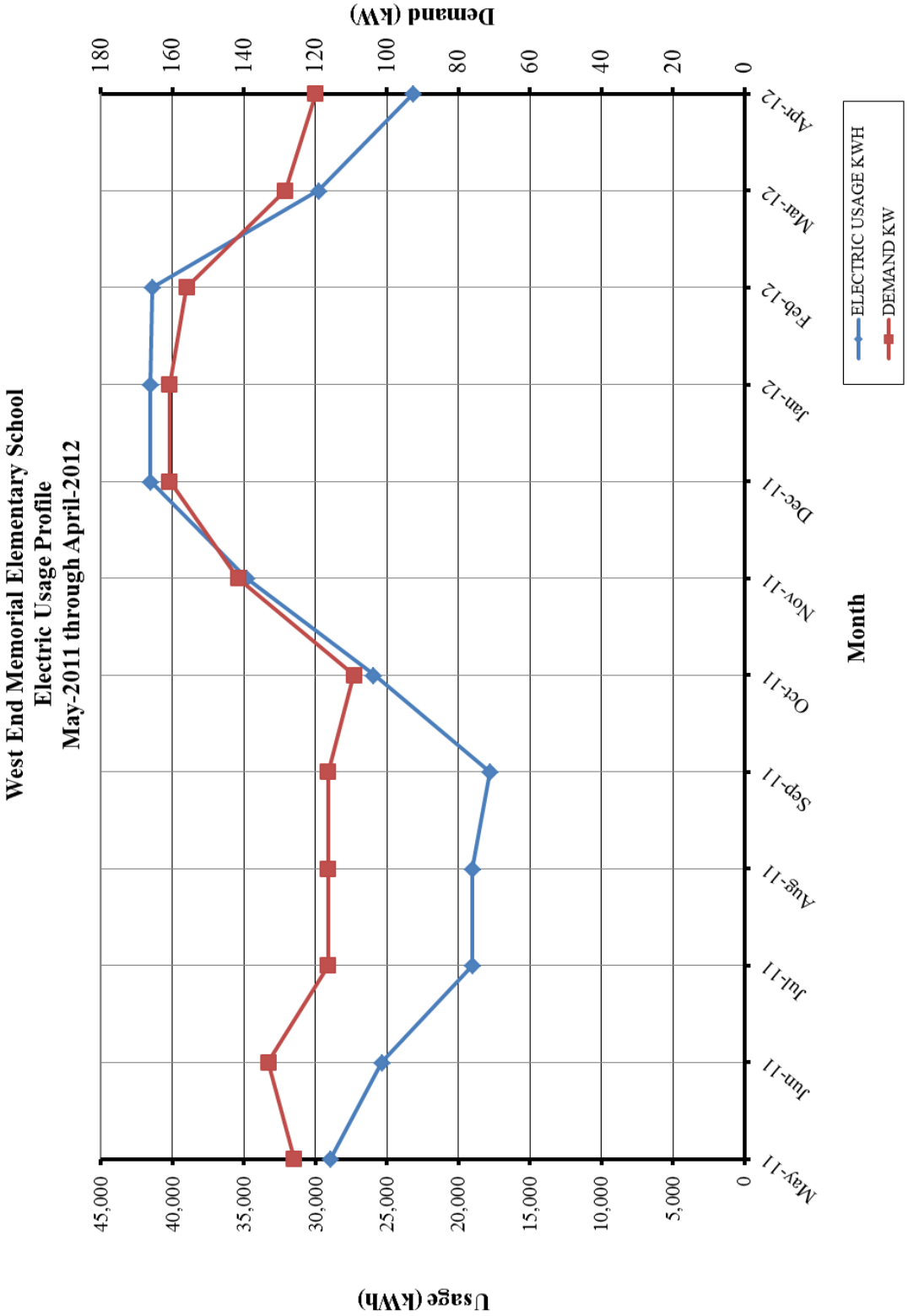
ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G
Rate: LPLS
Meter No: 778016913
Account # 42 000 489 06
Third Party Utility Provider: South Jersey Energy
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
May-11	28,920	126	$4,289
Jun-11	25,320	133	$4,966
Jul-11	19,009	116	$4,077
Aug-11	19,009	116	$4,077
Sep-11	17,782	116	$3,814
Oct-11	25,920	109	$3,889
Nov-11	34,800	142	$5,089
Dec-11	41,520	161	$5,983
Jan-12	41,520	161	$5,983
Feb-12	41,400	156	$6,085
Mar-12	29,760	128	$4,539
Apr-12	23,160	120	$3,687
Totals	**348,120**	**161 Max**	**$56,476**

AVERAGE DEMAND **132.1 KW average**
AVERAGE RATE **$0.162** **$/kWh**

Figure 1
Electricity Usage Profile



II. FACILITY DESCRIPTION

The West End Memorial Elementary School is located at 215 Queen Street in Woodbury, New Jersey. The 48,431SF facility was built in 1949 with renovations/additions in 1955, 1967 and 1999. In 2007, a large HVAC upgrade project was completed that converted the elementary school to geothermal heat pump technology. The building is a single-story structure that includes administration offices, classrooms, multi-purpose room, stage, library, computer lab, nurse's suite, mechanical/electrical rooms, rest rooms, etc.

Occupancy Profile

The typical hours of operation for this facility are Monday through Friday between 7:00 AM and 4:30 PM. There are sports and other activities in the evenings. The school employs 65 people.

Building Envelope

Exterior walls for the building are brick faced with a concrete block construction. The amount of insulation within the walls is approximately ¾" foam insulation. The windows throughout the facility are in good condition and appear to be maintained. Typical windows throughout the school are double pane, operable, ¼" clear glass with aluminum frames. The roof is a flat, built up rubber roof where the HVAC equipment resides. The amount of insulation below the roofing ranges from 2" to 5" depending on the location and slope of the roof.

HVAC Systems

The school is served by a geothermal heat pump loop system. The geothermal system provides both heating and cooling to the entire facility. There are three loop pumps located in the basement MER that circulate loop water throughout the building. These pumps are rated at 200 GPM each with 15 horsepower motors fitted with variable speed drives. The loop requires two of the three pumps to operate in order to supply sufficient flow to the system.

The All Purpose Room is heated & cooled by a Mammoth Model DGY240K23A packaged water source heat pump rooftop unit that is rated at 8,000 CFM, 170 MBH heating and a nominal 19 tons of cooling. The unit has an EER of 14.5 in the cooling mode and a heating efficiency of 3.5 COP which is efficient for a 2006 vintage unit.

The Library is heated & cooled by a Trane Model TCD180B3 commercial packaged electric/DX cooling rooftop unit that is rated at 6,000 CFM, 92.1 MBH heating and a nominal 15 tons of cooling. The unit includes an economizer for free cooling during the shoulder months, a power exhaust, and 27 kW of electric heat.

The entrances, administration offices, nurse's suite, faculty room, and SG rooms are heated and cooled by Waterfurnace Model CW15R22CNNB console geothermal heat pumps. The units are rated at 1.25 ton cooling and 11.46 MBH heating with an EER=15.4 and a COP=3.5.

The classrooms are heated and cooled by vertical heat pumps which are installed in the exterior walls of the classrooms. These Airedale Model SMG3 and SMG4 consist of water source heat pumps, desiccant heat recovery wheels, and 7.5 kW of auxiliary electric heat.

The restroom perimeter walls, pantry, and basement mechanical room are heated by Qmark electric unit heaters ranging in size from 2 kW to 7.5 kW. The rated output capacity of these heating units ranges from 7,500 BTU/Hour to 25,600 BTU/Hour.

The corridors and computer lab are heated and cooled by Mammoth horizontal water source heat pumps located in the space above the ceilings. These units are rated from 5 tons to 2 tons in the cooling mode and from 47.5 MBH to 15.2 MBH in the heating mode.

HVAC System Controls

Most of the upgraded HVAC units are connected and controlled by the building's DDC System. The balance of the units such as the unit heaters are controlled by local wall sensors.

Domestic Hot Water

Domestic hot water for the facility is provided by two (2) 50-gallon GE Model SE50M12 electric hot water heaters with capacity of 4,130 Watts (2 levels) and a 19-gallon Bradford White Model MI20U6SS electric hot water heater with a capacity of 1,500 Watts (2 levels) for the nurse's suite.

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	Lighting Upgrade (CFL's)	$2,568	$1,091	2.4	537.3%
ECM #2	Lighting Upgrade (MH to T5HO)	$5,850	$394	14.8	1.0%
ECM #3	Exterior Lighting Upgrades	$9,100	$1,246	7.3	105.4%
ECM #4	Lighting Controls Upgrade	$10,944	$2,400	4.6	228.9%
ECM #5	Energy Star Refrigerators	$2,080	$152	13.7	9.6%
ECM #6	Rooftop Conversion to Geothermal	$131,313	$5,951	22.1	-32.0%
ECM #7	Vending Miser Controls	$600	$253	2.4	533.6%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	129.02 KW PV System	$828,489	$55,230	15.0	0.0%
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	Lighting Upgrade (CFL's)	4.00	6,737	0
ECM #2	Lighting Upgrade (MH to T5HO)	0.89	2,434	0
ECM #3	Exterior Lighting Upgrades	2.62	7,692	0
ECM #4	Lighting Controls Upgrade	0.00	14,813	0
ECM #5	Energy Star Refrigerators	0.00	938	0
ECM #6	Rooftop Conversion to Geothermal	0.00	36,732	0
ECM #7	Vending Miser Controls	0.00	1,564	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	129.02 KW PV System	129.0	156,421	0

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 Upgrade (CFL's)	$1,091	$2,618	$50	$2,568	2.4
Lighting Upgrade (MH to T5HO)	$394	$6,600	$750	$5,850	14.8
Exterior Lighting Upgrades	$1,246	$11,100	$2,000	$9,100	7.3
Lighting Controls Upgrade	$2,400	$11,924	$980	$10,944	4.6
Energy Star Refrigerators	$152	$2,080	$0	$2,080	13.7
Rooftop Conversion to Geothermal	$5,951	$131,313	$0	$131,313	22.1
Vending Miser Controls	$253	$600	$0	$600	2.4
Design / Construction Extras (15%)	*$0*	*$24,935*	*$0*	*$24,935*	
Total Project	**$11,487**	**$191,170**	**$3,780**	**$187,390**	**16.3**

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 – General

Description:

The majority of the interior lighting throughout West End Memorial Elementary School is provided with fluorescent fixtures with older generation, 32W T8 lamps and electronic ballasts. Although these T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. Concord Engineering recommends that these fixtures remain unmodified due to the extensive costs which will be incurred if these fixtures are to be re-lamped and re-ballasted, which results in a long payback period.

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.

Additionally, there is an area which contains older CFL exit lamps which can be replaced with new LED exit lamp technology.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,618
NJ Smart Start Equipment Incentive ($):	$50
Net Installation Cost ($):	$2,568
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,091
Total Yearly Savings ($/Yr):	$1,091
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.4
Simple Lifetime ROI	537.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$16,365
Internal Rate of Return (IRR)	42%
Net Present Value (NPV)	$10,456.29

ECM #2: Lighting Upgrade – All Purpose Room and Main Vestibule

Description:

The All Purpose room and main vestibule at West End Memorial Elementary School are currently lit via 250 watt Metal Halide HID fixtures. The space would be better served with a more efficient, fluorescent lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient T5 high output system that includes new four lamp, 54 watt high output fixtures.

This measure replaces all the HID, 250 watt HID MH fixtures with a well-designed T5 high output (HO) system. T5 High output fixtures with reflectors and wire guards will be required in order to meet the mandated 50 foot-candle average within the spaces.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,600
NJ Smart Start Equipment Incentive ($):	$750
Net Installation Cost ($):	$5,850
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$394
Total Yearly Savings ($/Yr):	$394
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.8
Simple Lifetime ROI	1.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$5,910
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($1,146.45)

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at West End Memorial Elementary School is currently lit via 175 watt metal halide wall packs and 100 watt incandescent fixtures. The exterior would be better served by LED lamps and fixture as well as CFL replacements for existing metal halide and incandescent fixtures.

This measure replaces watt metal halide and incandescent fixtures with new LED and CFL technology .

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,100
NJ Smart Start Equipment Incentive ($):	$2,000
Net Installation Cost ($):	$9,100
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,246
Total Yearly Savings ($/Yr):	$1,246
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.3
Simple Lifetime ROI	105.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$18,690
Internal Rate of Return (IRR)	11%
Net Present Value (NPV)	$5,774.67

ECM #4: Lighting Controls Upgrade – Occupancy Sensors

Description:

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

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

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

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

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

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

Energy Savings Calculations:

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

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

Rebates and Incentives:

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

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,924
NJ Smart Start Equipment Incentive ($):	$980
Net Installation Cost ($):	$10,944
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,400
Total Yearly Savings ($/Yr):	$2,400
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.6
Simple Lifetime ROI	228.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$36,000
Internal Rate of Return (IRR)	21%
Net Present Value (NPV)	$17,707.04

ECM #5: Energy Star Refrigerators

Description:

Refrigerators manufactured before 2003 should be replaced with Energy Star® Qualified Refrigerators that can save up to $100 per year in electric costs. There are two (2) units in this facility that are good candidates for replacement. These are both Frigidaire Model FRT21LRGW with an energy rating of 849 kWh per year.

Energy Savings Calculations:

Using an Energy Star energy savings calculator, the total annual savings for replacing both these units is estimated at 872 kWh for a cumulative energy cost savings of $141. The basis used for cost estimation was the GE Model GTH21KBXBB refrigerator listed at $790.

ENERGY STAR REFRIGERATOR CALCULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Quantity of Units	2	2	
Manufacturer	Frigidare	GE	
Type	Top/Bottom	Top/Bottom	
Model	FRT21LRG		
Size (Cu-Ft)	20.8	21.0	
Per Unit Electric Usage (kWh)	883	414	
Electric Rate ($/kWh)	$0.162	$0.162	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	1,766	828	938
Energy Cost ($)	$286	$134	$152
COMMENTS:	Calculations based Energy Star Website http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator		

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,080
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$2,080
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$152
Total Yearly Savings ($/Yr):	$152
Estimated ECM Lifetime (Yr):	15
Simple Payback	13.7
Simple Lifetime ROI	9.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,280
Internal Rate of Return (IRR)	1%
Net Present Value (NPV)	($265.43)

ECM #6: High-Efficiency Geothermal Rooftop Unit Replacement

Description:

Older direct expansion (DX) cooling rooftop units with electric heating are excellent candidates for replacement with high-efficiency, geothermal, heating/cooling units. There is a Trane Model TCD180B packaged DX cooling/electric heating rooftop unit that serves the Library. Due to escalating owning and maintenance costs, along with energy inefficiencies, this unit should be replaced.

This energy conservation measure would replace this packaged rooftop DX cooling/electric heating unit with an energy-efficient, commercial, geothermal rooftop unit.

Energy Savings Calculations:

According to the New Jersey Clean Energy Program, Protocols to Measure Resource Savings, dated August 2012, the heat pump algorithms are as follows:

Cooling Energy Savings:

$$\text{Energy Savings, kWh} = \text{Cooling Capacity,} \frac{\text{BTUHc}}{1{,}000} \times \left(\frac{1}{\text{EER}_{\text{Old}}} - \frac{1}{\text{EER}_{\text{New}}}\right) \times \text{Equivalent Full Load Hrs}$$

$$\text{Demand Savings, kW} = \frac{\text{BTUHc}}{1{,}000} \times \left(\frac{1}{\text{EER}_{\text{Old}}} - \frac{1}{\text{EER}_{\text{New}}}\right) \times \textit{Coincidence Factor } (CF)$$

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

Heating Energy Savings

$$\text{Energy Savings} = \text{Heating Capacity,} \frac{\text{BTUHh}}{1{,}000} \times \frac{\left(\left(\frac{1}{\text{COP}_{\text{Old}}} - \frac{1}{\text{COP}_{\text{New}}}\right) 3.412\right)}{\text{Equivalent Full Load Hrs}}$$

$$\text{Heating Cost Savings} = \text{Energy Savings, therms} \times \text{Cost of Natural Gas} \left(\frac{\$}{\text{Therm}}\right)$$

The following table represents the energy saving for the rooftop conversion to geothermal:

CONVERT ELECTRIC HEAT / COOLING TO GEO HEATPUMP			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Quantity of Units	1	1	
Unit Cooling Capacity (Btu/h)	180,000	180,000	
Unit Electric Heating Capacity (kW)	27.0	0.0	
HEATING SAVINGS CALCULATION			
Unit Capacity (Btu/h)	92,124	92,124	
Coefficient of Performance (COP)	-	3.20	
Heating Degree Days (65 F)	3,701	3,701	
Heating Stage 1 [Heat Pump] (kBtu)	N/A	11,756	
Electric Usage (kWh)	37,620	11,756	25,863
COOLING SAVINGS CALCULATION			
Cooling Efficiency (EER)	8.6	15.9	
Cooling Equivalent Full Load Hours	1,131	1,131	
Electric Usage (kWh)	23,672	12,804	10,868
Electric Cost ($/kWh)	$0.1620	$0.1620	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Usage (kWh)	61,292	24,560	36,732
Energy Cost ($)	$9,929	$3,979	$5,951
COMMENTS:			

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$131,313
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$131,313
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$5,951
Total Yearly Savings ($/Yr):	$5,951
Estimated ECM Lifetime (Yr):	15
Simple Payback	22.1
Simple Lifetime ROI	-32.0%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$89,258
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	($60,275.24)

ECM #7: Vending Miser Controls

Description:

The facility currently utilizes a cold beverage and a snack vending machine. Vending machines can be in use for a limited time during the day. The installation of the Vending Miser system will help reduce the operating hours of vending machines.

Cold beverage machines regularly operate inefficiently trying to maintain a constant cool temperature within the machine and snack machines with no cooling usually have lights that operate 24/7. The VendingMiser® system incorporates innovative energy-saving technology into a small plug-and-play device that in conjunction with a passive infrared sensor regulate the operation of the cold beverage and snack machines based on occupancy and room temperature.

This ECM approximates the installation of two (2) of these control systems, one (1) for the snack machine and one (1) for the cold beverage machine.

Energy Savings Calculations:

See **Vending Miser Appendix** for calculation methods and analysis.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$253
Total Yearly Savings ($/Yr):	$253
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.4
Simple Lifetime ROI	533.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,802
Internal Rate of Return (IRR)	42%
Net Present Value (NPV)	$2,425.55

REM #1: 129.02 kW Solar System

Description:

The West End Memorial Elementary School has available roof and parking lot space that could accommodate a significant amount of solar generation. Based on the available areas a 129.02 kilowatt solar array could be installed, assuming the existing roof structure is capable of supporting an array. The array will produce approximately 156,421 kilowatt-hours annually that will reduce the overall electric usage of the facility by 63.4%.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas. Financial results in table below are based on 100% financing of the system over a fifteen year period.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	129.02
Electric Generation (KWH/Yr):	156,421
Installation Cost ($):	$828,489
SREC Revenue ($/Yr):	$29,890
Energy Savings ($/Yr):	$25,340
Total Yearly Savings ($/Yr):	$55,230
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	15.0
Analysis Period Electric Savings ($):	$471,300
Analysis Period SREC Revenue ($):	$432,987
Net Present Value (NPV)	($271,671.02)

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.

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

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Woodbury City Public School District – West End Memorial Elementary School

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^{n_i}}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^{n_i}}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade (CFL's)	$683	$1,935	$50	$2,568	$1,091	$0	$1,091	15	$16,365	$0	537.3%	2.4	42.27%	$10,456.29
ECM #2	Lighting Upgrade (MH to T5HO)	$4,050	$2,550	$750	$5,850	$394	$0	$394	15	$5,910	$0	1.0%	14.8	0.13%	($1,146.45)
ECM #3	Exterior Lighting Upgrades	$7,660	$3,440	$2,000	$9,100	$1,246	$0	$1,246	15	$18,690	$0	105.4%	7.3	10.72%	$5,774.67
ECM #4	Lighting Controls Upgrade	$6,450	$5,474	$980	$10,944	$2,400	$0	$2,400	15	$36,000	$0	228.9%	4.6	20.61%	$17,707.04
ECM #5	Energy Star Refrigerators	$1,580	$500	$0	$2,080	$152	$0	$152	15	$2,280	$0	9.6%	13.7	1.17%	($265.43)
ECM #6	Rooftop Conversion to Geothermal	$82,200	$49,113	$0	$131,313	$5,951	$0	$5,951	15	$89,258	$0	-32.0%	22.1	-4.48%	($60,275.24)
ECM #7	Vending Miser Controls	$400	$200	$0	$600	$253	$0	$253	15	$3,802	$0	533.6%	2.4	42.02%	$2,425.55
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	129.02 KW PV System	$828,489	$0	$0	$828,489	$25,340	$29,890	$55,230	15	$828,448	$448,345	0.0%	15.0	0.00%	($169,158.41)

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

APPENDIX B

Concord Engineering Group, Inc.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February 15, 2011:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Cooling

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

Desiccant Systems

$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

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

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

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

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons, 0.67 energy factor or better	\$50 per unit
Gas-Fired Water Heaters > 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture

Prescriptive Lighting - LED

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

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2007 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
West End Memorial Elementary

Building ID: 3313172
For 12-month Period Ending: April 30, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 16, 2012

Facility
West End Memorial Elementary
215 Queen Street
Woodbury, NJ 08096

Facility Owner
Woodbury City Public School District
25 North Broad Street
Woodbury, NJ 08096

Primary Contact for this Facility
Kara Huber
25 North Broad Street
Woodbury, NJ 08096

Year Built: 1955
Gross Floor Area (ft²): 48,431

Energy Performance Rating[2] (1-100) 96

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	1,185,151
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	1,185,151

Energy Intensity[4]

Site (kBtu/ft²/yr)	24
Source (kBtu/ft²/yr)	82

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	168

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	48
National Median Source EUI	160
% Difference from National Median Source EUI	-49%
Building Type	K-12 School

Stamp of Certifying Professional

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

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

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

Certifying Professional
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	West End Memorial Elementary	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	215 Queen Street, Woodbury, NJ 08096	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Elementary School (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	48,431 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	123	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
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	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: 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))**
03/02/2012	04/01/2012	29,760.00
02/02/2012	03/01/2012	41,400.00
01/02/2012	02/01/2012	41,520.00
12/02/2011	01/01/2012	41,520.00
11/02/2011	12/01/2011	34,800.00
10/02/2011	11/01/2011	25,920.00
09/02/2011	10/01/2011	17,782.00
08/02/2011	09/01/2011	19,009.00
07/02/2011	08/01/2011	19,009.00
06/02/2011	07/01/2011	25,320.00
05/02/2011	06/01/2011	28,920.00
Electric Consumption (kWh (thousand Watt-hours))		**324,960.00**
Electric Consumption (kBtu (thousand Btu))		**1,108,763.52**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,108,763.52**
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
West End Memorial Elementary
215 Queen Street
Woodbury, NJ 08096

Facility Owner
Woodbury City Public School District
25 North Broad Street
Woodbury, NJ 08096

Primary Contact for this Facility
Kara Huber
25 North Broad Street
Woodbury, NJ 08096

General Information

West End Memorial Elementary	
Gross Floor Area Excluding Parking: (ft^2)	48,431
Year Built	1955
For 12-month Evaluation Period Ending Date:	April 30, 2012

Facility Space Use Summary

Elementary School	
Space Type	K-12 School
Gross Floor Area (ft^2)	48,431
Open Weekends?	No
Number of PCs	123
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months °	10
High School?	No
School District °	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2012)	**Baseline** (Ending Date 04/30/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	96	96	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	24	24	38	N/A	48
Source ($kBtu/ft^2$)	82	82	125	N/A	160
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	168	168	258	N/A	330
$kgCO_2e/ft^2$/year	3	3	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 Median column presents energy performance data your building would have if your building had a median rating of 50.

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

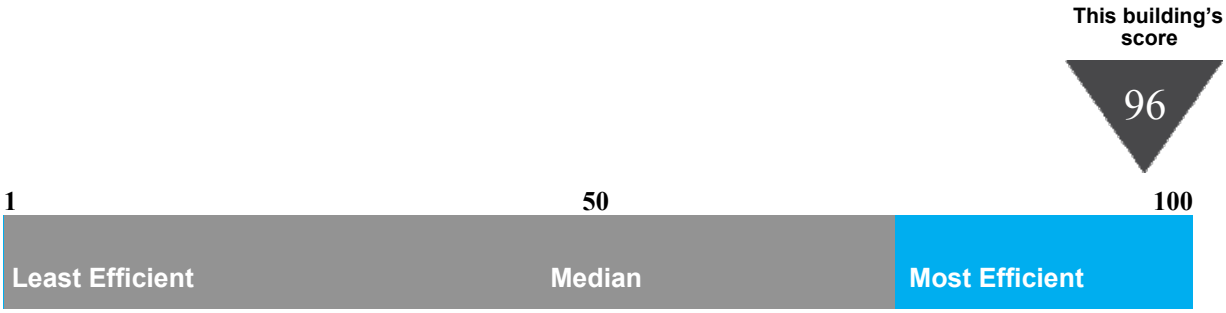
Statement of Energy Performance

2012

West End Memorial Elementary
215 Queen Street
Woodbury, NJ 08096

Portfolio Manager Building ID: 3313172

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 82 kBtu per square foot per year.*

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

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

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

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 11/16/2012

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Rooftop Units

Tag	RTU-1	RTU-2
Unit Type	Packaged Cooling/Electric Heat	Rooftop GSHP
Qty	1	1
Location	Roof	Roof
Area Served	Library	All Purpose Room
Manufacturer	Trane	Mammoth
Model #	TCD180B30CEA	DGY240K23A
Serial #	P20104506D	U606U06101001
Cooling Type	DX	Geothermal
Cooling Capacity (Tons)	15	19
Cooling Efficiency (SEER/EER)	EER=8.6	EER=14.5
Heating Type	Electric	Geothermal
Heating Input (MBH)	_	170.0
Heating Efficiency (COP)	_	3.5
Capacity (CFM)	6,000	8,000
Supply Fan HP	5	5
Electrical	208/3/60	208/3/60
Approx Age	13	6
ASHRAE Service Life	20	20
Remaining Life	7	14
Comments		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Console HP's

Tag	CHP-1
Unit Type	Console GSHP
Qty	15
Location	In Area Served
Area Served	Entrances, Offices, Nurse, SG Rooms, etc.
Manufacturer	Waterfurnace
Unit Model #	CW15R22CNNBM19A
Cooling Type	Geothermal
Cooling Capacity (Tons)	1.25
Cooling Efficiency (SEER/EER)	EER=15.4
Heating Type	Geothermal
Heating Input (MBH)	11.46
Heating Efficiency (COP)	COP=3.5
Fuel	Electric
Approx Age	6
ASHRAE Service Life	20
Remaining Life	14
Comments	

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Domestic Water Heaters

Tag	DHW-1, 2	DHW
Unit Type	Electric DHW Heater	Electric DHW Heater
Qty	2	1
Location	Basement MER	Nurse's Suite
Area Served	Entire Facility	Nurse's Suite
Manufacturer	General Electric	Bradford White
Model #	SE50M12AA01	MI20U6SS13
Serial #	_	_
Size (Gallons)	50 gallons	19 gallons
Input Capacity (MBH/KW)	4,130 Watts 2 Levels	1,500 Watts 2 Levels
Recovery (Gal/Hr)	_	_
Efficiency %	100%	100%
Fuel	Electric	Electric
Approx Age	9	_
ASHRAE Service Life	15	15
Remaining Life	6	_
Comments		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Electric Unit Heaters

Tag	UH-1 & UH-2	UH-3	UH-4
Unit Type	Electric Unit Heater	Electric Unit Heater	Electric Unit Heater
Qty	6	3	2
Location	Restrooms, MER's	Stairways	MPR/Stage,Basement Mech Room
Area Served	Restrooms, MER's	Stairways	MPR/Stage,Basement Mech Room
Manufacturer	QMARK	QMARK	QMARK
Model #	MUH0321	MUH0381	MUH078
kW Rating	2/2.2	3	7.5
HEATING - Rated Output Capacity (Btu/Hr)	7,500	10,200	25,600
Rated CFM	250	350	650
Electrical	208/3/60	208/3/60	208/3/60
Approx Age	6	6	6
ASHRAE Service Life	13	13	13
Remaining Life	7	7	7
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Vertical Heat Pumps

Tag	VHP-3	VHP-4
Unit Type	Vertical UV GSHP	Vertical UV GSHP
Qty	20	5
Location	Classrooms	Classrooms
Area Served	Classrooms	Classrooms
Manufacturer	Airedale	Airedale
Model #	SMG3-208	SMG4-208
Serial #	–	–
Cooling Type	Geothermal	Geothermal
Cooling Capacity (Tons)	3	4
Cooling Efficiency	EER=16.4	EER=16.0
Heating Type	Geothermal	Geothermal
Heating Input (MBH)	33	43
Heating Efficiency	COP=3.5	COP=3.4
Fuel	Electric	Electric
Approx Age	6	6
ASHRAE Service Life	20	20
Remaining Life	14	14
Comments	Includes Desicant HR Wheel	Includes Desicant HR Wheel

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group
West End Memorial Elementary School

Horizontal Heat Pumps

Tag	HHP-064	HHP-064	HHP-025
Unit Type	Horizontal GSHP	Horizontal GSHP	Horizontal GSHP
Qty	1	1	4
Location	Corridor	Computer Lab	Corridors
Area Served	Corridor	Computer Lab	Corridors
Manufacturer	Mammoth	Mammoth	Mammoth
Model #	F-064-H-L	F064VLN	F-025-H-L
Cooling Type	Geothermal	Geothermal	Geothermal
Cooling Capacity (Tons)	5	5	2
Cooling Efficiency	EER=14.5	EER=14.5	EER=14.0
Heating Type	Geothermal	Geothermal	Geothermal
Heating Input (MBH)	47.5	47.5	19.2
Efficiency	COP=3.2	COP=3.2	COP=3.1
Fuel	Electric	Electric	Electric
Approx Age	6	6	6
ASHRAE Service Life	20	20	20
Remaining Life	14	14	14
Comments			

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

-

Horizontal Heat Pur

Tag	HHP-020
Unit Type	Horizontal GSHP
Qty	1
Location	Corridor
Area Served	Corridor
Manufacturer	Mammoth
Model #	D-020-H-L
Cooling Type	Geothermal
Cooling Capacity (Tons)	2
Cooling Efficiency	EER=14.0
Heating Type	Geothermal
Heating Input (MBH)	15.2
Efficiency	COP=3.1
Fuel	Electric
Approx Age	6
ASHRAE Service Life	20
Remaining Life	14
Comments	

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

West End Memorial Elementary School

Pumps

Tag	P-4, 5, 6	
Unit Type	End Suction Pump	
Qty	3	
Location	Basement MER	
Area Served	Geothermal Loop	
Manufacturer	Bell & Gossett	
Model #	VSCS 5x5x12B	
Serial #	-	
Horse Power	15	
Flow	250 GPM @ 125' TDH	
Motor Info	Emerson Electric	
Electrical Power	208/3/60	
RPM	1785	
Motor Efficiency %	92.4%	
Approx Age	6	
ASHRAE Service Life	18	
Remaining Life	12	
Comments	Have VSD, 2 pumps required to operate	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12054
Facility Name: West End Elementary School
Address: 215 Queen Street
City, State, Zip Woodbury, NJ 08096

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
1	Basement Stairwell	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
2	Basement Main Area	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Cage	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	Basement Main Area	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
4	Basement Main Area	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., No Lens	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
22	Basement Main Area	920	LED Exit Sign	1	2	1	0.00	2	Existing to Remain	Existing to Remain	1	2	0	0.00	2	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Basement Corridor	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
10	Basement Corridor	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Basement Pump Room	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	2	0.20	184	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	2	0.05	46	0.15	138	$22	0	No New Controls	0	0.0%	0	$0
4	Basement Electrical Room	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., No Lens	2	58	2	0.12	107	Existing to Remain	Existing to Remain	2	58	0	0.12	107	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
9	Basement Electrical Room	920	1x4, 1 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., No Lens	2	28	1	0.03	26	Existing to Remain	Existing to Remain	2	28	0	0.03	26	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
11	Basement Crawl Space	920	1 Lamp, 100w Incandescent, Wall Mount, Jelly Jar	1	100	25	2.50	2,300	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	1	26	25	0.65	598	1.85	1,702	$276	0	No New Controls	0	0.0%	0	$0
5	Kitchen	1900	2x2, 2 Lamp, T8 17w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	2	0.07	129	Existing to Remain	Existing to Remain	2	34	0	0.07	129	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Principal Lobby	3460	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	346	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	87	0.08	260	$42	0	No New Controls	0	0.0%	0	$0
7	Principal Office	1900	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	2	0.22	414	Existing to Remain	Existing to Remain	4	109	0	0.22	414	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	Copy Room	1900	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	2	0.22	414	Existing to Remain	Existing to Remain	4	109	0	0.22	414	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
6	Corridor to Main Office - From Princ. Office	3460	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	346	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	346	$56	0	No New Controls	0	0.0%	0	$0
7	Main Office	1900	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	2	0.22	414	Existing to Remain	Existing to Remain	4	109	0	0.22	414	0.00	0	$0	0	No New Controls	0	0.0%	0	$0

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12	Main Vestibule	3460	24" Diameter, 1 Lamp, 250W MH, Mag. Ballast, Pendant Mnt., Prismatic Lens	1	295	1	0.30	1,021	Replace	2x4 54w T5HO 4 Lamp w/Reflector, Lightolier TriLyte #FH4C5DVI454UNV	4	236	1	0.24	817	0.06	204	$33	0	No New Controls	0	0.0%	0	$0
8	Corridor by Main Vestibule	3460	12"x12", 2 Lamp, 100w Incandescent, Prismatic Lens	2	200	2	0.40	1,384	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	2	52	2	0.10	360	0.30	1,024	$166	0	No New Controls	0	0.0%	0	$0
10	Corridor - Princ. To Main Office	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	3	0.17	602	Existing to Remain	Existing to Remain	2	58	0	0.17	602	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	All Purpose Room	2700	24" Diameter, 1 Lamp, 250W MH, Mag. Ballast, Pendant Mnt., Prismatic Lens	1	295	14	4.13	11,151	Replace	2x4 54w T5HO 4 Lamp w/Reflector, Lightolier TriLyte #FH4C5DVI454UNV	4	236	14	3.30	8,921	0.83	2,230	$361	0	No New Controls	0	0.0%	0	$0
10	Stage	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	8	0.46	427	Existing to Remain	Existing to Remain	2	58	0	0.46	427	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
22	Stage	8760	LED Exit Sign	1	2	1	0.00	18	Existing to Remain	Existing to Remain	1	2	0	0.00	18	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
11	Stage	920	1 Lamp, 100w Incandescent, Wall Mount, Jelly Jar	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	1	26	1	0.03	24	0.07	68	$11	0	No New Controls	0	0.0%	0	$0
1	Stage - Upper Room	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	2	0.20	184	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	2	0.05	46	0.15	138	$22	0	No New Controls	0	0.0%	0	$0
1	Custodial Closet	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
6	Boys Lav.	3460	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	346	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	346	$56	0	No New Controls	0	0.0%	0	$0
10	Boys Lav.	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	2	0.12	401	Existing to Remain	Existing to Remain	2	58	0	0.12	401	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Classroom 3	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 4	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 5	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 6	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 7	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 8	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 9	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70

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10	Classroom 10	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 11	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
7	Classroom 23	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	16	1.74	4,639	Existing to Remain	Existing to Remain	4	109	0	1.74	4,639	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	928	$150
7	Classroom 24	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	16	1.74	4,639	Existing to Remain	Existing to Remain	4	109	0	1.74	4,639	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	928	$150
7	Classroom 25	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	16	1.74	4,639	Existing to Remain	Existing to Remain	4	109	0	1.74	4,639	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	928	$150
13	Electric Room by CR 25	920	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Vestibule by CR 25	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	201	Existing to Remain	Existing to Remain	2	58	0	0.06	201	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
14	Library	2280	2x2, 3 Lamp T8, 17w, Elect. Ballast, Recessed, 9 Cell Parabolic Lens	3	47	22	1.03	2,358	Existing to Remain	Existing to Remain	3	47	0	1.03	2,358	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
14	Library	2280	2x2, 3 Lamp T8, 17w, Elect. Ballast, Recessed, 9 Cell Parabolic Lens	3	47	46	2.16	4,929	Existing to Remain	Existing to Remain	3	47	0	2.16	4,929	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
15	Library	2280	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt.Uplight Architectural	2	58	6	0.35	793	Existing to Remain	Existing to Remain	2	58	0	0.35	793	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
15	Library	2280	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt.Uplight Architectural	2	58	5	0.29	661	Existing to Remain	Existing to Remain	2	58	0	0.29	661	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
16	Library	2280	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt. Uplight Architectural	2	58	10	0.58	1,322	Existing to Remain	Existing to Remain	2	58	0	0.58	1,322	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
17	Library Office	1900	2x4, 3 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	3	82	3	0.25	467	Existing to Remain	Existing to Remain	3	82	0	0.25	467	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
18	Counselor Office	1900	2x4, 3 Lamp, T8 32w, Elect. Ballast, Recessed, (2) 9 Cell Parabolic Lens	3	82	2	0.16	312	Existing to Remain	Existing to Remain	3	82	0	0.16	312	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Custodial Closet by Couns. Office	920	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	53	Existing to Remain	Existing to Remain	2	58	0	0.06	53	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Faculty Lav 1	380	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
19	Faculty Lav 1	380	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt., Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Faculty Lav 2	380	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0

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19	Faculty Lav 2	380	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt., Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Faculty Lav 3	380	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
19	Faculty Lav 3	380	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt., Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Custodial Closet by CR 1	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
10	Psychologist Office	1900	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	4	0.23	441	Existing to Remain	Existing to Remain	2	58	0	0.23	441	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Classroom 1	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom 2	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	14	0.81	2,160	Existing to Remain	Existing to Remain	2	58	0	0.81	2,160	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	432	$70
10	Classroom Kindergarten	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	20	1.16	3,086	Existing to Remain	Existing to Remain	2	58	0	1.16	3,086	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	2	20.0%	617	$100
6	Classroom Kindergarten Closet 1	920	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	92	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	92	$15	0	No New Controls	0	0.0%	0	$0
6	Classroom Kindergarten Closet 2	920	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	92	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	92	$15	0	No New Controls	0	0.0%	0	$0
1	Classroom Kindergarten Closet 3	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
5	Classroom Kindergarten Rear Vestibule	2660	2x2, 2 Lamp, T8 17w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	1	0.03	90	Existing to Remain	Existing to Remain	2	34	0	0.03	90	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
5	Classroom Kindergarten Lav. 1	2660	2x2, 2 Lamp, T8 17w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	1	0.03	90	Existing to Remain	Existing to Remain	2	34	0	0.03	90	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
5	Classroom Kindergarten Lav. 2	2660	2x2, 2 Lamp, T8 17w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	1	0.03	90	Existing to Remain	Existing to Remain	2	34	0	0.03	90	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
8	Vestibule by CR Kind.	2660	12"x12", 2 Lamp, 100w Incandescent, Prismatic Lens	2	200	1	0.20	532	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	2	52	1	0.05	138	0.15	394	$64	0	No New Controls	0	0.0%	0	$0
20	Corridor - E Hall	3460	2x4, 4 Lamp, T8 32w, Elect. Ballast, Surface Mnt. Prismatic Lens	4	109	3	0.33	1,131	Existing to Remain	Existing to Remain	4	109	0	0.33	1,131	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Girls Lav.	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	2	0.12	401	Existing to Remain	Existing to Remain	2	58	0	0.12	401	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
6	Girls Lav. Vestibule	3460	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	346	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	346	$56	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
3	Faculty Room	1900	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	8	0.46	882	Existing to Remain	Existing to Remain	2	58	0	0.46	882	0.00	0	$0	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	176	$29
3	Classroom 12A	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	6	0.35	926	Existing to Remain	Existing to Remain	2	58	0	0.35	926	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	185	$30
3	Classroom 12B	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	6	0.35	926	Existing to Remain	Existing to Remain	2	58	0	0.35	926	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	185	$30
3	Classroom 12C	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	6	0.35	926	Existing to Remain	Existing to Remain	2	58	0	0.35	926	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	185	$30
3	Classroom 14	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
3	Classroom 15	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
3	Classroom 16	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
3	Classroom 17	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
10	Nurse Office	1900	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	6	0.35	661	Existing to Remain	Existing to Remain	2	58	0	0.35	661	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
21	Nurse Office Lav	380	2 Lamp, 100w Incandescent, Ceiling Mount, Globe	2	200	1	0.20	76	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	2	52	1	0.05	20	0.15	56	$9	0	No New Controls	0	0.0%	0	$0
10	Faculty Lav. Vestibule	380	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
19	Faculty Lav.	380	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt., Prismatic Lens	2	58	1	0.06	22	Existing to Remain	Existing to Remain	2	58	0	0.06	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Girls Lav. By CR 20	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	3	0.17	602	Existing to Remain	Existing to Remain	2	58	0	0.17	602	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Custodial Closet by CR 20	920	1 Lamp, 100w Incandescent, Ceiling Mnt., No Lens	1	100	1	0.10	92	Re-lamp	Philips CFL Energy Saver TuffGuard 25w	1	25	1	0.03	23	0.08	69	$11	0	No New Controls	0	0.0%	0	$0
10	Boys Lav. By CR 20	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	3	0.17	602	Existing to Remain	Existing to Remain	2	58	0	0.17	602	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	Classroom 18	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	24	1.39	3,703	Existing to Remain	Existing to Remain	2	58	0	1.39	3,703	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	741	$120
3	Classroom 18 Closet	920	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	2	0.12	107	Existing to Remain	Existing to Remain	2	58	0	0.12	107	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
5	Classroom 18 Lav.	2660	2x2, 2 Lamp, T8 17w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	34	1	0.03	90	Existing to Remain	Existing to Remain	2	34	0	0.03	90	0.00	0	$0	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
7	Classroom 22	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	16	1.74	4,639	Existing to Remain	Existing to Remain	4	109	0	1.74	4,639	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	928	$150
7	Classroom 22 Closet	920	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	2	0.22	201	Existing to Remain	Existing to Remain	4	109	0	0.22	201	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	Classroom 22 Lav.	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	1	0.11	290	Existing to Remain	Existing to Remain	4	109	0	0.11	290	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Classroom 22 Lav.	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	1	0.06	154	Existing to Remain	Existing to Remain	2	58	0	0.06	154	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	Classroom 21	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	16	1.74	4,639	Existing to Remain	Existing to Remain	4	109	0	1.74	4,639	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	928	$150
7	Classroom 21 Closet	920	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	2	0.22	201	Existing to Remain	Existing to Remain	4	109	0	0.22	201	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	Classroom 21 Lav.	2660	2x4, 4 Lamp, T8 32w, Elect. Ballast, Recessed Prismatic Lens	4	109	1	0.11	290	Existing to Remain	Existing to Remain	4	109	0	0.11	290	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Classroom 21 Lav.	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	1	0.06	154	Existing to Remain	Existing to Remain	2	58	0	0.06	154	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	Classroom 19	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
3	Classroom 20	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	18	1.04	2,777	Existing to Remain	Existing to Remain	2	58	0	1.04	2,777	0.00	0	$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	555	$90
13	Vestibule by CR 22	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	1	0.06	201	Existing to Remain	Existing to Remain	2	58	0	0.06	201	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Corridor by CR 22	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	3	0.17	602	Existing to Remain	Existing to Remain	2	58	0	0.17	602	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
23	Corridor by CR 22	3460	2 Lamp, 7w CFL, Exit Sign	2	20	1	0.02	69	Replace Fixture	LED Exit Sign	1	4	1	0.00	14	0.02	55	$9	0	No New Controls	0	0.0%	0	$0
13	Corridor: CR 19 to CR 14	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	16	0.93	3,211	Existing to Remain	Existing to Remain	2	58	0	0.93	3,211	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Corridor: Faculty Room to Girls Lav. (A Hall)	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	6	0.35	1,204	Existing to Remain	Existing to Remain	2	58	0	0.35	1,204	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
20	Corridor: Girls Lav. To CPU Lab (A Hall)	3460	2x4, 4 Lamp, T8 32w, Elect. Ballast, Surface Mnt. Prismatic Lens	4	109	12	1.31	4,526	Existing to Remain	Existing to Remain	4	109	0	1.31	4,526	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Corridor: CR 24 to Cust. Closet (D Hall)	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	12	0.70	2,408	Existing to Remain	Existing to Remain	2	58	0	0.70	2,408	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
23	Corridor: CR 24 to Cust. Closet (D Hall)	3460	2 Lamp, 7w CFL, Exit Sign	2	20	3	0.06	208	Replace Fixture	LED Exit Sign	1	4	3	0.01	42	0.05	166	$27	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
16	Corridor: Library Entrance (D Hall)	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Wall Mnt. Uplight Architectural	2	58	6	0.35	1,204	Existing to Remain	Existing to Remain	2	58	0	0.35	1,204	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
15	Corridor: Library Entrance (D Hall)	3460	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt.Uplight Architectural	2	58	3	0.17	602	Existing to Remain	Existing to Remain	2	58	0	0.17	602	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	Corridor: CR 25 to CR 11 (C Hall)	3460	2x4, 2 Lamp, T8 32w, Elect. Ballast, Recessed, Prismatic Lens	2	58	5	0.29	1,003	Existing to Remain	Existing to Remain	2	58	0	0.29	1,003	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
20	Corridor: CR 25 to CR 11 (C Hall)	3460	2x4, 4 Lamp, T8 32w, Elect. Ballast, Surface Mnt. Prismatic Lens	4	109	2	0.22	754	Existing to Remain	Existing to Remain	4	109	0	0.22	754	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
23	Corridor: CR 25 to CR 11 (C Hall)	3460	2 Lamp, 7w CFL, Exit Sign	2	20	1	0.02	69	Replace Fixture	LED Exit Sign	1	4	1	0.00	14	0.02	55	$9	0	No New Controls	0	0.0%	0	$0
8	Vestibule by CR 11	3460	12"x12", 2 Lamp, 100w Incandescent, Prismatic Lens	2	200	1	0.20	692	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	2	52	1	0.05	180	0.15	512	$83	0	No New Controls	0	0.0%	0	$0
20	Corridor: B Hall	3460	2x4, 4 Lamp, T8 32w, Elect. Ballast, Surface Mnt. Prismatic Lens	4	109	8	0.87	3,017	Existing to Remain	Existing to Remain	4	109	0	0.87	3,017	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	Computer Lab	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	15	0.87	2,314	Existing to Remain	Existing to Remain	2	58	0	0.87	2,314	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
10	Computer Lab	2660	1x4, 2 Lamp, T8 32w, Elect. Ballast, Surface Mnt., Prismatic Lens	2	58	1	0.06	154	Existing to Remain	Existing to Remain	2	58	0	0.06	154	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
6	Computer Lab Storage	2660	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	266	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	266	$43	0	No New Controls	0	0.0%	0	$0
6	Computer Lab Stair	2660	1 Lamp, 100w Incandescent, Ceiling Mnt., Globe	1	100	1	0.10	266	Re-lamp	Existing to Remain	0	0	1	0.00	0	0.10	266	$43	0	No New Controls	0	0.0%	0	$0
24	Rooftop Equipment	920	1 Lamp, 100w Incandescent, Wall Mount, Jelly Jar - Exterior	1	100	3	0.30	276	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	1	26	3	0.08	72	0.22	204	$33	0	No New Controls	0	0.0%	0	$0
26	Exterior Shoe-Box	3120	1 Lamp, 175W Metal Halide, Mag. Ballast, Pole mount, Shoebox Fixture, Exterior	1	213	7	1.49	4,652	LED Retrofit	4" LED Retrofit Unit	1	62	7	0.43	1,354	1.06	3,298	$534	0	No New Controls	0	0.0%	0	$0
25	Exterior Wall Pack	3120	1 Lamp, 175w Metal Halide, Mag. Ballast, Wall Pack, Exterior	1	213	8	1.70	5,316	Replace Fixture	90w LED Wall Pack	1	90	8	0.72	2,246	0.98	3,070	$497	0	No New Controls	0	0.0%	0	$0
28	Exterior HPS Flood	3120	1 Lamp, 100w HPS, Mag. Ballast, Flood Light, Exterior	1	130	2	0.26	811	Existing to Remain	Existing to Remain	1	130	0	0.26	811	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
29	Exterior Incandescent Spot	3120	1 Lamp, 100w Incandescent, Wall Mnt., Flood Light, Exterior	1	100	1	0.10	312	Existing to Remain	Existing to Remain	1	100	0	0.10	312	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
27	Exterior Canopy	3120	1 Lamp, 100w Metal Halide, Mag. Ballast, Canopy Light, Exterior	1	125	2	0.25	780	Replace Fixture	80w LED Canopy Mount	1	80	2	0.16	499	0.09	281	$45	0	No New Controls	0	0.0%	0	$0
24	Exterior Wall - Stair to Basement	3120	1 Lamp, 100w Incandescent, Wall Mount, Jelly Jar - Exterior	1	100	1	0.10	312	Re-lamp	Philips CFL Energy Saver 26w Mini Twister	1	26	1	0.03	81	0.07	231	$37	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
30	Exterior Bollard	3120	1 Lamp, 100w Metal Halide, Mag. Ballast, Bollard, Exterior	1	125	2	0.25	780	Existing to Remain	Existing to Remain	1	125	0	0.25	780	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
31	Exterior Downlight	3120	1 Lamp, 32w CFL, Recessed Downlight, Exterior	1	32	5	0.16	499	Existing to Remain	Existing to Remain	1	32	0	0.16	499	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
32	Exterior Wall Pack	3120	1 Lamp, 100w Metal Halide, Wall Pack, Exterior	1	125	3	0.38	1,170	Replace Fixture	60w LED Wall Pack	1	60	3	0.18	562	0.20	608	$99	0	No New Controls	0	0.0%	0	$0
	TOTAL					**775**	**59**	**150,878**					**93**	**51**	**134,015**	**8**	**16,863**	**2,732**			**29**	**6**	**14,813**	**2,400**

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
Walmut Elementary	7700	SHARP NU-U235F2	549	17.5	9,630	129.02	156,421	104.5	23,003	13.40

= Proposed Roof PV Layout = Proposed Parking PV Layout

Notes:

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

Project Name: **LGEA Solar PV Project - Walmut Elementary**
Location: **Woodbury, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$828,489
Annual kWh Production	156,421
Annual Energy Cost Reduction	$25,340
Average Annual SREC Revenue	$29,890

Simple Payback: **15.00** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.162**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	156,421	$25,340	$0	$39,105	$48,753	$35,142	($19,450)	($19,450)
2	$0	155,639	$26,100	$0	$38,910	$46,586	$37,309	($18,885)	($38,335)
3	$0	154,861	$26,883	$0	$38,715	$44,285	$39,610	($18,297)	($56,631)
4	$0	154,086	$27,690	$0	$38,522	$41,842	$42,053	($17,684)	($74,315)
5	$0	153,316	$28,521	$1,579	$38,329	$39,248	$44,647	($18,625)	($92,939)
6	$0	152,549	$29,376	$1,571	$30,510	$36,494	$47,401	($25,580)	($118,520)
7	$0	151,787	$30,258	$1,563	$30,357	$33,571	$50,325	($24,844)	($143,363)
8	$0	151,028	$31,165	$1,556	$30,206	$30,467	$53,428	($24,080)	($167,443)
9	$0	150,273	$32,100	$1,548	$30,055	$27,171	$56,724	($23,288)	($190,731)
10	$0	149,521	$33,063	$1,540	$22,428	$23,673	$60,222	($29,944)	($220,675)
11	$0	148,774	$34,055	$1,532	$22,316	$19,958	$63,937	($29,056)	($249,731)
12	$0	148,030	$35,077	$1,525	$22,204	$16,015	$67,880	($28,139)	($277,870)
13	$0	147,290	$36,129	$1,517	$22,093	$11,828	$72,067	($27,190)	($305,060)
14	$0	146,553	$37,213	$1,509	$14,655	$7,383	$76,512	($33,536)	($338,596)
15	$0	145,820	$38,329	$1,502	$14,582	$2,664	$81,231	($32,486)	($371,082)
	Totals:	2,265,947	$471,300	$16,943	$432,987	$429,938	$828,489	($371,082)	($2,664,740)

Net Present Value (NPV) **($271,671)**