

**MOORESTOWN TOWNSHIP
PUBLIC SCHOOLS**

MARY ROBERTS ELEMENTARY SCHOOL

**290 CRESCENT AVENUE
MOORESTOWN, NJ 08057**

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

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Hess

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: BPL / LPLS Meter No: Unmetered / 778009667 Account # 67 806 125 02 / 42 003 464 00 Third Party Utility Provider: South Jersey Energy Company TPS Meter / Acct No: -			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Sep-10	36,036	234.0	\$7,904
Oct-10	37,338	207.0	\$6,068
Nov-10	34,662	177.0	\$5,582
Dec-10	50,346	141.0	\$7,532
Jan-11	44,703	147.0	\$6,745
Feb-11	44,929	147.0	\$6,770
Mar-11	38,748	132.0	\$5,930
Apr-11	29,706	141.0	\$4,841
May-11	33,413	177.0	\$5,081
Jun-11	40,517	243.0	\$8,149
Jul-11	18,452	111.0	\$3,961
Aug-11	11,851	33.0	\$2,275
Totals	420,701	243.0 Max	\$70,838
AVERAGE DEMAND 157.5 KW average AVERAGE RATE \$0.168 \$/kWh			

Figure 1
Electricity Usage Profile

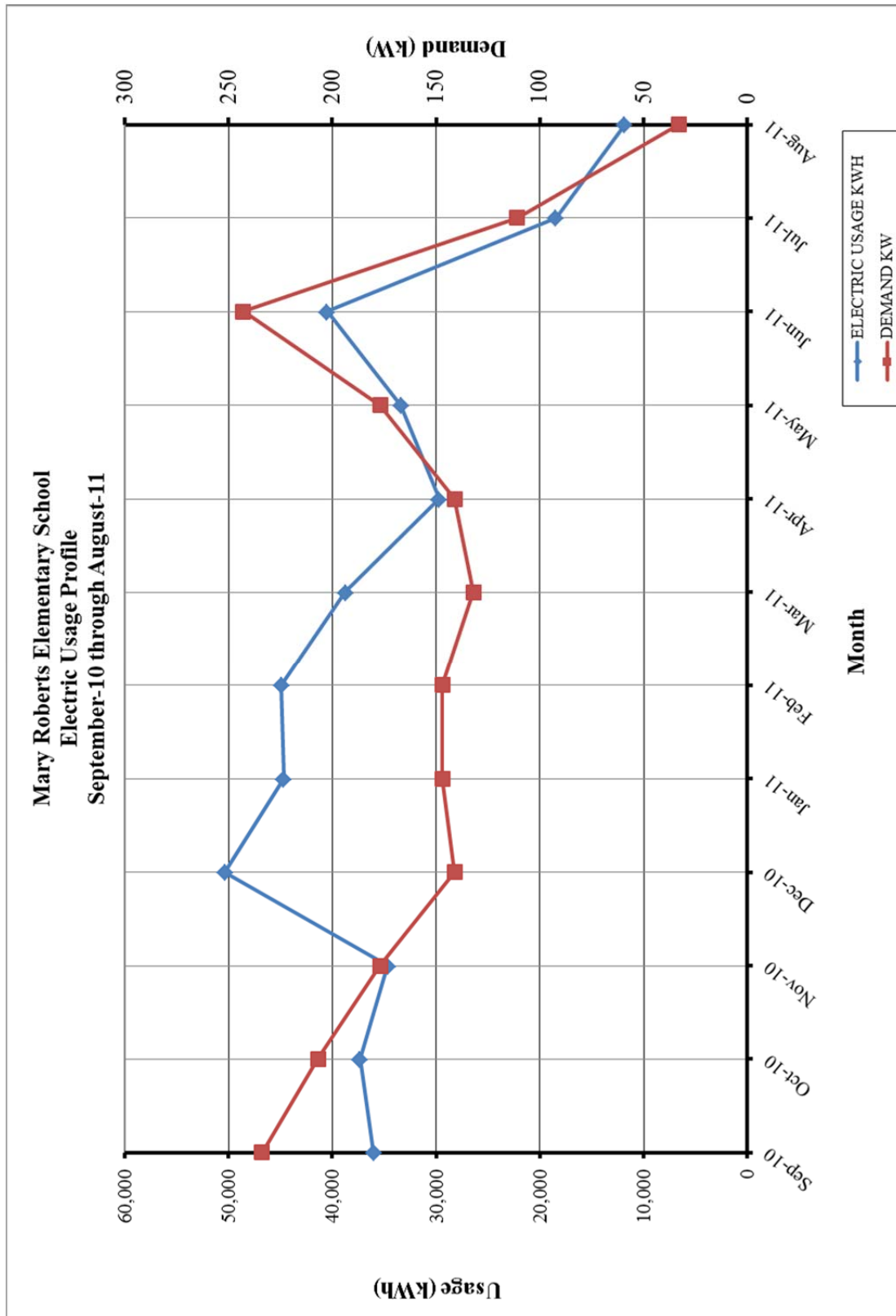
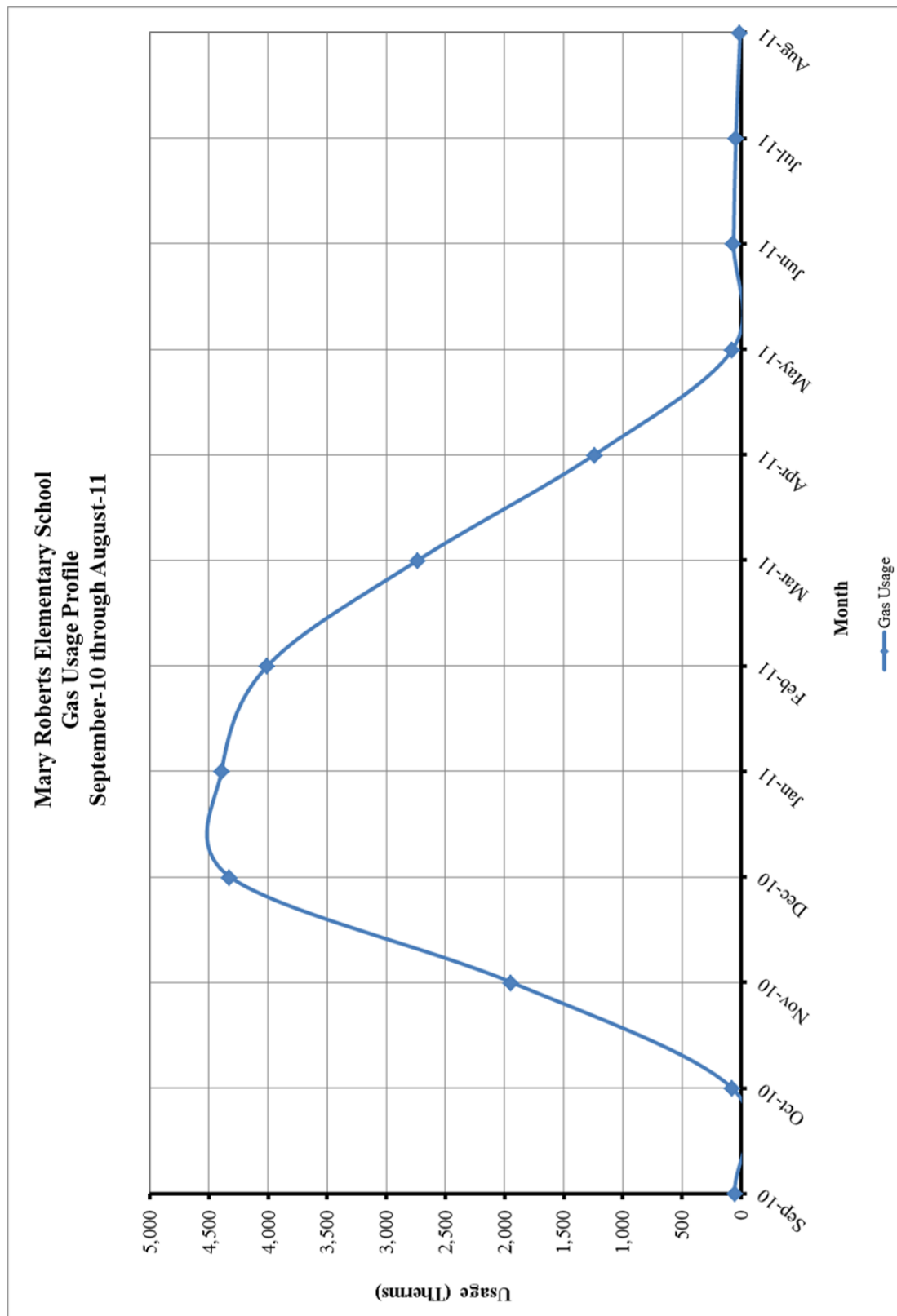


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G Rate: LVG Meter No: 2414996 Point of Delivery ID: PG000008092729643810 Third Party Utility Provider: Hess TPS Meter No: 363677 / 360836		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Sep-10	54.80	\$135.05
Oct-10	78.91	\$156.38
Nov-10	1,942.65	\$2,210.93
Dec-10	4,323.27	\$4,214.81
Jan-11	4,394.09	\$4,309.96
Feb-11	4,005.16	\$3,984.91
Mar-11	2,733.50	\$2,933.33
Apr-11	1,238.45	\$1,039.95
May-11	71.10	\$149.93
Jun-11	63.32	\$143.65
Jul-11	44.67	\$130.45
Aug-11	7.64	\$105.12
TOTALS	18,957.57	\$19,514.47
AVERAGE RATE: \$1.03 \$/THERM		

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Mary Roberts Elementary School is located on 290 Crescent Avenue in Moorestown, New Jersey. The 50,615 SF Mary Roberts Elementary School was built in 1957 with renovations in 1989 and 1992. The building is single story building and is comprised of office space for administrative use, multi-purpose room, classrooms, cafeteria, kitchen and mechanical rooms.

Occupancy Profile

The typical hours of operation for Mary Roberts Elementary School are Monday through Friday between 8:00 am and 3:00 pm, with custodial services running until 8:00 pm. The elementary school has a 12 month administrative occupancy of 60 people and 10 month occupancy with students of 375.

Building Envelope

Exterior walls for the Mary Roberts Elementary School are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the elementary school are in good condition and appear to be maintained. Typical windows throughout the elementary school are double pane, ¼” clear glass with aluminum frames. Blinds are utilized throughout the school per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roofs for the two front wings of classrooms are sloped with A-frame type structure. The remaining roof is a flat, built up rubber roof where the HVAC equipment resides. The amount of insulation below the roof is unknown.

HVAC Systems

The media center is conditioned by two 5-ton York packaged rooftop units with direct expansion coils and hot water heat from baseboard and unit ventilators.

The multi-purpose room is conditioned by four air handling units which are equipped with hot water and direct expansion coils. The cooling coils in these air handlers are set up for 2-stages of cooling and each air handler is combined with two Rheem condensing units.

The two front classroom wings are conditioned by two large York air handling units with direct expansion coils. These air handlers supply variable air volume devices which serve each classroom. The VAV's are equipped with hot water reheat coils.

The IT Room is conditioned by a 3.5 ton Mitsubishi mini split system.

Heating Hot Water for the building is generated by a boiler plant fitted with two H.B. Smith 28A-9 cast iron sectional boilers. The boilers are natural gas fired with input rating of 2,836 MBH and output rating of 2,232. The boilers are all equipped with Power Flame Burners. Heating water is circulated via four 3 horsepower pumps; two Taco pumps and two Bell & Gossett pumps.

For further clarification of which areas are being supplied by certain systems, refer to the **Major Equipment List Appendix**.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters.

HVAC System Controls

The Mary Roberts Elementary School is controlled by a Niagara Tridium controls system. Supplemental cooling systems are controlled by individual thermostat.

Domestic Hot Water

The main source of domestic hot water for Mary Roberts School is an A.O. Smith 199 MBH gas fired water heater with an integrated storage capacity of 100 gallons.

Domestic hot water for small restroom area in the front of the school is provided by one American Water Heater Company 1.5 KW electric domestic water heater with an integrated storage capacity of 19 gallons.

The kitchen for Mary Roberts has a separate domestic hot water system provided by a State 9 KW electric domestic water heater with an integrated storage capacity of 30 gallons.

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 - General	\$30,380	\$6,316	4.8	211.9%
ECM #2	Lighting Upgrade - Media Center	\$2,240	\$234	9.6	56.8%
ECM #3	Lighting Controls	\$13,335	\$3,159	4.2	255.3%
ECM #4	AC Unit Replacements	\$92,920	\$6,207	15.0	0.2%
ECM #5	NEMA Premium Motor Replacements	\$1,978	\$349	5.7	217.6%
ECM #6	Domestic Hot Water Heater Upgrade	\$29,750	\$2,169	13.7	-12.5%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	52.64 KW PV System	\$296,673	\$23,792	12.5	20.3%
Notes:	A. Cost takes into consideration applicable NJ Smart Start TM 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 - General	14.6	37,598	0
ECM #2	Lighting Upgrade - Media Center	1	1,394	
ECM #3	Lighting Controls	0.0	18,804	0
ECM #4	AC Unit Replacements	18.5	36,947	0
ECM #5	NEMA Premium Motor Replacements	0.7	2,727	0
ECM #6	Domestic Hot Water Heater Upgrade	0.0	16,324	-557
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	52.64 KW PV System	52.6	66,258	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 - General	\$6,316	\$32,600	\$2,220	\$30,380	4.8
Lighting Upgrade - Media Center	\$234	\$2,240	\$0	\$2,240	9.6
Lighting Controls	\$3,159	\$14,550	\$1,215	\$13,335	4.2
AC Unit Replacements	\$6,207	\$96,600	\$3,680	\$92,920	15.0
NEMA Premium Motor Replacements	\$349	\$2,098	\$120	\$1,978	5.7
Domestic Hot Water Heater Upgrade	\$2,169	\$30,000	\$250	\$29,750	13.7
<i>Design / Construction Extras (15%)</i>	<i>\$0</i>	<i>\$26,713</i>	<i>\$0</i>	<i>\$26,713</i>	
Total Project	\$18,435	\$204,801	\$7,485	\$197,316	11

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 Mary Roberts Elementary School is provided with fluorescent fixtures with 32W T8 lamps and electronic ballasts. In addition, there are a number of older and outdated fixtures with T12 lamps and magnetic ballasts. It is recommended to replace all of the T12 fixtures in these areas with higher efficiency fluorescent T8 fixtures with electronic ballasts.

This ECM includes retrofit of all older fluorescent fixtures with T8 or T5 fluorescent fixtures with electronic ballasts in the building. The new, energy efficient T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$32,600
NJ Smart Start Equipment Incentive (\$):	\$2,220
Net Installation Cost (\$):	\$30,380
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$6,316
Total Yearly Savings (\$/Yr):	\$6,316
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.8
Simple Lifetime ROI	211.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$94,746
Internal Rate of Return (IRR)	19%
Net Present Value (NPV)	\$45,025.14

ECM #2: Lighting Upgrade – Media Center

Description:

The Media Center at Mary Roberts Elementary School is currently lit via fluorescent T8 and Metal Halide HID fixtures. The space would be better served with a pulse start lighting system. CE recommends upgrading the 250 watt metal halides to pulse start metal halide fixtures.

This measure replaces all the HID, 250 watt HID MH fixtures with 200 watt pulse start metal halide fixtures.

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 (\$):	\$2,240
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$2,240
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$234
Total Yearly Savings (\$/Yr):	\$234
Estimated ECM Lifetime (Yr):	15
Simple Payback	9.6
Simple Lifetime ROI	56.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,512
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$554.97

ECM #3: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Mary Roberts 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:

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

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

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

$$= (\# \text{ Wall mount sensors} \times \$20 \text{ per sensor}) \\ + (\# \text{ Ceiling mount sensors} \times \$35 \text{ per sensor})$$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$14,550
NJ Smart Start Equipment Incentive (\$):	\$1,215
Net Installation Cost (\$):	\$13,335
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,159
Total Yearly Savings (\$/Yr):	\$3,159
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.2
Simple Lifetime ROI	255.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$47,385
Internal Rate of Return (IRR)	23%
Net Present Value (NPV)	\$24,376.94

ECM #4: Replace Split System Units with High Efficiency Units

Description:

The media center, faculty room and multi-purpose room are cooled by split systems at Mary Roberts Elementary School. The unit capacities range from 2 tons to 5 tons. Please refer to the **Major Equipment List Appendix** for further information about these units.

These units are in average condition though the current units in operation are not high efficiency units. These units are approximately twenty-one years old and have surpassed their ASHRAE service life of fifteen years.

These units can be replaced with new higher efficiency units. New split system units provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and higher efficiency refrigerants such as R410A which would be used in place of R22 that is currently used in the units.

This ECM includes one-for-one replacement of the older packaged and split system units with new higher efficiency systems which include new evaporator coils and refrigerant lines. 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
SS	AC - 1-8	8	54,000	36.0	Carrier 24ANA1
SS	AC - 9,10,15	2	24,000	4.0	Carrier 24ANA1
Total		10	78,000	40.0	

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

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS SEER	SPLIT UNITS SEER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
SS	54,000	2,000	10 SEER	16 SEER	8	32,400	16.2
SS	24,000	2,000	10 SEER	19 SEER	2	4,547	2.3
Total					10	36,947	18.5

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start[®] Program appendix, the rebate is \$92 per ton for units below 5.4 tons.

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	\$82,800	8	\$82,800	\$3,312	\$79,488	\$5,443	14.6
SS	\$13,800	2	\$13,800	\$368	\$13,432	\$764	17.6
Total	\$96,600	10	\$96,600	\$3,680	\$92,920	\$6,207	15.0

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$96,600
NJ Smart Start Equipment Incentive (\$):	\$3,680
Net Installation Cost (\$):	\$92,920
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$6,207
Total Yearly Savings (\$/Yr):	\$6,207
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.0
Simple Lifetime ROI	0.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$93,105
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	(\$18,821.24)

ECM #5: Install NEMA Premium® Efficiency Motors

Description:

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

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

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

IMPLEMENTATION SUMMARY					
EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
P-1	Hot Water Pump	3	4,087	78.0%	89.5%
P-2	Hot Water Pump	3	4,087	78.0%	89.5%

Energy Savings Calculations:

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

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor

Motor Efficiency = Motor Nameplate Efficiency

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

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

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

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

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWh	COST SAVINGS
P-1	3	90%	78.0%	89.5%	0.33	1,363	\$175
P-2	3	90%	78.0%	89.5%	0.33	1,363	\$175
TOTAL					0.7	2,727	\$349

Equipment Cost and Incentives

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

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
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
P-1	3	\$1,049	\$60	\$989	\$175	5.7
P-2	3	\$1,049	\$60	\$989	\$175	5.7
TOTAL	Totals:	\$2,098	\$120	\$1,978	\$349	5.7

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,098
NJ Smart Start Equipment Incentive (\$):	\$120
Net Installation Cost (\$):	\$1,978
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$349
Total Yearly Savings (\$/Yr):	\$349
Estimated ECM Lifetime (Yr):	18
Simple Payback	5.7
Simple Lifetime ROI	217.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$6,282
Internal Rate of Return (IRR)	17%
Net Present Value (NPV)	\$2,821.98

ECM #6: High Efficiency Gas Hot Water Heater**Description:**

The Mary Roberts Elementary School's rear wing contains a State SB6 electric hot water heater which supplies 9 KW of heat for that wing. This heater has surpassed its ASHRAE service life of 12 years and should be replaced with a new high efficiency, gas fired model.

This ECM will replace the one electric domestic water heater with one 98.5% thermal efficient Bradford White eF Series Natural Gas fired 125 MBH and 60 gallons of storage domestic water heaters.

Energy Savings Calculations:

DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Electric Hot Water Heaters	High Efficiency Heaters	
Building Type	Education		
Building Square-foot	10,500	10,500	
Domestic Water Usage, kBtu	54,600.00	54,600.00	
DHW Heating Fuel Type	Electric	Gas	
Heating Efficiency	98%	98%	0%
Total Usage (kBtu)	55,714	55,714	0
Electric Cost (\$/kWh)	\$ 0.168	\$ 0.168	
Nat Gas Cost (\$/Therm)	\$ 1.030	\$ 1.030	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	16,324	0	16,324
Natural Gas Usage (Therms)	0	557	-557
Energy Cost (\$)	\$2,742	\$574	\$2,169
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Energy Density for “Education” type building = 5.2 kBtu / SF / year

$$DHW \text{ Heat Usage} = \text{Energy Density} \left(\frac{\text{kBtu yr}}{\text{SF}} \right) \times \text{Building Square Footage (SF)}$$

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

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

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$30,000
NJ Smart Start Equipment Incentive (\$):	\$250
Net Installation Cost (\$):	\$29,750
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,169
Total Yearly Savings (\$/Yr):	\$2,169
Estimated ECM Lifetime (Yr):	12
Simple Payback	13.7
Simple Lifetime ROI	-12.5%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$26,028
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	(\$8,159.77)

REM #1: 52.64 kW Solar System**Description:**

The Mary Roberts Elementary School has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 52.64 kilowatt solar array could be installed, assuming the existing roof structure is capable of supporting an array. The array will produce approximately 66,258 kilowatt-hours annually that will reduce the overall electric usage of the facility by 15.75%.

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}):	52.64
Electric Generation (KWH/Yr):	66,258
Installation Cost (\$):	\$296,673
SREC Revenue (\$/Yr):	\$12,661
Energy Savings (\$/Yr):	\$11,131
Total Yearly Savings (\$/Yr):	\$23,792
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	12.5
Analysis Period Electric Savings (\$):	\$207,031
Analysis Period SREC Revenue (\$):	\$183,408
Net Present Value (NPV)	(\$47,777.34)

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

Moorestown Public Schools - Mary Roberts 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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SEC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * 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)	(\$)	(\$)
ECM #1	Lighting Upgrade - General	\$11,107	\$21,493	\$2,220	\$30,380	\$6,316	\$0	\$6,316	15	\$94,746	\$0	211.9%	4.8	19.32%	\$45,025.14
ECM #2	Lighting Upgrade - Media Center	\$1,600	\$640	\$0	\$2,240	\$234	\$0	\$234	15	\$3,512	\$0	56.8%	9.6	6.23%	\$554.97
ECM #3	Lighting Controls	\$12,150	\$2,400	\$1,215	\$13,335	\$3,159	\$0	\$3,159	15	\$47,385	\$0	255.3%	4.2	22.57%	\$24,376.94
ECM #4	AC Unit Replacements	\$51,750	\$44,850	\$3,680	\$92,920	\$6,207	\$0	\$6,207	15	\$93,105	\$0	0.2%	15.0	0.02%	(\$18,821.24)
ECM #5	NEMA Premium Motor Replacements	\$2,098	\$0	\$120	\$1,978	\$349	\$0	\$349	18	\$6,282	\$0	217.6%	5.7	16.52%	\$2,821.98
ECM #6	Domestic Hot Water Heater Upgrade	\$12,000	\$18,000	\$250	\$29,750	\$2,169	\$0	\$2,169	12	\$26,028	\$0	-12.5%	13.7	-2.00%	(\$8,159.77)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	52.64 KW PV System	\$296,673	\$0	\$0	\$296,673	\$11,131	\$12,661	\$23,792	15	\$356,883	\$189,913	20.3%	12.5	2.40%	(\$12,642.55)

Notes: 1) The variable Cn in the formulae 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 $\geq$ 16 \$600 per ton, EER $\geq$ 18 \$750 per ton, EER $\geq$ 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 $\geq$ 10 hp	\$60 per VFD rated hp

Natural Gas Water Heating

Gas Water Heaters $\leq$ 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 $\geq$ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID $\geq$ 100w Replacement with new HID $\geq$ 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



STATEMENT OF ENERGY PERFORMANCE

5-Moorestown BOE - Mary Roberts Elementary School

Building ID: 3221073

For 12-month Period Ending: August 31, 2011¹

Date SEP becomes ineligible: N/A

Date SEP Generated: August 01, 2012

Facility

5-Moorestown BOE - Mary Roberts
Elementary School
290 Crescent Avenue
Moorestown, NJ 08057

Facility Owner

Moorestown Township Public Schools
803 North Stanwick Road
Moorestown, NJ 08057

Primary Contact for this Facility

Lynn Shugars
803 North Stanwick Road
Moorestown, NJ 08057

Year Built: 1957

Gross Floor Area (ft²): 50,615Energy Performance Rating² (1-100) 62**Site Energy Use Summary³**

Electricity - Grid Purchase(kBtu)	1,435,432
Natural Gas (kBtu) ⁴	1,895,756
Total Energy (kBtu)	3,331,188

Energy Intensity⁴

Site (kBtu/ft ² /yr)	66
Source (kBtu/ft ² /yr)	134

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	304
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Electric Distribution Utility

Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	74
National Median Source EUI	150
% Difference from National Median Source EUI	-11%
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 Standards⁵ 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	5-Moorestown BOE - Mary Roberts 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	290 Crescent Avenue, Moorestown, NJ 08057	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.		☐
Mary Roberts Elementary School (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☒
Gross Floor Area	50,615 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	89 (Default)	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	90 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	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'.	☐
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ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Electric & Gas Co

Fuel Type: Electricity		
Meter: electricity (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
08/01/2011	08/31/2011	11,851.00
07/01/2011	07/31/2011	18,452.00
06/01/2011	06/30/2011	40,517.00
05/01/2011	05/31/2011	33,413.00
04/01/2011	04/30/2011	29,706.00
03/01/2011	03/31/2011	38,748.00
02/01/2011	02/28/2011	44,929.00
01/01/2011	01/31/2011	44,703.00
12/01/2010	12/31/2010	50,346.00
11/01/2010	11/30/2010	34,662.00
10/01/2010	10/31/2010	37,338.00
09/01/2010	09/30/2010	36,036.00
electricity Consumption (kWh (thousand Watt-hours))		420,701.00
electricity Consumption (kBtu (thousand Btu))		1,435,431.81
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		1,435,431.81
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐
Fuel Type: Natural Gas		
Meter: gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
08/01/2011	08/31/2011	7.64
07/01/2011	07/31/2011	44.67
06/01/2011	06/30/2011	63.32
05/01/2011	05/31/2011	71.10
04/01/2011	04/30/2011	1,238.45
03/01/2011	03/31/2011	2,733.50
02/01/2011	02/28/2011	4,005.16
01/01/2011	01/31/2011	4,394.09
12/01/2010	12/31/2010	4,323.27
11/01/2010	11/30/2010	1,942.65

10/01/2010	10/31/2010	78.91
09/01/2010	09/30/2010	54.80
gas Consumption (therms)		18,957.56
gas Consumption (kBtu (thousand Btu))		1,895,756.00
Total Natural Gas Consumption (kBtu (thousand Btu))		1,895,756.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels

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

☐

On-Site Solar and Wind Energy

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

☐

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility

5-Moorestown BOE - Mary Roberts
Elementary School
290 Crescent Avenue
Moorestown, NJ 08057

Facility Owner

Moorestown Township Public Schools
803 North Stanwick Road
Moorestown, NJ 08057

Primary Contact for this Facility

Lynn Shugars
803 North Stanwick Road
Moorestown, NJ 08057

General Information

5-Moorestown BOE - Mary Roberts Elementary School	
Gross Floor Area Excluding Parking: (ft ²)	50,615
Year Built	1957
For 12-month Evaluation Period Ending Date:	August 31, 2011

Facility Space Use Summary

Mary Roberts Elementary School	
Space Type	K-12 School
Gross Floor Area (ft ²)	50,615
Open Weekends?	No
Number of PCs ^d	89
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	100
Months ^o	10
High School?	No
School District ^o	moorestown

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 08/31/2011)	Baseline (Ending Date 08/31/2011)	Rating of 75	Target	National Median
Energy Performance Rating	62	62	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	66	66	58	N/A	74
Source (kBtu/ft ²)	134	134	117	N/A	150
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 ₂ e/year	304	304	266	N/A	340
kgCO ₂ e/ft ² /year	6	6	5	N/A	7

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National 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.

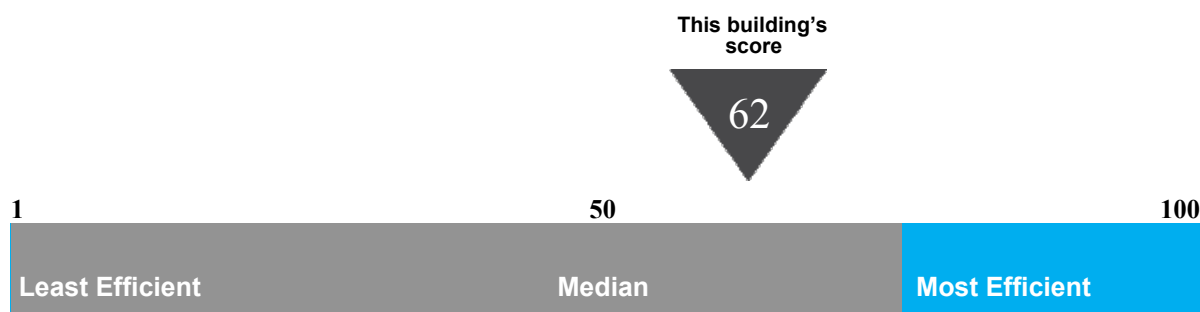
Statement of Energy Performance

2011

5-Moorestown BOE - Mary Roberts Elementary
School
290 Crescent Avenue
Moorestown, NJ 08057

Portfolio Manager Building ID: 3221073

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 134 kBtu per square foot per year.*

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



APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

Mary Roberts Elementary School

AC Units

Tag			
Unit Type	Rooftop Unit	Rooftop Unit	Condensing Unit
Qty	1	1	2
Location	Roof	Roof	Roof
Area Served	Café	Office	Side Media Center AH / Faculty Rm
Manufacturer	York	York	Rheem
Model #	DM150C00N4BAA3C	D4CE048A46BDA	RACC-024JAS
Serial #	NFNM084237	NGNM085543	3114 M4091 2638
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	12.5 Tons	4 Tons	2 Tons
Cooling Efficiency (SEER/EER)	9.3 EER	10 SEER / 9 EER	10 SEER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	8	8	21
ASHRAE Service Life	15	15	15
Remaining Life	7	7	(6)
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

AC Units

Tag			
Unit Type	Rooftop Unit	Rooftop Unit	Rooftop Unit
Qty	1	2	2
Location	Roof	Roof	Roof
Area Served	Computer Room	Media Center	AHU-1,2
Manufacturer	York	York	York
Model #	ZJ037C00N2AAA5A	ZJ061C00N2AAA5A	HB360C00A4BAA2B
Serial #	N1F1145346	N1F1145351	NFNM081333
Cooling Type	DX, R-410A	DX, R-410A	DX, R-22
Cooling Capacity (Tons)	3 Tons	5 Tons	30 Tons
Cooling Efficiency (SEER/EER)	12.2 EER / 15 EER	12.2 EER / 15 EER	9.5 EER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	1	1	1
ASHRAE Service Life	15	15	15
Remaining Life	14	14	14
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

AC Units

Tag			
Unit Type	Condensing Unit	Condensing Unit	Condensing Unit
Qty	2	8	5
Location	Roof	Roof	Roof
Area Served	Classroom UV's	Multi Purpose Room AHU's	A-Wing
Manufacturer	York	Rheem	York
Model #	H5DB042S06A	RACC-056CAS	H4DB018S06A
Serial #	WFNM076282	4147 M3791 4913	WFNM050700
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	3.5 Tons	4.5 Tons	1.5 Tons
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	10.3 SEER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	8	21	8
ASHRAE Service Life	15	15	15
Remaining Life	7	(6)	7
Comments		2 Stage cooling for AHU's	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

AC Units

Tag			
Unit Type	Condensing Unit	Condensing Unit	Condensing Unit
Qty	3	1	2
Location	Roof	Roof	Roof
Area Served	A-Wing	IT Room	A-Wing
Manufacturer	York	Mitsubishi	York
Model #	H4DB036S06A	PUY-A42NHA2	H4DB042S06A
Serial #	WFNM091285	84U00078C	WFNM076275
Cooling Type	DX, R-22	DX, R-410A	DX, R-22
Cooling Capacity (Tons)	3 Tons	3.5 Tons	3.5 Tons
Cooling Efficiency (SEER/EER)	10.2 SEER	13.8 SEER	10 SEER
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	8	1	8
ASHRAE Service Life	15	15	15
Remaining Life	7	14	7
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Mary Roberts Elementary School

Boilers

Tag			
Unit Type	Cast Iron Sectional Boiler		
Qty	2		
Location	Boiler Room		
Area Served	Hot Water Loop		
Manufacturer	Smith		
Model #	28A-9 Series		
Serial #	N2004-683		
Input Capacity (Btu/Hr)	2,836 MBH		
Rated Output Capacity (Btu/Hr)	2,232 MBH		
Approx. Efficiency %	78.7%		
Fuel	Natural Gas		
Approx Age	8		
ASHRAE Service Life	35		
Remaining Life	27		
Comments	Glycol Mix		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Mary Roberts Elementary School

Domestic Water Heaters

Tag			
Unit Type	Gas Fired Domestic Hot Water Heater	Electric Domestic Hot Water	Electric Domestic Hot Water
Qty	1	1	1
Location	Boiler Room	Storage	Storage
Area Served	Domestic Hot Water	Domestic Hot Water	Domestic Hot Water
Manufacturer	A.O. Smith	State	American Water Heater Company
Model #	BTR 200A 110	SB6 30 9 IFE ASME X NSF	E51-20U-015SV
Serial #	MA040019676	D926 09310	9724117721
Size (Gallons)	100 Gallons	30 Gallons	19 Gallons
Input Capacity (MBH/KW)	199 MBH	9 KW	1500 Watts
Recovery (Gal/Hr)	192.96 GPH	-	-
Efficiency %	80%	98%	98%
Fuel	Natural Gas	Electric	Electric
Approx Age	8	20	15
ASHRAE Service Life	12	12	12
Remaining Life	4	(8)	(3)
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Mary Roberts Elementary School

Pumps

Tag			
Unit Type	Base Mounted End Suction Pump	Base Mounted End Suction Pump	
Qty	2	2	
Location	Boiler Room	Boiler Room	
Area Served	Hot Water Loop	Hot Water Loop	
Manufacturer	Taco	Bell & Gossett	
Model #	BB2508 7 6 B5B2ELO	1510 Series	
Serial #		CS5165 02 F40	
Horse Power	3 HP	3 HP	
Flow		90 GPM @ 60 FT/HD	
Motor Info	US Electric Motors	US Electric Motors	
Electrical Power	208-230/460/3/60	230/460/3/60	
RPM	1730 RPM	1770 RPM	
Motor Efficiency %	78.0%	90.2%	
Approx Age	21	10	
ASHRAE Service Life	20	20	
Remaining Life	(1)	10	
Comments	VFD		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12019
Facility Name: Mary E. Roberts Elementary School
Address:
City, State, Zip

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Control Ref #	Proposed Lighting Controls					
			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, \$	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
121.11	Classroom R12	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R13	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R14	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R15	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R16	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	17	1.33	3,448	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	17	0.85	2,210	0.48	1,238	\$208	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	442	\$74
562	Classroom R16 Restroom	1200	Recessed Down Light, (1)18w CFL Lamp	1	18	1	0.02	22	Existing to Remain	Existing to Remain	1	18	0	0.02	22	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
121.11	Classroom R17	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	17	1.33	3,448	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	17	0.85	2,210	0.48	1,238	\$208	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	442	\$74
562	Classroom R17 Restroom	1200	Recessed Down Light, (1)18w CFL Lamp	1	18	1	0.02	22	Existing to Remain	Existing to Remain	1	18	0	0.02	22	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
121.11	Classroom R18	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R19	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom R20	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
131.21	Nurse's Office	2600	1x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	3	127	4	0.51	1,321	Reballast & Relamp	3 Lamp, 28w T8, Elect. Ballast; retrofit	3	75	4	0.30	780	0.21	541	\$91	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	156	\$26
227.21	Nurse's Office	2600	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	58	1	0.06	151	Existing to Remain	Existing to Remain	2	58	0	0.06	151	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	30	\$5
211.41	Nurse's Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	1	0.04	42	Existing to Remain	Existing to Remain	1	35	0	0.04	42	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
237.22	Conference Room	2600	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	92	6	0.55	1,435	Existing to Remain	Existing to Remain	3	92	0	0.55	1,435	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	287	\$48
211.41	Main Office Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	1	0.04	42	Existing to Remain	Existing to Remain	1	35	0	0.04	42	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
237.22	Principal's Office	2600	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	92	6	0.55	1,435	Existing to Remain	Existing to Remain	3	92	0	0.55	1,435	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	287	\$48
232.22	Main Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic	3	86	8	0.69	1,789	Existing to Remain	Existing to Remain	3	86	0	0.69	1,789	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	358	\$60
237.22	Main Office	2600	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	92	3	0.28	718	Existing to Remain	Existing to Remain	3	92	0	0.28	718	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	144	\$24
211.41	Faculty Restroom (2)	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	2	0.07	84	Existing to Remain	Existing to Remain	1	35	0	0.07	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Proposed Lighting Controls						
			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, \$
211.41	Phone Room	2600	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	1	0.04	91	Existing to Remain	Existing to Remain	1	35	0	0.04	91	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
232.22	Faculty Lounge	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic	3	86	7	0.60	1,565	Existing to Remain	Existing to Remain	3	86	0	0.60	1,565	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	313	\$53
222.21	Girl's Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	223	Existing to Remain	Existing to Remain	2	62	0	0.19	223	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
222.21	Boy's Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	3	0.19	223	Existing to Remain	Existing to Remain	2	62	0	0.19	223	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
332.2	Cafeteria	2600	2x4, 3 Lamp, 54w T5HO	3	180	15	2.70	7,020	Existing to Remain	Existing to Remain	3	180	0	2.70	7,020	0.00	0	\$0	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	1,404	\$236
221.11	Kitchen	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	17	1.05	2,740	Existing to Remain	Existing to Remain	2	62	0	1.05	2,740	0.00	0	\$0	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	548	\$92
617	Kitchen Hood	2600	100w A Lamp - Kit. Hood	1	100	3	0.30	780	Relamp	(1) 26w CFL Lamp	1	26	3	0.08	203	0.22	577	\$97	0	No New Controls	0	0.0%	0	\$0
200	Kitchen Restroom	1200	2x4, 4-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	4	156	1	0.16	187	Reballast & Relamp	4 Lamp, 28w T8, Elect. Ballast; retrofit	4	100	1	0.10	120	0.06	67	\$11	0	No New Controls	0	0.0%	0	\$0
222.31	Electrical Room	600	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	2	0.12	70	Existing to Remain	Existing to Remain	2	58	0	0.12	70	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
222.31	Work Room / Storage	600	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	58	3	0.17	104	Existing to Remain	Existing to Remain	2	58	0	0.17	104	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
222.11	Boy's Restroom	1200	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	3	0.19	223	Existing to Remain	Existing to Remain	2	62	0	0.19	223	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
222.11	Girl's Restroom	1200	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	3	0.19	223	Existing to Remain	Existing to Remain	2	62	0	0.19	223	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
121.11	Classroom Y21	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y22	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y23	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y24	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y25	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y26	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y27	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
121.11	Classroom Y28	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	12	0.94	2,434	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	12	0.60	1,560	0.34	874	\$147	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	312	\$52
221.11	Classroom Y29	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	21	1.30	3,385	Existing to Remain	Existing to Remain	2	62	0	1.30	3,385	0.00	0	\$0	3	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - Remote Mnt.	1	20.0%	677	\$114

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Proposed Lighting Controls						
			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, \$
221.31	Boiler Room	600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	62	4	0.25	149	Existing to Remain	Existing to Remain	2	62	0	0.25	149	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
652	Boiler Room	600	"Industrial" Relector, 28w CFL	1	28	4	0.11	67	Existing to Remain	Existing to Remain	1	28	0	0.11	67	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
128.31	Classroom A11	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	3	0.56	1,443	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	3	0.30	780	0.26	663	\$111	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	156	\$26
128.31	Classroom A10	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	3	0.56	1,443	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	3	0.30	780	0.26	663	\$111	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	156	\$26
128.31	Classroom A9	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	3	0.56	1,443	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	3	0.30	780	0.26	663	\$111	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	156	\$26
128.31	Classroom A8	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	3	0.56	1,443	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	3	0.30	780	0.26	663	\$111	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	156	\$26
128.31	Classroom A7	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	3	0.56	1,443	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	3	0.30	780	0.26	663	\$111	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	156	\$26
128.31	Classroom A6	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	7	1.30	3,367	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	7	0.70	1,820	0.60	1,547	\$260	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	364	\$61
128.31	Classroom A5	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	10	1.85	4,810	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	10	1.00	2,600	0.85	2,210	\$371	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	520	\$87
211.41	Classroom A5 Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	1	0.04	42	Existing to Remain	Existing to Remain	1	35	0	0.04	42	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
121.11	Classroom A5 Closet	600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	1	0.08	47	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	1	0.05	30	0.03	17	\$3	0	No New Controls	0	0.0%	0	\$0
128.31	Classroom A4	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	10	1.85	4,810	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	10	1.00	2,600	0.85	2,210	\$371	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	520	\$87
211.41	Classroom A4 Restroom	1200	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	1	35	1	0.04	42	Existing to Remain	Existing to Remain	1	35	0	0.04	42	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
121.11	Classroom A4 Closet	600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	2	78	1	0.08	47	Reballast & Relamp	2 Lamp, 28w T8, Elect. Ballast; retrofit	2	50	1	0.05	30	0.03	17	\$3	0	No New Controls	0	0.0%	0	\$0
128.31	Classroom A3	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	7	1.30	3,367	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	7	0.70	1,820	0.60	1,547	\$260	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	364	\$61
128.31	Classroom A2	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	6	1.11	2,886	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	6	0.60	1,560	0.51	1,326	\$223	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	312	\$52
142.31	Custodial Closet	600	2x4, 4-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	4	156	1	0.16	94	Reballast & Relamp	4 Lamp, 28w T8, Elect. Ballast; retrofit	4	100	1	0.10	60	0.06	34	\$6	0	No New Controls	0	0.0%	0	\$0
342.2	MPR	2600	2x4, 3 Lamp, 54w T5HO	3	180	28	5.04	13,104	Existing to Remain	Existing to Remain	3	180	0	5.04	13,104	0.00	0	\$0	4	Dual Technology Occupancy Sensor - Remote Mnt.	3	20.0%	2,621	\$440
121.31	MPR Office	2600	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	78	4	0.31	811	Remove Existing - Install New Troffer	(1) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	2	50	4	0.20	520	0.11	291	\$49	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	104	\$17
621	Stage	2600	150w A Lamp	1	150	10	1.50	3,900	Existing to Remain	Existing to Remain	0	0	10	0.00	0	1.50	3,900	\$655	0	No New Controls	0	0.0%	0	\$0
128.31	Classroom M32	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	10	1.85	4,810	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	10	1.00	2,600	0.85	2,210	\$371	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	520	\$87

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Proposed Lighting Controls						
			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, \$
128.31	Classroom M31	2600	8' Channel, 2 Lamp, 85w T12, Mag. Ballast, Pendant Mnt., Prismatic Lens	2	185	10	1.85	4,810	Remove Existing - Install New Troffer	(2) 2x4, 2 Lamp 28w T8, Electronic Ballast, Prismatic Lens, Specular Reflector	4	100	10	1.00	2,600	0.85	2,210	\$371	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	520	\$87
232.22	CST	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic	3	86	6	0.52	1,342	Existing to Remain	Existing to Remain	3	86	0	0.52	1,342	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	268	\$45
227.21	Corridor	3000	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	58	87	5.05	15,138	Existing to Remain	Existing to Remain	2	58	0	5.05	15,138	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
221.21	Corridor	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic	2	58	4	0.23	696	Existing to Remain	Existing to Remain	2	58	0	0.23	696	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	139	\$23
563	Corridor	3000	Recessed Down Light, (2)26w Quad CFL Lamp	1	52	2	0.10	312	Existing to Remain	Existing to Remain	1	52	0	0.10	312	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	62	\$10
221.21	Corridor	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic	2	58	4	0.23	696	Existing to Remain	Existing to Remain	2	58	0	0.23	696	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	139	\$23
563	Corridor	3000	Recessed Down Light, (2)26w Quad CFL Lamp	1	52	2	0.10	312	Existing to Remain	Existing to Remain	1	52	0	0.10	312	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	62	\$10
221.21	Corridor	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic	2	58	4	0.23	696	Existing to Remain	Existing to Remain	2	58	0	0.23	696	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	139	\$23
563	Corridor	3000	Recessed Down Light, (2)26w Quad CFL Lamp	1	52	4	0.21	624	Existing to Remain	Existing to Remain	1	52	0	0.21	624	0.00	0	\$0	2	Daylight Sensor (Sensorswitch PP-20 & CM PC or equal)	0.5	20.0%	125	\$21
TOTAL						573	55	141,488					314	40	103,890	15	37,598	6,316			45		17,328	2,911

CEG Project #: 9C12019
Facility Name: Mary E. Roberts Elementary School
Address:
City, State, Zip

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit						Retrofit Energy Savings			Proposed Lighting Controls						
			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, \$
231.33	Media Center	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	3	86	27	2.32	6,037	Existing to Remain	Existing to Remain	3	86	0	2.32	6,037	0.00	0	\$0	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	1,207	\$203
744	Media Center	2600	250w MH Pendant Mount	1	295	8	2.36	6,136	Reballast & Relamp	Retrofit: 200w MH Pulse Start Lamp and Ballast; Venture Lighting	1	228	8	1.82	4,742	0.54	1,394	\$234	0	No New Controls	0	0.0%	0	\$0
232.22	Media Center	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic	3	86	2	0.17	447	Existing to Remain	Existing to Remain	3	86	0	0.17	447	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
232.22	Media Center Work Room	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic	3	86	6	0.52	1,342	Existing to Remain	Existing to Remain	3	86	0	0.52	1,342	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	268	\$45
	TOTAL					43	5	13,962					8	5	12,568	1	1,394	234			3		1,476	248

CEG Project #: 9C12019
 Facility Name: Mary E. Roberts Elementary School
 Address: _____
 City, State, Zip: _____

Fixture Reference #	Location	Average Burn Hours	Existing Fixtures						Proposed Fixtures Retrofit								Retrofit Energy Savings			Proposed Lighting Controls					
			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, \$	
700	Exterior	4000	70w HPS, 1x1 Surface Mnt., Prismatic Lens	1	92	2	0.18	736	Existing to Remain	Existing to Remain	1	92	0	0.18	736	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	
725	Exterior	4000	150w HPS Wallpack	1	188	3	0.56	2,256	Existing to Remain	Existing to Remain	1	188	0	0.56	2,256	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	
551	Exterior	4000	Recessed Down Light, 100w A Lamp	1	100	3	0.30	1,200	Relamp	26w CFL Lamp	26	26	3	0.08	312	0.22	888	\$149	0	No New Controls	0	0.0%	0	\$0	
710	Exterior	4000	100w HPS Wallpack	0	125	3	0.38	1,500	Existing to Remain	Existing to Remain	0	125	0	0.38	1,500	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	
	TOTAL					11	1	5,692					3	1	4,804	0	888	149			0		0	0	

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
Mary Roberts Elementary School	4275	SHARP NU-U235F2	224	17.5	3,929	52.64	66,258	42.6	9,386	13.40



 = Proposed PV Layout

Notes:

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

Project Name: LGEA Solar PV Project - Mary Roberts Elementary School										
Location: Moorestown, NJ										
Description: Photovoltaic System 100% Financing - 15 year										
Simple Payback Analysis										
		Photovoltaic System 100% Financing - 15 year								
Total Construction Cost		\$296,673								
Annual kWh Production		66,258								
Annual Energy Cost Reduction		\$11,131								
Average Annual SREC Revenue		\$12,661								
Simple Payback:		12.47						Years		
Life Cycle Cost Analysis										
Analysis Period (years):		15						Financing %:		100%
Discount Rate:		3%						Maintenance Escalation Rate:		3.0%
Average Energy Cost (\$/kWh)		\$0.168						Energy Cost Escalation Rate:		3.0%
Financing Rate:		6.00%						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	66,258	\$11,131	\$0	\$16,565	\$17,458	\$12,584	(\$2,346)	(\$2,346)	
2	\$0	65,927	\$11,465	\$0	\$16,482	\$16,682	\$13,360	(\$2,095)	(\$4,441)	
3	\$0	65,597	\$11,809	\$0	\$16,399	\$15,858	\$14,184	(\$1,833)	(\$6,274)	
4	\$0	65,269	\$12,164	\$0	\$16,317	\$14,983	\$15,059	(\$1,561)	(\$7,836)	
5	\$0	64,943	\$12,528	\$669	\$16,236	\$14,054	\$15,988	(\$1,947)	(\$9,782)	
6	\$0	64,618	\$12,904	\$666	\$12,924	\$13,068	\$16,974	(\$4,880)	(\$14,662)	
7	\$0	64,295	\$13,291	\$662	\$12,859	\$12,021	\$18,021	(\$4,554)	(\$19,216)	
8	\$0	63,973	\$13,690	\$659	\$12,795	\$10,910	\$19,132	(\$4,216)	(\$23,432)	
9	\$0	63,654	\$14,101	\$656	\$12,731	\$9,730	\$20,312	(\$3,866)	(\$27,297)	
10	\$0	63,335	\$14,524	\$652	\$9,500	\$8,477	\$21,565	(\$6,670)	(\$33,968)	
11	\$0	63,019	\$14,960	\$649	\$9,453	\$7,147	\$22,895	(\$6,279)	(\$40,246)	
12	\$0	62,704	\$15,408	\$646	\$9,406	\$5,735	\$24,307	(\$5,874)	(\$46,120)	
13	\$0	62,390	\$15,871	\$643	\$9,359	\$4,236	\$25,806	(\$5,455)	(\$51,575)	
14	\$0	62,078	\$16,347	\$639	\$6,208	\$2,644	\$27,398	(\$8,127)	(\$59,702)	
15	\$0	61,768	\$16,837	\$636	\$6,177	\$954	\$29,088	(\$7,664)	(\$67,366)	
Totals:		959,827	\$207,031	\$7,177	\$183,408	\$153,956	\$296,673	(\$67,366)	(\$414,263)	
Net Present Value (NPV)							(\$47,777)			