

**CLIFTON PUBLIC SCHOOLS
PUBLIC SCHOOL #5**

**136 VALLEY ROAD
CLIFTON, NEW JERSEY 07013**

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:	General Lighting and Power (GLP)
Third Party Supplier:	Champion Energy Services LLC

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

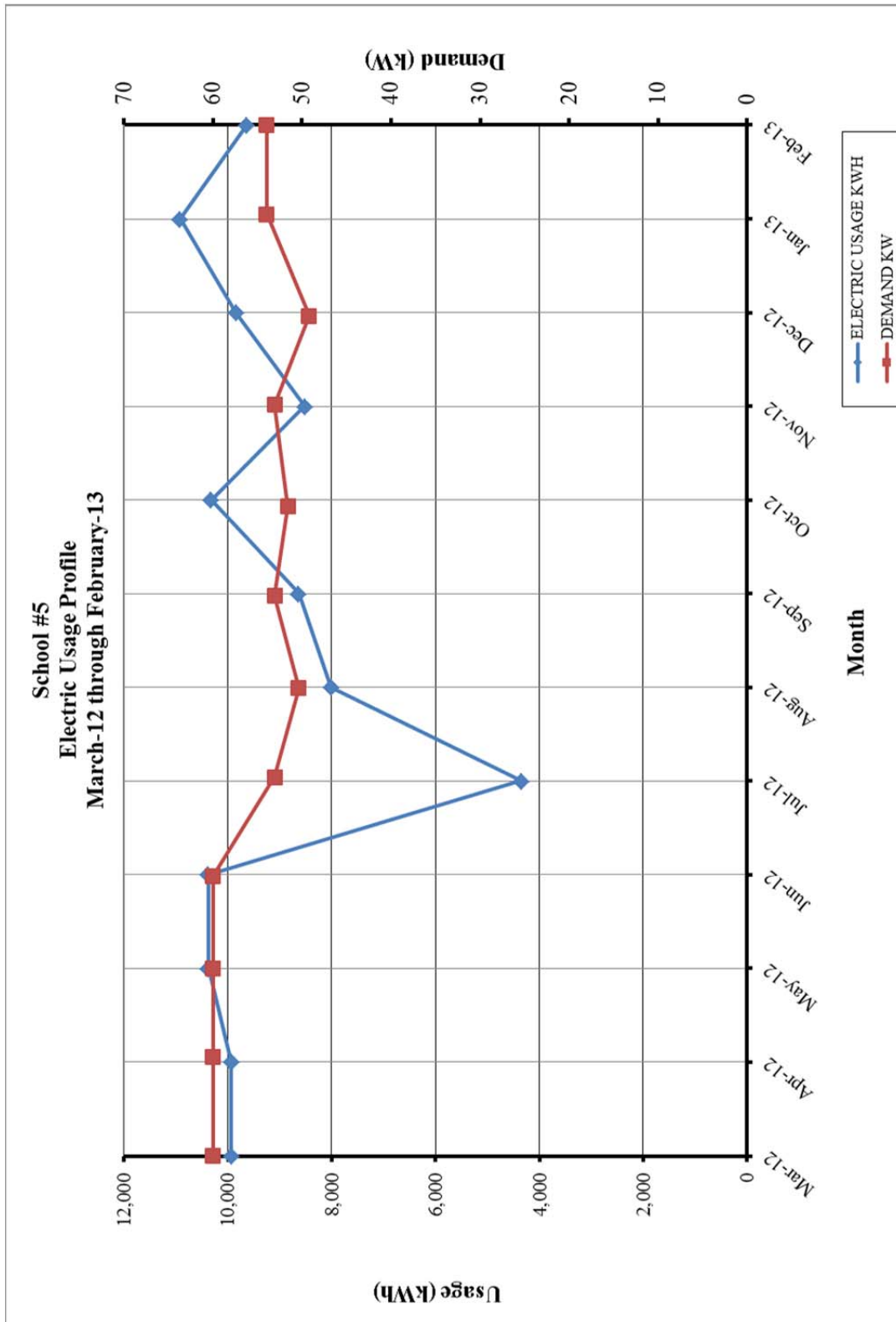
The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts 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: GLP			
Meter No: 678001601			
Account No: 65 167 583 01			
Third Party Utility Provider: Champion Energy Services LLC			
TPS Meter / Acct No: -			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	9,930	60.0	\$1,704
Apr-12	9,930	60.0	\$1,704
May-12	10,380	60.0	\$1,860
Jun-12	10,380	60.0	\$1,860
Jul-12	4,350	53.1	\$1,134
Aug-12	8,010	50.4	\$1,511
Sep-12	8,640	53.1	\$1,141
Oct-12	10,320	51.6	\$1,309
Nov-12	8,520	53.1	\$1,125
Dec-12	9,840	49.2	\$1,249
Jan-13	10,920	54.0	\$1,445
Feb-13	9,630	54.0	\$1,281
Totals	110,850	60.0 Max	\$17,322
AVERAGE DEMAND		54.9 KW average	
AVERAGE RATE		\$0.156 \$/kWh	

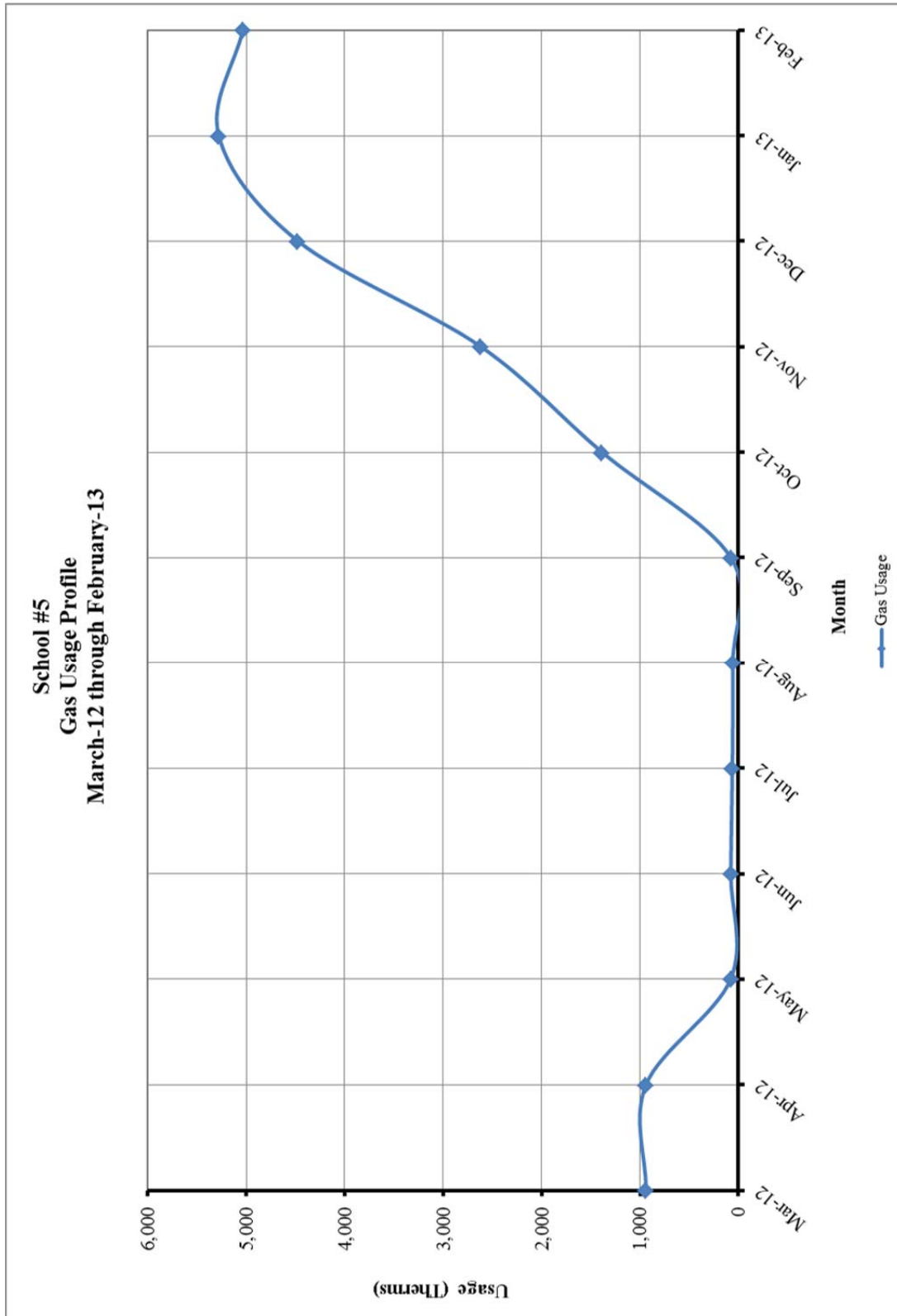
Figure 1
Electricity Usage Profile



**Table 2
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: GSG (HTG), LVG		
Meter No: 1990027, 2600152		
Account No: 65 167 583 01		
Third Party Utility Provider: Hess		
TPS Meter No: 446575/447979		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Mar-12	938.94	\$758.82
Apr-12	938.93	\$586.13
May-12	78.41	\$150.59
Jun-12	78.40	\$154.02
Jul-12	61.98	\$148.04
Aug-12	57.72	\$144.64
Sep-12	77.73	\$155.58
Oct-12	1,389.06	\$1,572.18
Nov-12	2,620.58	\$2,609.10
Dec-12	4,477.57	\$4,077.02
Jan-13	5,280.96	\$4,679.03
Feb-13	5,034.20	\$4,599.32
TOTALS	21,034.47	\$19,634.46
AVERAGE RATE:	\$0.93	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Public School #5 is located at 136 Valley Road in Clifton, New Jersey. The 15,120 SF Elementary school was built in 1913, with three additions since the original construction. The first was an 11,530 SF addition completed in 1929. The second was a 16,420 SF addition completed in 1951, and the third was a 6,575 SF addition completed in 1964. The building is a two story facility comprised of classrooms, offices, cafeteria, gym, media center and mechanical rooms.

Occupancy Profile

The typical hours of operation for the elementary school are Monday through Friday between 7:00 AM and 4:00 PM. Maintenance staff is present in the building as early as 6:00 AM. The school's enrollment is approximately 368 students, grades kindergarten through 5th, and has 29 teachers, support staff, and administrative personnel.

Building Envelope

Exterior walls are brick faced with concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the facility are double pane, operable, ¼" clear glass with wooden frames. Portions of the roof are pitched with asphalt shingles; however, the majority of the roof is a flat EPDM rubber roof on steel decking. The amount of insulation below the roof is unknown.

HVAC Systems

The elementary school HVAC systems consist of three steam boilers, unit ventilators in the classrooms, and window air conditioning units in several areas. In the main building boiler room, there are two gas-fired HB Smith 450 Mills cast iron sectional boilers. Each boiler has 13 sections with a total nameplate rated input capacity of 3,370 MBH and an output capacity of 2,640 MBH, or an efficiency of 78%. In the boiler room attached to the gym, there is a gas-fired Weil McLain model ICH/HR-40-7 cast iron sectional boiler. This boiler has a nameplate rated input capacity of 1,700 MBH and an output capacity of 1,346 MBH, or an efficiency of 79%

Fresh air is supplied to the building by the unit ventilators in each classroom. These units have steam heating coils and a fan set up in a blow through arrangement. Each unit has an outside air inlet and supplies air directly to the space in which it is located. The unit ventilators all appear to be very old and well beyond their useful life.

Exhaust System

Air is exhausted from the toilet rooms through switch operated exhaust fans. There are also two exhaust fans that exhaust air from the gym through the roof. The gym exhaust fans are controlled by a timer.

HVAC System Controls

The HVAC systems within the building are controlled through local electronic controls and timers. The classrooms have individual thermostats to control a steam valve at the unit ventilators and radiators. The larger systems that are on a timer are set up for an occupied schedule of approximately 6:00 AM till 3:00 PM.

Domestic Hot Water

Domestic hot water for the restrooms is provided by two hot water heaters. In the main boiler room, there is a Rheem model 22V50F1 domestic water heater. This unit has a 50 gallon tank size, and an input rating of 38 MBH. It has a recovery capacity of 32.2 gallons per hour. In the gym boiler room, there is a Rheem model 81V30D domestic water heater. This unit has a tank size of 30 gallons, and is an electric unit with an input of 4,500 Watts.

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.

Miscellaneous

The kitchen is equipped with two TurboAire Energy Star rated reach in refrigerators, one EPCO heating rack, and one Powers chest cooler.

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	\$24,770	\$1,644	15.1	-0.4%
ECM #2	Lighting Upgrade - MPR	\$5,040	\$126	40.0	-62.5%
ECM #3	Lighting Upgrade - Exterior	\$1,080	\$125	8.6	73.6%
ECM #4	Lighting Controls Upgrade	\$8,110	\$812	10.0	50.2%
ECM #5	DDC Building Controls Upgrade	\$207,380	\$1,953	106.2	-85.9%
ECM #6	New Boiler Burner and Controls	\$0	\$978	52.1	-59.7%
ECM #7	Steam Trap Replacement	\$48,910	\$3,928	12.5	-19.7%
ECM #8	Condensate Receiver Replacement	\$39,400	\$409	96.3	-89.6%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	67.21 KW PV System	\$416,665	\$26,956	15.5	-3.0%

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 - General	7.6	10,540	-
ECM #2	Lighting Upgrade - MPR	0.5	806	-
ECM #3	Lighting Upgrade - Exterior	0.4	799	-
ECM #4	Lighting Controls Upgrade	-	5,208	-
ECM #5	DDC Building Controls Upgrade	0.0	1,518	1,845
ECM #6	New Boiler Burner and Controls	0.0	0	1,052
ECM #7	Steam Trap Replacement	0.0	0	6,081
ECM #8	Condensate Receiver Replacement	0.0	53	430
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	67.21 KW PV System	67.2	77,664	-

**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	\$1,644	\$27,440	\$2,670	\$24,770	15.1
Lighting Upgrade - MPR	\$126	\$5,440	\$400	\$5,040	40.0
Lighting Upgrade - Exterior	\$125	\$1,680	\$600	\$1,080	8.6
Lighting Controls Upgrade	\$812	\$9,200	\$1,090	\$8,110	10.0
DDC Building Controls Upgrade	\$1,953	\$207,380	\$0	\$207,380	106.2
New Boiler Burner and Controls	\$978	\$51,000	\$0	\$51,000	52.1
Steam Trap Replacement	\$3,928	\$48,910	\$0	\$48,910	12.5
Condensate Receiver Replacement	\$409	\$39,400	\$0	\$39,400	96.3
<i>Design / Construction Extras (15%)</i>		\$13,901		<i>\$13,901</i>	
Total Project	\$6,635	\$106,571	\$4,760	\$101,811	15.3

Note: ECM's with the strike-through font are not included in the ESIP.

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 Clifton Elementary School #5 is provided with fluorescent fixtures with older generation, 700 series and 741/ECO 32W T8 lamps and electronic ballasts. Although these T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. Concord Engineering recommends that most of 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. For other areas that are over lit, Concord Engineering recommends that the fixture be retrofitted with new Super T-8 lamps/reflector, de-lamped to the appropriate light levels, and a new high-efficiency electronic ballast be installed.

This 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. 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. 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. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$27,440
NJ Smart Start Equipment Incentive (\$):	\$2,670
Net Installation Cost (\$):	\$24,770
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,644
Total Yearly Savings (\$/Yr):	\$1,644
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.1
Simple Lifetime ROI	-0.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$24,660
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	(\$5,144.03)

ECM #2: Lighting Upgrade – Multi-Purpose Room

Description:

The Multi-Purpose Room at Clifton Elementary School #5 is 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 (\$):	\$5,440
NJ Smart Start Equipment Incentive (\$):	\$400
Net Installation Cost (\$):	\$5,040
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$126
Total Yearly Savings (\$/Yr):	\$126
Estimated ECM Lifetime (Yr):	15
Simple Payback	40.0
Simple Lifetime ROI	-62.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,890
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	(\$3,535.82)

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at Clifton Elementary School #5 is currently lit via 70 watt high pressure sodium (HPS) wall packs. The exterior would be better served with more efficient LED lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient LED lighting system that includes LED lamps for the existing 70 watt HPS wall packs on the exterior with 20 watt Lumarck LED Wall packs.

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 (\$):	\$1,680
NJ Smart Start Equipment Incentive (\$):	\$600
Net Installation Cost (\$):	\$1,080
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$125
Total Yearly Savings (\$/Yr):	\$125
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.6
Simple Lifetime ROI	73.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,875
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	\$412.24

ECM #4: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Elementary School #5 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:

Energy Savings = (% Savings × Controlled Light Energy (kWh/Yr))

Savings. = Energy Savings (kWh) × 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 #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$9,200
NJ Smart Start Equipment Incentive (\$):	\$1,090
Net Installation Cost (\$):	\$8,110
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$812
Total Yearly Savings (\$/Yr):	\$812
Estimated ECM Lifetime (Yr):	15
Simple Payback	10.0
Simple Lifetime ROI	50.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$12,180
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	\$1,583.60

ECM #5: Digital Energy Management System (DDC EMS)

Description:

Currently, Clifton Public School #5 uses a pneumatic control system. This system is very old and offers limited control options for the HVAC systems.

Concord Engineering recommends installing a DDC system throughout the school to control all of the HVAC systems including the boilers, indoor air handling units, and roof exhaust fans.

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

The new DDC system has the potential to provide significant savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, etc. The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the “Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways,” document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the referenced report:

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the electricity and 10% for natural gas in these buildings.

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

Energy Savings Calculations:

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

Energy Savings (Utility) = Current Energy Consumption × Estimated Savings, %

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

DDC ENERGY MANAGEMENT SYSTEM CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Nat Gas Usage (Therms)	18,452	-	
Existing Electricity Usage (kWh)	30,365	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	5%	
Gas Cost (\$/Therm)	\$0.93	\$0.93	
Electricity Cost (\$/kWh)	\$0.156	\$0.156	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Nat Gas Usage (Therms)	18,452	16,607	1,845
Electricity Usage (kWh)	30,365	28,847	1,518
Nat Gas Cost (\$)	\$17,161	\$15,445	\$1,716
Electricity Cost (\$)	\$4,737	\$4,500	\$237
Energy Cost (\$)	\$21,898	\$19,945	\$1,953
COMMENTS:			

Demand savings due to implementation of this ECM is minimal.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately \$4.18 per SF in accordance with recent Contractor pricing for systems of this magnitude. Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$207,380
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$207,380
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,953
Total Yearly Savings (\$/Yr):	\$1,953
Estimated ECM Lifetime (Yr):	15
Simple Payback	106.2
Simple Lifetime ROI	-85.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$29,295
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	(\$184,065.21)

ECM #6: Steam Boiler Burner & Controls Upgrade

Description:

The majority of the heating is provided to the Clifton Public School 5 facility by two HB Smith 450 mills cast iron sectional steam boilers and one Weil McLain HR-40 steam boiler. Based on age and condition, these boilers should receive a 5%-10% gain in efficiency with more advanced burner controls.

This ECM will install new Cleaver Brooks Profire burners with Honeywell controls on each of these boilers with separate motors that will control fuel flow, excess air oxygen trim and variable speed on the blower. Installation of this system will result in improved operating efficiency of the boilers and less cycling of boilers since the boilers can operate closer to the demanded load requirement.

Energy Savings Calculations:

Annual Heating Energy Savings = Existing Fuel Consumption x 5% Efficiency Increase

Heating Cost Savings = Annual Heating Energy x Fuel Cost \$/Unit

Month	Days	Fuel Usage , kBtu	Fuel Usage, Therms	Avg Boiler Input Load, Btu/h	Fuel Usage Reduction, kBtu	Fuel Usage Reduction, Therms	Fuel Cost Savings
January	31	526,871.4	5,268.7	708,160.5	26,343.6	263.4	\$245
February	28	477,709.0	4,777.1	710,876.5	23,885.5	238.9	\$222
March	31	205,508.7	2,055.1	276,221.3	10,275.4	102.8	\$96
April	30	94,326.2	943.3	131,008.6	4,716.3	47.2	\$44
May	31	32,774.7	327.7	44,052.0	1,638.7	16.4	\$15
June	30	7,456.4	74.6	10,356.1	372.8	3.7	\$3
July	31	6,924.4	69.2	9,307.0	346.2	3.5	\$3
August	31	6,127.1	61.3	8,235.4	306.4	3.1	\$3
September	30	7,579.4	75.8	10,526.9	379.0	3.8	\$4
October	31	109,908.3	1,099.1	147,726.2	5,495.4	55.0	\$51
November	30	236,288.7	2,362.9	328,178.7	11,814.4	118.1	\$110
December	31	391,972.7	3,919.7	526,845.1	19,598.6	196.0	\$182
Total	365	2,103,447.0	21,034.5		105,172	1,052	\$978

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$51,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$51,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$978
Total Yearly Savings (\$/Yr):	\$978
Estimated ECM Lifetime (Yr):	21
Simple Payback	52.1
Simple Lifetime ROI	-59.7%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$20,538
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	(\$35,924.11)

ECM #7: Steam Trap Replacement Program

Description:

Steam traps are required for the proper operation of steam distribution systems. Traps are mechanical devices installed on steam pipes to remove condensate from steam flow. When working properly, traps allow condensate to pass, while keeping the steam in the system to deliver heat where it is needed. Unfortunately steam traps have a tendency to leak. On average, steam traps have a useful life of 5 years, and with the large quantity of traps typically used within a facility, maintenance personnel have a hard time keeping up with the replacements. As a result, steam is lost and energy is wasted.

This ECM would replace approximately fourteen (14) steam traps throughout the building. All non-thermostatic traps will be replaced with either bucket or float & thermostatic traps. Thermostatic traps will be repaired with cage units and new covers. Where repairing is not feasible, the thermostatic traps will be replaced. Schedule 80 piping and extra heavy fittings will be used, and all piping and fittings between the unions will be replaced along with the steam traps. In addition, a complete steam trap survey will be performed along with tagging and implementing a 3-year, revolving, steam trap maintenance program.

Energy Savings Calculations:

See **Appendix G** for a detailed analysis.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$48,910
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$48,910
Maintenance Savings (\$/Yr):	(\$1,728)
Energy Savings (\$/Yr):	\$5,655
Total Yearly Savings (\$/Yr):	\$3,928
Estimated ECM Lifetime (Yr):	10
Simple Payback	12.5
Simple Lifetime ROI	-19.7%
Simple Lifetime Maintenance Savings	(\$17,276)
Simple Lifetime Savings	\$39,279
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$15,404.27)

ECM #8: Condensate Pump and Receiver Replacement

Description:

The condensate pump and receiver set in the boiler room is in very poor condition and leaking condensate from the receiver and pump seals. The lost condensate is a loss of water which is costly and a loss of 200° F water that does not return to the receiver and steam boilers. The make-up water has to be heated from 55° F resulting in a loss of energy.

Energy Savings Calculations:

The losses of condensate were estimated and the energy required to heat the make-up water from 60°F to 200°F was calculated. The existing condensate pumps have older less efficient motors and the efficiency gained by installing premium efficiency motors was also calculated.

See **Appendix H** for detailed energy savings calculations.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$39,400
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$39,400
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$409
Total Yearly Savings (\$/Yr):	\$409
Estimated ECM Lifetime (Yr):	10
Simple Payback	96.3
Simple Lifetime ROI	-89.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$4,090
Internal Rate of Return (IRR)	-28%
Net Present Value (NPV)	(\$35,911.15)

REM #1: 67.21 kW Solar System

Description:

The Clifton Elementary School #5 has available roof space that could accommodate a significant amount of solar generation, provided the roof can accommodate the additional panel weight. Based on the available areas a 67.21 kilowatt solar array could be installed. The array will produce approximately 77,664 kilowatt-hours annually that will reduce the overall electric usage of the facility by 70.06%.

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}):	67.21
Electric Generation (KWH/Yr):	77,664
Installation Cost (\$):	\$416,665
SREC Revenue (\$/Yr):	\$14,840
Energy Savings (\$/Yr):	\$12,116
Total Yearly Savings (\$/Yr):	\$26,956
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	15.5
Analysis Period Electric Savings (\$):	\$225,337
Analysis Period SREC Revenue (\$):	\$214,981
Net Present Value (NPV)	(\$147,332.69)

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. While the District is already performing many of these functions through routine maintenance it is important to continue to address these items as they provide an energy savings benefit.

- A. Maintain all weather stripping on windows and doors.
- B. Clean all light fixtures to maximize light output.
- C. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- D. Turn off computers when not in use. Ensure computers are not running in screen saver mode.
- E. Replace older style CRT monitors with newer energy efficient LCD/LED monitors.
- F. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Clifton Public Schools – School #5

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	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 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	\$12,800	\$14,640	\$2,670	\$24,770	\$1,644	\$0	\$1,644	15	\$24,660	\$0	-0.4%	15.1	-0.06%	(\$5,144.03)
ECM #2	Lighting Upgrade - MPR	\$1,800	\$3,640	\$400	\$5,040	\$126	\$0	\$126	15	\$1,890	\$0	-62.5%	40.0	-10.33%	(\$3,535.82)
ECM #3	Lighting Upgrade - Exterior	\$1,200	\$480	\$600	\$1,080	\$125	\$0	\$125	15	\$1,875	\$0	73.6%	8.6	7.85%	\$412.24
ECM #4	Lighting Controls Upgrade	\$6,100	\$3,100	\$1,090	\$8,110	\$812	\$0	\$812	15	\$12,180	\$0	50.2%	10.0	5.58%	\$1,583.60
ECM #5	DDC Building Controls Upgrade	\$207,380	\$0	\$0	\$207,380	\$1,953	\$0	\$1,953	15	\$29,295	\$0	-85.9%	106.2	-18.19%	(\$184,065.21)
ECM #6	New Boiler Burner and Controls	\$26,000	\$25,000	\$0	\$51,000	\$978	\$0	\$978	21	\$20,538	\$0	-59.7%	52.1	-7.11%	(\$35,924.11)
ECM #7	Steam Trap Replacement	\$13,510	\$35,400	\$0	\$48,910	\$5,655	(\$1,728)	\$3,928	10	\$39,279	-\$17,276	-19.7%	12.5	-3.80%	(\$15,404.27)
ECM #8	Condensate Receiver Replacement	\$30,000	\$9,400	\$0	\$39,400	\$409	\$0	\$409	10	\$4,090	\$0	-89.6%	96.3	-28.44%	(\$35,911.15)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	67.21 KW PV System	\$416,665	\$0	\$0	\$416,665	\$12,116	\$14,840	\$26,956	15	\$404,340	\$222,600	-3.0%	15.5	-0.37%	(\$94,866.02)

- 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 11, 2013:

Electric Chillers

Water-Cooled Chillers	\$16 - \$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
A/C Economizing Controls	≤ 5 tons \$85/unit; >5 tons \$170/unit

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	\$2.00 per MBH, but not less than \$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	\$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	\$1,200 - \$2,700
Low Intensity Infrared Heating	\$300 - \$500 per unit

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
Boiler Fans \geq 5 HP	\$65 to \$155 per hp
Boiler Feed Water Pumps \geq 5 HP	\$60 to \$155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit \$55 – \$300 per hp New Hood \$55 - \$250 per 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 (Expires 3/1/2013)	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities (Expires 3/1/2013)	\$25 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	\$15 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 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 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 (1x4, 2x2, 2x4 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Screw-based & Pin-based (PAR, MR, BR, R) Standards (A-Style) and Decorative Lamps	\$20 per lamp
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$30 per 4 foot \$42 per 5 foot \$65 per 6 foot
LED Retrofit Kits	To be evaluated through the customer measure path

Lighting Controls – Occupancy Sensors

Wall Mounted	\$20 per control
Remote Mounted	\$35 per control
Daylight Dimmers	\$25-\$50 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

Premium Motors

Three-Phase Motors (<i>Expires 3/1/2013</i>)	\$45 - \$700 per motor
Fractional HP Motors Electronic Commutated Motors (replacing shaded pole motors in refrigerator/freezer cases)	\$40 per electronic commutated motor

Refrigeration Doors/Covers

Energy-Efficient Doors/Covers for Installation on Open Refrigerated Cases	\$100 per door
Aluminum Night Curtains for Installation on Open Refrigerated Cases	\$3.50 per linear foot

Refrigeration Controls

Door Heater Controls	\$50 per control
Electric Defrost Controls	\$50 per control
Evaporator Fan Controls	\$75 per control
Novelty Cooler Shutoff	\$50 per control

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 an IRR of at least 10%.

APPENDIX C



STATEMENT OF ENERGY PERFORMANCE

5-Clifton BOE - PS 5

Building ID: 3477571

For 12-month Period Ending: February 28, 2013¹

Date SEP becomes ineligible: N/A

Date SEP Generated: April 11, 2013

Facility
5-Clifton BOE - PS 5
136 Valley Road
Clifton, NJ 07013

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

Primary Contact for this Facility
Karen Perkins
745 Clifton Avenue
Clifton, NJ 07013

Year Built: 1913

Gross Floor Area (ft²): 49,645Energy Performance Rating² (1-100) 78**Site Energy Use Summary³**

Electricity - Grid Purchase(kBtu)	377,097
Natural Gas (kBtu) ⁴	2,003,527
Total Energy (kBtu)	2,380,624

Energy Intensity⁴

Site (kBtu/ft ² /yr)	48
Source (kBtu/ft ² /yr)	68

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	160
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Electric Distribution Utility

Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	64
National Median Source EUI	91
% Difference from National Median Source EUI	-25%
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:

- 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.
- 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.
- Values represent energy consumption, annualized to a 12-month period.
- Values represent energy intensity, annualized to a 12-month period.
- 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	<input checked="" type="checkbox"/>
Building Name	5-Clifton BOE - PS 5	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	K-12 School	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	136 Valley Road, Clifton, NJ 07013	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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.		<input type="checkbox"/>
Elementary School 5 (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	49,645 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.		<input type="checkbox"/>
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.		<input type="checkbox"/>
Number of PCs	94	Is this the number of personal computers in the K12 School?		<input type="checkbox"/>
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.		<input type="checkbox"/>
Presence of cooking facilities	No	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".		<input type="checkbox"/>
Percent Cooled	10 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		<input type="checkbox"/>

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'.		<input type="checkbox"/>
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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: electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/09/2013	02/08/2013	10,920.00
12/09/2012	01/08/2013	9,840.00
11/09/2012	12/08/2012	8,520.00
10/09/2012	11/08/2012	10,320.00
09/09/2012	10/08/2012	8,640.00
08/09/2012	09/08/2012	8,010.00
07/09/2012	08/08/2012	4,350.00
06/09/2012	07/08/2012	10,380.00
05/09/2012	06/08/2012	10,380.00
04/09/2012	05/08/2012	9,930.00
03/09/2012	04/08/2012	9,930.00
electric Consumption (kWh (thousand Watt-hours))		101,220.00
electric Consumption (kBtu (thousand Btu))		345,362.64
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		345,362.64
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
01/09/2013	02/08/2013	5,280.96
12/09/2012	01/08/2013	4,477.57
11/09/2012	12/08/2012	2,620.58
10/09/2012	11/08/2012	1,389.06
09/09/2012	10/08/2012	77.73
08/09/2012	09/08/2012	57.72
07/09/2012	08/08/2012	61.98
06/09/2012	07/08/2012	78.40
05/09/2012	06/08/2012	78.41
04/09/2012	05/08/2012	938.93
03/09/2012	04/08/2012	938.94

gas Consumption (therms)	16,000.28
gas Consumption (kBtu (thousand Btu))	1,600,028.00
Total Natural Gas Consumption (kBtu (thousand Btu))	1,600,028.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

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-Clifton BOE - PS 5
136 Valley Road
Clifton, NJ 07013

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

Primary Contact for this Facility
Karen Perkins
745 Clifton Avenue
Clifton, NJ 07013

General Information

5-Clifton BOE - PS 5	
Gross Floor Area Excluding Parking: (ft ²)	49,645
Year Built	1913
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Elementary School 5	
Space Type	K-12 School
Gross Floor Area (ft ²)	49,645
Open Weekends?	No
Number of PCs	94
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	10
Percent Heated	100
Months °	10
High School?	No
School District °	clifton

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 02/28/2013)	Baseline (Ending Date 02/28/2013)	Rating of 75	Target	National Median
Energy Performance Rating	78	78	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	48	48	50	N/A	64
Source (kBtu/ft ²)	68	68	71	N/A	91
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	160	160	168	N/A	215
kgCO ₂ e/ft ² /year	3	3	3	N/A	4

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.

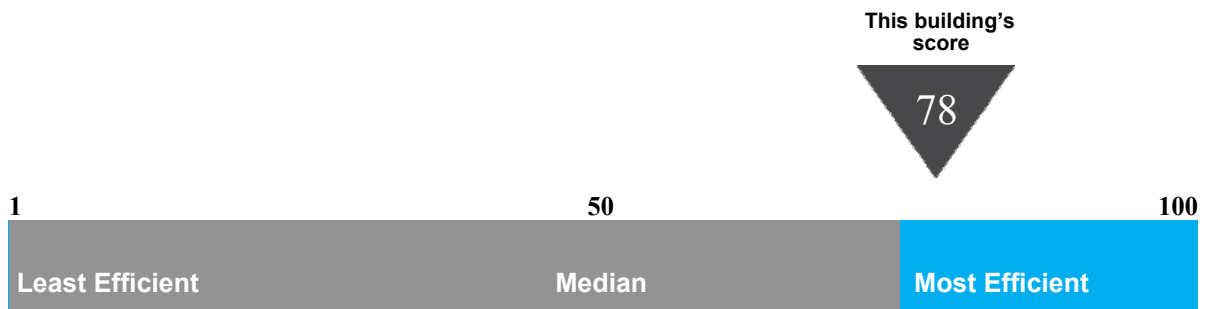
Statement of Energy Performance

2013

5-Clifton BOE - PS 5
136 Valley Road
Clifton, NJ 07013

Portfolio Manager Building ID: 3477571

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 68 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending February 2013

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

School #5

AC Units

Tag	UV		
Unit Type	Unit Ventilator		
Qty	19		
Location	Classrooms		
Area Served	Classrooms		
Manufacturer	Nesbitt		
Model #	-		
Serial #	-		
Cooling Type	N/A		
Cooling Capacity (Tons)	N/A		
Cooling Efficiency (SEER/EER)	N/A		
Heating Type	Steam		
Heating Input (MBH)	-		
Efficiency	-		
Fuel	-		
Approx Age	>25		
ASHRAE Service Life	25		
Remaining Life	0		
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #5

Boilers

Tag	B-1 & B-2	B-3	
Unit Type	Cast Iron Sectional	Cast Iron Sectional	
Qty	2	1	
Location	Main Boiler Room	Gym Boiler Room	
Area Served	Building Heat	Building Heat	
Manufacturer	HB Smith	Weil McLain	
Model #	450 Mills	HR-40	
Serial #	-	-	
Input Capacity (MBH)	3,370	1,700	
Rated Output Capacity (MBH)	2,640	1,346	
Approx. Efficiency %	78.3%	79.2%	
Fuel	Natural Gas	Natural Gas	
Approx Age	-	46	
ASHRAE Service Life	25	25	
Remaining Life	0	(21)	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #5

Domestic Water Heaters

Tag	DHW-1	DHW-2	
Unit Type	DHW Heater	DHW Heater	
Qty	1	1	
Location	Main Boiler Room	Gym Boiler Room	
Area Served	Building DHW	Building DHW	
Manufacturer	Rheem	Rheem	
Model #	22V50F1	81V30D	
Serial #	RHLN0806514579	RH 1202B09801	
Size (Gallons)	50	30	
Input Capacity (MBH/KW)	38 MBH	9 kW	
Recovery (Gal/Hr)	32.2	0.61416	
Efficiency %	71%	100%	
Fuel	Nat Gas	Electricity	
Approx Age	7	11	
ASHRAE Service Life	10	10	
Remaining Life	3	(1)	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #5

Pumps

Tag	CRP-1	CRP-2	
Unit Type	Condensate Return	Condensate Return	
Qty	1	1	
Location	Main Boiler Room	Under Stage	
Area Served	Boilers 1 & 2	Boiler 3	
Manufacturer	Skidmore	-	
Model #	10MX P/MTP	-	
Serial #		-	
Horse Power	0.5	0.5	
Flow	-	-	
Motor Info		AO Smith	
Electrical Power	208-230/460 V 3 Ph	200 / 400 V 3 Ph	
RPM	3450	3450	
Motor Efficiency %	-	-	
Approx Age	-	-	
ASHRAE Service Life	20	20	
Remaining Life	-	-	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12066
 Facility Name: School #5
 Address: 136 Valley Road
 City, State, Zip: Clifton, New Jersey

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE 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, \$
5	0 - Cafeteria #1	2000	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	14	0.81	1,624	Existing to Remain	Existing to Remain	2	58	0	0.81	1,624	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
7	0 - Kitchen #2	1600	1x4 Surface Utility w/ Tube Guard 2-Lamp 32 W T8	2	58	5	0.29	464	Existing to Remain	Existing to Remain	2	58	0	0.29	464	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
9	0 - Kitchen Storage Rooms	1000	100 W Incandescent A-Lamp	1	100	4	0.40	400	Re-Lamp	23w CFL Screw Base	1	23	4	0.09	92	0.31	308	\$48	0	No New Controls	0	0.0%	0	\$0
1	0 - Storage Room #3	1000	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	4	0.23	232	Existing to Remain	Existing to Remain	2	58	0	0.23	232	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	0 - Cafeteria #4	2000	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	4	0.23	464	Existing to Remain	Existing to Remain	2	58	0	0.23	464	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	0 - Science Storage #5	1000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	12	0.70	696	Existing to Remain	Existing to Remain	2	58	0	0.70	696	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	0 - Music #6	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
1	0 - Cafeteria #7	2000	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	2	0.12	232	Existing to Remain	Existing to Remain	2	58	0	0.12	232	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	0 - Nurse #8	1800	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	2	0.12	209	Existing to Remain	Existing to Remain	2	58	0	0.12	209	0.00	0	\$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	42	\$7
1	0 - Small Group #9	1400	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	6	0.35	487	Existing to Remain	Existing to Remain	2	58	0	0.35	487	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	97	\$15
10	0 - Small Group #9	1400	40 W Incandescent A-Lamp	1	40	1	0.04	56	Re-Lamp	9w CFL Screw Base	1	9	1	0.01	13	0.03	43	\$7	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	3	\$0
1	0 - Small Group #10	1400	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	6	0.35	487	Existing to Remain	Existing to Remain	2	58	0	0.35	487	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	97	\$15
5	0 - Office #11	1800	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	10	0.58	1,044	Existing to Remain	Existing to Remain	2	58	0	0.58	1,044	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	209	\$33
2	0 - Classroom #12	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
1	0 - Storage Rooms by Office #11	1000	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	4	0.23	232	Existing to Remain	Existing to Remain	2	58	0	0.23	232	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
4	0 - Storage "C"	1000	1x4 Utility 2-Lamp 32 W T8	2	58	3	0.17	174	Existing to Remain	Existing to Remain	2	58	0	0.17	174	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
4	0 - Mechanical Room	1000	1x4 Utility 2-Lamp 32 W T8	2	58	3	0.17	174	Existing to Remain	Existing to Remain	2	58	0	0.17	174	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
9	0 - Mechanical Room	1000	100 W Incandescent A-Lamp	1	100	2	0.20	200	Re-Lamp	23w CFL Screw Base	1	23	2	0.05	46	0.15	154	\$24	0	No New Controls	0	0.0%	0	\$0
11	0 - Mechanical Room	1000	Phillips 28 W CFL Screw-In	1	28	1	0.03	28	Existing to Remain	Existing to Remain	1	28	0	0.03	28	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	0 - Girl's Restroom	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0

Fixture Reference #	Location	Average Burn Hours	Description	EXISTING FIXTURES				PROPOSED FIXTURE RETROFIT								RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS				
				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, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
5	0 - Boy's Restroom	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	0 - Lower Hallway	2200	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	8	0.46	1,021	Existing to Remain	Existing to Remain	2	58	0	0.46	1,021	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	0 - Upper Hallway	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	7	0.41	893	Existing to Remain	Existing to Remain	2	58	0	0.41	893	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	0 - Entry	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	1	0.06	128	Existing to Remain	Existing to Remain	2	58	0	0.06	128	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	1 - Classroom #1	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
2	1 - Classroom #2	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	1 - Classroom #3	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	1 - Classroom #4	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
2	1 - Art Room #5	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	1 - Cafeteria/Art #6	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	1 - Classroom #7	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	1 - Kindergarten #8	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	13	1.42	1,984	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	13	0.94	1,310	0.48	673	\$105	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	262	\$41
5	1 - Kindergarten #8 Storage	1400	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	162	Existing to Remain	Existing to Remain	2	58	0	0.12	162	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	1 - Kindergarten #8 Toilet Room	1000	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	1	0.06	58	Existing to Remain	Existing to Remain	2	58	0	0.06	58	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	1 - Classroom #9	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	9	0.98	1,373	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	9	0.65	907	0.33	466	\$73	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	181	\$28
2	1 - Classroom #9 Storage	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	153	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	1	0.07	101	0.04	52	\$8	0	No New Controls	0	0.0%	0	\$0
2	1 - Classroom #10	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
2	1 - Library #11	1600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,395	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	922	0.30	474	\$74	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	184	\$29
5	1 - Teachers' Room #12	1600	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	186	Existing to Remain	Existing to Remain	2	58	0	0.12	186	0.00	0	\$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	37	\$6
12	1 - Teachers' Room #12 Toilet	1000	60 W Incandescent A-Lamp	1	60	1	0.06	60	Re-Lamp	13w CFL Screw Base	1	9	1	0.01	9	0.05	51	\$8	0	No New Controls	0	0.0%	0	\$0
2	1 - Classrooms #13	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	1,221	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/EC03 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	\$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
4	1 - Stage #14	1800	1x4 Utility 2-Lamp 32 W T8	2	58	6	0.35	626	Existing to Remain	Existing to Remain	2	58	0	0.35	626	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0

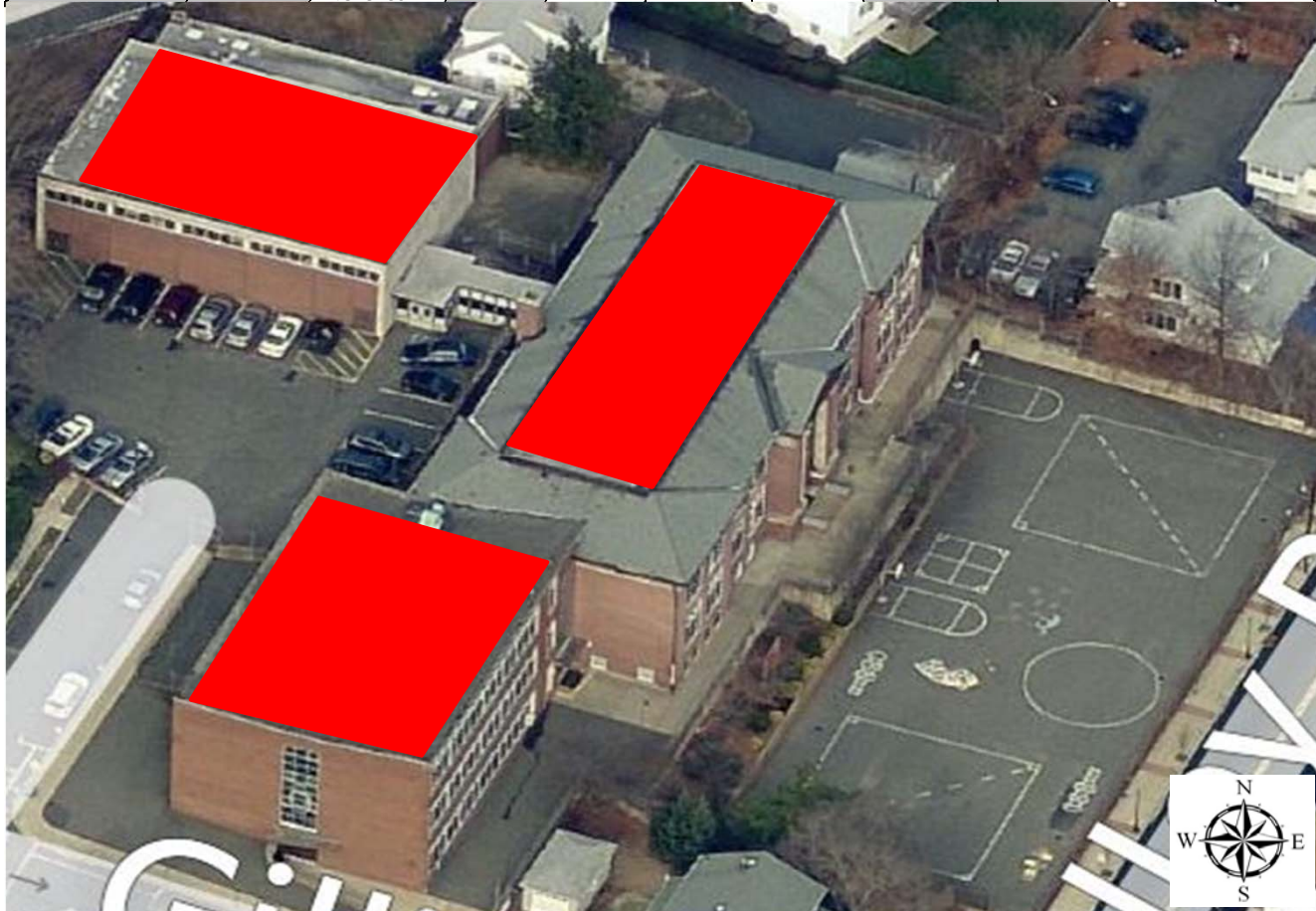
Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	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, \$
13	1 - Multi-Purpose	1800	Recessed Cage Guard 250 W Metal Halide HID	1	285	8	2.28	4,104	Replace	2x4, 4 Lamp, 54w T5, (2) 2/54 Elect. Ballast, Recessed, lens, Wire Guard	4	229	8	1.83	3,298	0.45	806	\$126	0	No New Controls	0	0.0%	0	\$0
12	1 - Mechanical Room Gym #1	1000	60 W Incandescent A-Lamp	1	60	6	0.36	360	Re-Lamp	13w CFL Screw Base	1	9	6	0.05	54	0.31	306	\$48	0	No New Controls	0	0.0%	0	\$0
14	1 - Mechanical Room Gym #2	1000	4' Surface Wrap 1-Lamp 34 W T12	1	50	3	0.15	150	Re-Lamp / Re-Ballast	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	1	28	3	0.08	84	0.07	66	\$10	0	No New Controls	0	0.0%	0	\$0
15	1 - Stage Storage	1000	3x3 Recessed 4-Lamp F17 T8	4	56	2	0.11	112	Existing to Remain	Existing to Remain	4	56	0	0.11	112	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
15	1 - Stage Men's Restroom	2200	3x3 Recessed 4-Lamp F17 T8	4	56	1	0.06	123	Existing to Remain	Existing to Remain	4	56	0	0.06	123	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
16	1 - Stage Men's Restroom	2200	2' Vanity 2-Lamp F17 T8	2	34	1	0.03	75	Existing to Remain	Existing to Remain	2	34	0	0.03	75	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
15	1 - Stage Women's Restroom	2200	3x3 Recessed 4-Lamp F17 T8	4	56	1	0.06	123	Existing to Remain	Existing to Remain	4	56	0	0.06	123	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
16	1 - Stage Women's Restroom	2200	2' Vanity 2-Lamp F17 T8	2	34	2	0.07	150	Existing to Remain	Existing to Remain	2	34	0	0.07	150	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
12	1 - Stage Stairs	1800	60 W Incandescent A-Lamp	1	60	2	0.12	216	Re-Lamp	13w CFL Screw Base	1	9	2	0.02	32	0.10	184	\$29	0	No New Controls	0	0.0%	0	\$0
11	1 - Stage Stairs	1800	Phillips 28 W CFL Screw-In	1	28	1	0.03	50	Existing to Remain	Existing to Remain	1	28	0	0.03	50	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
17	1 - Hallway to Multi	2200	1x1 Recessed Opaque Lens 1-Lamp 28 W CFL	1	28	6	0.17	370	Existing to Remain	Existing to Remain	1	28	0	0.17	370	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	1 - Lower Hallway	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	8	0.46	1,021	Existing to Remain	Existing to Remain	2	58	0	0.46	1,021	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	1 - Upper Hallway	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	6	0.35	766	Existing to Remain	Existing to Remain	2	58	0	0.35	766	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	1 - Girl's Restroom	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	1 - Restroom Closet	1000	Phillips 28 W CFL Screw-In	1	28	1	0.03	28	Existing to Remain	Existing to Remain	1	28	0	0.03	28	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
8	2 - Classroom #1	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #2	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #3	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #4	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
2	2 - Classroom #5	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	2 - Classroom #6	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31
2	2 - Classroom #7	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	10	1.09	1,526	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	10	0.72	1,008	0.37	518	\$81	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	\$31

Fixture Reference #	Location	Average Burn Hours	Description	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT					RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS						
				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, \$
2	2 - Classroom #8	1400	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	12	1.31	1,831	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	12	0.86	1,210	0.44	622	\$97	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	242	\$38
5	2 - Nurses Office #9,10	1800	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	4	0.23	418	Existing to Remain	Existing to Remain	2	58	0	0.23	418	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	84	\$13
11	2 - Nurses Office #9,10 Toilet	1000	Phillips 28 W CFL, Screw-In	1	28	3	0.08	84	Existing to Remain	Existing to Remain	1	28	0	0.08	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
8	2 - Classroom #11	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #12	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #12 Storage	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	1	0.03	39	Existing to Remain	Existing to Remain	1	28	0	0.03	39	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
8	2 - Classroom #13	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	706	Existing to Remain	Existing to Remain	1	28	0	0.50	706	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	141	\$22
8	2 - Classroom #13 Storage	1400	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	1	0.03	39	Existing to Remain	Existing to Remain	1	28	0	0.03	39	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	2 - Storage/Toilet by #13	1000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	3	0.17	174	Existing to Remain	Existing to Remain	2	58	0	0.17	174	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
8	2 - Teachers' Room	1600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	18	0.50	806	Existing to Remain	Existing to Remain	1	28	0	0.50	806	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	\$25
3	2 - Boy's Restroom	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	2 - Janitor Closet	1000	Phillips 28 W CFL, Screw-In	1	28	1	0.03	28	Existing to Remain	Existing to Remain	1	28	0	0.03	28	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	2 - Upper Corridor	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	6	0.35	766	Existing to Remain	Existing to Remain	2	58	0	0.35	766	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	2 - Lower Corridor	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	7	0.41	893	Existing to Remain	Existing to Remain	2	58	0	0.41	893	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
18	2 - Mid Stair	2200	2x4 Surface Prismatic 4-Lamp 32 W T8	4	109	1	0.11	240	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	1	0.07	158	0.04	81	\$13	0	No New Controls	0	0.0%	0	\$0
5	2 - Mid Stair	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	1 - Mid Stair	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	3	0.17	383	Existing to Remain	Existing to Remain	2	58	0	0.17	383	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
19	0 - Mid Stair	2200	1x2 Surface Wrap 2-Lamp F17 T8	2	34	1	0.03	75	Existing to Remain	Existing to Remain	2	34	0	0.03	75	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	Stair 1	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	4	0.23	510	Existing to Remain	Existing to Remain	2	58	0	0.23	510	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	Stair 1	2200	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	480	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	317	0.07	163	\$25	0	No New Controls	0	0.0%	0	\$0
20	Stair 1	2200	1x2 Surface Wrap 1-Lamp F17 T8	1	20	2	0.04	88	Existing to Remain	Existing to Remain	1	20	0	0.04	88	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	Stair 2	2200	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	480	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	2	0.14	317	0.07	163	\$25	0	No New Controls	0	0.0%	0	\$0

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE 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, \$
21	Stair 2	2200	2x2 Surface Wrap 4-Lamp F17 T8	4	54	1	0.05	119	Existing to Remain	Existing to Remain	4	54	0	0.05	119	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	Stair 2	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	Stair 3	2200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	4	0.23	510	Existing to Remain	Existing to Remain	2	58	0	0.23	510	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	Stair 3	2200	2x4 Recessed Prismatic w/ Reflector 2-Lamp 32 W T8	2	58	2	0.12	255	Existing to Remain	Existing to Remain	2	58	0	0.12	255	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
22	Exterior	1800	70 W HPS Wall Pack	1	94	6	0.56	1,015	Replace	Lumark 20W LED Wall Pack XTOR2A-PC2	1	20	6	0.12	216	0.44	799	\$125	0	No New Controls	0	0.0%	0	\$0
TOTAL							542	38	58,431				211	29	46,286	8	12,145	\$1,895			32	7	5,208	\$812

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
School #5	7025	SHARP NU-U235F2	286	17.5	5,017	67.21	77,664	54.4	11,983	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 - School #5
Location: Clifton, NJ
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

Photovoltaic System 100% Financing - 15 year	
Total Construction Cost	\$416,665
Annual kWh Production	77,664
Annual Energy Cost Reduction	\$12,116
Average Annual SREC Revenue	\$14,840

Simple Payback: **15.46** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost (\$/kWh)	\$0.156	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	77,664	\$12,116	\$0	\$19,416	\$24,519	\$17,674	(\$10,661)	(\$10,661)
2	\$0	77,276	\$12,479	\$0	\$19,319	\$23,429	\$18,764	(\$10,395)	(\$21,056)
3	\$0	76,889	\$12,853	\$0	\$19,222	\$22,272	\$19,921	(\$10,117)	(\$31,173)
4	\$0	76,505	\$13,239	\$0	\$19,126	\$21,043	\$21,150	(\$9,827)	(\$41,000)
5	\$0	76,122	\$13,636	\$784	\$19,031	\$19,739	\$22,454	(\$10,310)	(\$51,310)
6	\$0	75,742	\$14,045	\$780	\$15,148	\$18,354	\$23,839	(\$13,779)	(\$65,090)
7	\$0	75,363	\$14,467	\$776	\$15,073	\$16,883	\$25,309	(\$13,430)	(\$78,519)
8	\$0	74,986	\$14,901	\$772	\$14,997	\$15,322	\$26,870	(\$13,067)	(\$91,586)
9	\$0	74,611	\$15,348	\$768	\$14,922	\$13,665	\$28,528	(\$12,691)	(\$104,278)
10	\$0	74,238	\$15,808	\$765	\$11,136	\$11,906	\$30,287	(\$16,014)	(\$120,291)
11	\$0	73,867	\$16,282	\$761	\$11,080	\$10,037	\$32,155	(\$15,591)	(\$135,882)
12	\$0	73,498	\$16,771	\$757	\$11,025	\$8,054	\$34,138	(\$15,154)	(\$151,037)
13	\$0	73,130	\$17,274	\$753	\$10,970	\$5,949	\$36,244	(\$14,703)	(\$165,739)
14	\$0	72,765	\$17,792	\$749	\$7,276	\$3,713	\$38,480	(\$17,874)	(\$183,613)
15	\$0	72,401	\$18,326	\$746	\$7,240	\$1,340	\$40,853	(\$17,372)	(\$200,985)
Totals:		1,125,057	\$225,337	\$8,412	\$214,981	\$216,225	\$416,665	(\$200,985)	(\$1,452,221)
Net Present Value (NPV)								(\$147,333)	

APPENDIX G

STEAM TRAP REPLACEMENT ANALYSIS

Calculation Assumptions

Description	Value	Units
Ann. Gas Usage	21,034	Therm
Less DHW Gas Usage	2,582	Therm
Less Other Gas Usage	0	Therm
Net Heating Gas Usage	18,453	Therm
Est. Steam Production	1,375,715	lbs
Boiler Efficiency	75%	
Makeup Water	50	°F
Condensate Return	200	°F
30% Makeup		
Feedwater Enthalpy	155	btu/lb
Steam Enthalpy	1161	btu/lb
Steam Production Conversion	74.55	lb / Th
Hours per Day On	8	
Days per Week	5.5	
Htg Months per Year	6	
Ann. System Operation	1,144	hrs / yr
Gas Cost (\$/Th)	\$0.93	
Trap Failure Rate	15.00%	

Building Area	Estimated Quantity
Boiler Plant	2
Classroom UV	30
Radiators	25
TOTAL	57

STEAM TRAP LOSS CALCULATION

Steam Trap Sizes	Trap Orifice Diameter (in)	Steam Loss lb/hr (15 PSI)	Quantity of Traps	Estimated Quantity Failed	Annual Steam Loss lbs	Annual Steam Loss Therm	Cost Savings
1/2" Trap	1/8"	13.70	0	0	0	0	\$0
3/4" Trap	3/16"	30.70	25	4	140,483	1,884	\$1,752
1" Trap	1/4"	54.70	30	5	312,884	4,197	\$3,903
1 -1/2" Trap	3/8"	123.00	2	0	0	0	\$0
TOTAL			57	9	453,367	6,081	\$5,655

APPENDIX H

DESCRIPTION: CONDENSATE RETURN PUMP/RECEIVER REPLACEMENT

UNIT #	FUNCTION	MOTOR HP	MOTOR EFF.%	HR/DAY OPER.	ANNUAL KWh	PREMIUM EFF.%	ANNUAL KWh	ANNUAL KWh SAVINGS	\$ SAV. \$0.156	COND LOSS QT/MIN	ANNUAL HTG \$ SAV	TOTAL \$ ENERGY SAV (E&G)	EQUIP.& INST. COST	TOTAL COST NOTE 2
CP-1	COND. PUMP	0.5	84.0%	8	1,153	85.5%	1,132	20	\$3	0.25	\$186	\$189	\$19,700	\$28,565
CP-2	COND. PUMP	0.5	84.0%	8	1,153	86.5%	1,119	33	\$5	0.25	\$214	\$219	\$19,700	\$28,565
TOTALS=									\$8		\$400	\$ 409		\$57,130

NOTE 1: KWH= HP / MOTOR% * 746 /1000 * HR/DAY * 365 * 0.8(MOTOR LOAD) * 0.9 PF

NOTE 2: INCLUDES 15% CONTINGENCY + 25% FOR RETROFIT WORK+ 15% CONTR. OH&P+ 10% Cx

NOTE 3: SAVINGS CALCULATED ON HEATING MAKE-UP FROM 60 F TO 200 F AND \$1.07/THERM AND 70% EFFICIENT BOILER PLANT