CLIFTON PUBLIC SCHOOLS
PUBLIC SCHOOL #3

365 WASHINGTON AVENUE
CLIFTON, NEW JERSEY 07011

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 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: 238000612, 246001058
Account No: 67 175 133 06
Third Party Utility Provider: Champion Energy LLC
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	9,940	39.0	$1,541
Apr-12	8,728	36.7	$1,399
May-12	9,600	37.8	$1,845
Jun-12	8,932	41.9	$1,792
Jul-12	5,044	39.0	$1,203
Aug-12	5,044	39.0	$1,203
Sep-12	9,639	42.3	$1,457
Oct-12	9,639	42.3	$1,457
Nov-12	9,638	42.3	$1,457
Dec-12	10,068	41.2	$1,500
Jan-13	10,644	40.6	$1,570
Feb-13	9,952	39.8	$1,509
Totals	**106,868**	**42.3 Max**	**$17,933**

AVERAGE DEMAND 40.2 KW average

AVERAGE RATE $0.168 $/kWh

Figure 1
Electricity Usage Profile

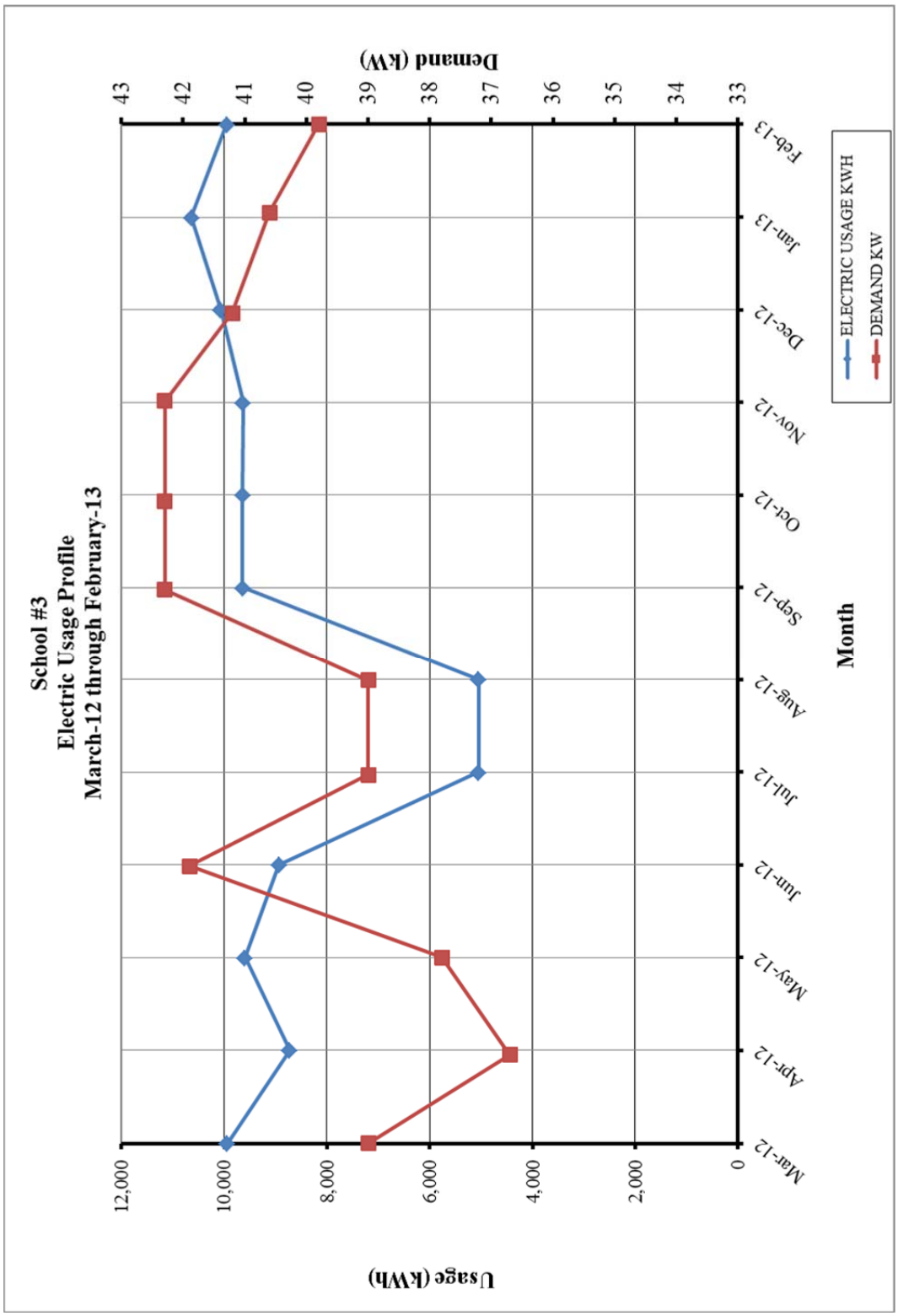
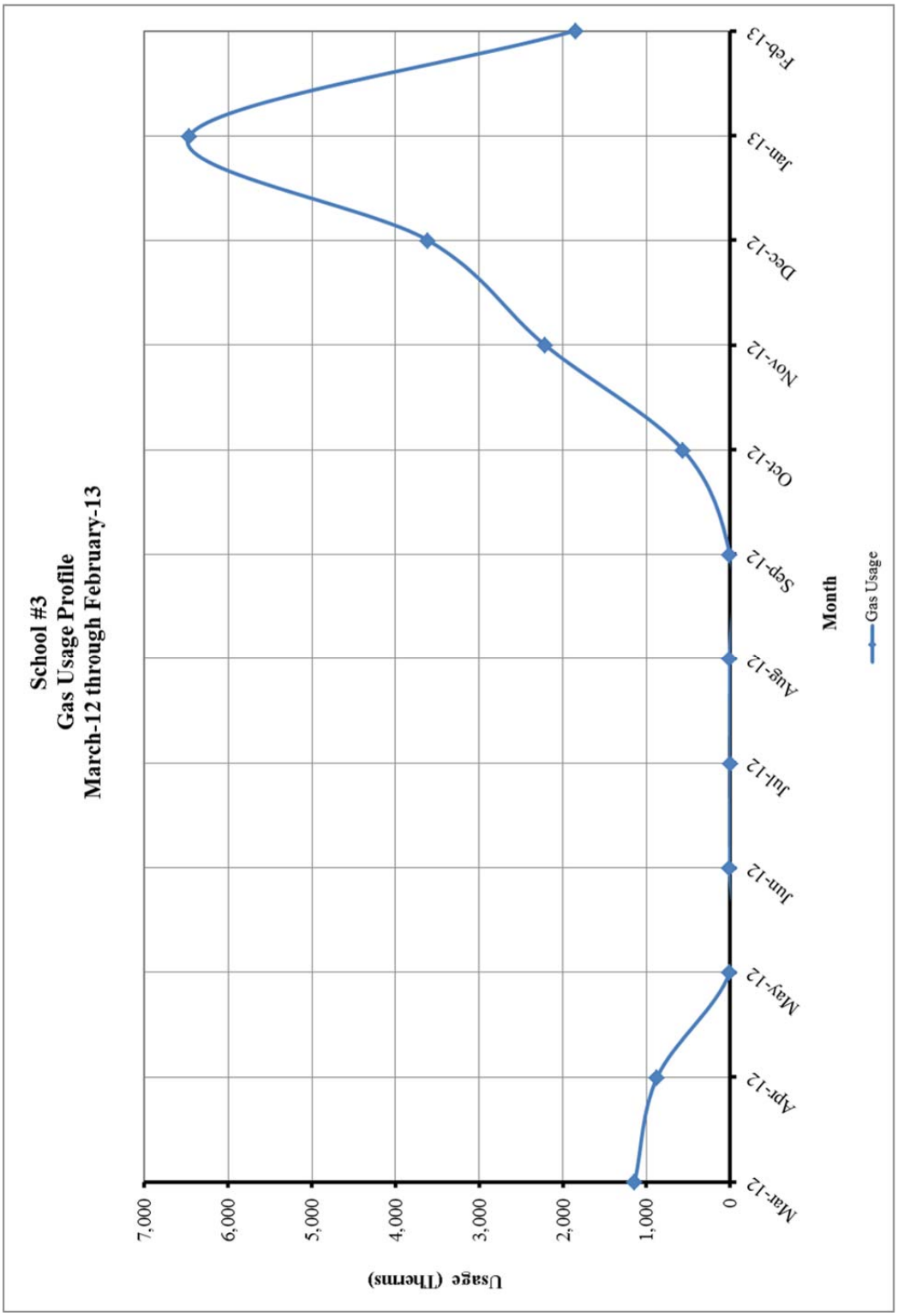


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: LVG		
Meter No: 1934154		
Account No: 67 175 133 06		
Third Party Utility Provider: Hess		
TPS Meter No: 446575/446940		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-12	1,140.96	$823.31
Apr-12	873.09	$534.63
May-12	6.62	$102.78
Jun-12	5.51	$102.52
Jul-12	0.00	$99.50
Aug-12	6.65	$202.94
Sep-12	5.54	$102.68
Oct-12	570.44	$955.12
Nov-12	2,218.03	$2,980.26
Dec-12	3,615.48	$3,255.36
Jan-13	6,462.45	$5,375.79
Feb-13	1,847.69	$2,018.69
TOTALS	**16,752.46**	**$16,553.58**
AVERAGE RATE:	**$0.99**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Clifton Public School #3 is located at 365 Washington Avenue in Clifton, New Jersey. The 46,335 SF Elementary School was built in 1931 with no major additions. The building is a two story facility comprised of classrooms, offices, cafeteria, auditorium, gym media center and mechanical rooms. There is also an attic space above the second floor that is largely empty except for some communications wiring that is run through the space.

Occupancy Profile

The typical hours of operation for the Middle 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 300 students grades kindergarten through fifth, and has 20 teachers, support staff, and administrative personnel.

Building Envelope

Exterior walls for the middle school are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the school are in good condition and appear to be maintained. Typical windows throughout the school are double pane, operable, ¼" clear glass with aluminum frames. A majority of the roof is pitched with asphalt shingles, with section in the middle that is a flat EPDM rubber roof spread over plywood decking.

HVAC Systems

The elementary school HVAC system consists of two steam boilers, several window mounted AC units, steam radiators in the corridors and classrooms, and unit ventilators spread throughout the classrooms. Additionally, the auditorium has several unit ventilators and steam radiators, and the gym has a large amount of steam radiators and two exhaust fans.

The boilers are gas-fired steam boilers, with an output rating of 70 boiler horsepower each, manufactured by Rockmills. The boilers are 18 years old and the exterior boiler casing is showing signs of rust. The boilers are hand controlled by the maintenance staff and typically only one boiler is required to fire to heat the building, however during periods of severely low temperatures both will operate. These boilers serve all of the steam radiation throughout the building as well as all of the steam heating coils in the unit ventilators. These boilers are capable of producing steam at 15 PSIG.

Fresh Air is supplied to the building by the unit ventilators in the classrooms and auditorium. 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 it is located in. The unit ventilators all appear to be well beyond their useful service 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 boilers are turned on and off manually by the head custodian. 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 a Rheem model 22V40F1 domestic hot water heater with 40 gallons of storage and 38 MBH input capacity. The kitchen has a Rheem model 81VP20S domestic hot water heater with 20 gallons of storage and 4000 Watts input capacity. There are also two smaller electric hot water heaters as well. A Ruud model PEP6-1 heater serves the restrooms near the auditorium, and an Ariston model GL4Ti serves the janitor's closet it is located in.

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 an Energy Star rated reach in freezer, a chest cooler, and a heating rack. Additionally there is an Energy Star rated reach in refrigerator and another chest cooler in the area below the stairs to the gym balcony.

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	$6,344	$727	8.7	71.9%
ECM #2	Lighting Upgrade - Gym	$4,550	$136	33.5	-55.2%
ECM #3	Lighting Upgrade - Exterior	$530	$518	1.0	1366.0%
ECM #4	Lighting Controls Upgrade	$4,640	$675	6.9	118.2%
ECM #5	DDC Controls Upgrade	$143,680	$1,952	73.6	-79.6%
ECM #6	Boiler Upgrade	$0	$3,341	40.8	-38.7%
ECM #7	Steam Trap Replacement	$38,815	$1,098	35.4	-71.7%
ECM #8	Condensate Reciever and Pumps	$32,625	$294	111.0	-86.5%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	28.67 KW PV System	$182,262	$11,896	15.3	-2.1%

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

Table 2
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Upgrade - General	3.3	4,325	-
ECM #2	Lighting Upgrade - Gym	0.5	810	-
ECM #3	Lighting Upgrade - Exterior	0.2	3,084	-
ECM #4	Lighting Controls Upgrade	-	4,020	-
ECM #5	DDC Controls Upgrade	0.0	1,794	1,675
ECM #6	Boiler Upgrade	0.0	0	3,375
ECM #7	Steam Trap Replacement	0.0	0	3,533
ECM #8	Condensate Reciever and Pumps	0.0	404	229
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	28.67 KW PV System	28.7	33,130	-

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	$727	$6,764	$420	$6,344	8.7
Lighting Upgrade - Gym	$136	$5,050	$500	$4,550	33.5
Lighting Upgrade - Exterior	$518	$530	$0	$530	1.0
Lighting Controls Upgrade	$675	$5,300	$660	$4,640	6.9
~~DDC Controls Upgrade~~	~~$1,952~~	~~$143,680~~	~~$0~~	~~$143,680~~	~~73.6~~
Boiler Upgrade	$3,341	$136,259	$0	$136,259	40.8
Steam Trap Replacement	$1,098	$38,815	$0	$38,815	35.4
~~Condensate Reciever and Pumps~~	~~$294~~	~~$32,625~~	~~$0~~	~~$32,625~~	~~111.0~~
Design / Construction Extras (15%)		$28,908		*$28,908*	
Total Project	**$6,495**	**$221,626**	**$1,580**	**$220,046**	**33.9**

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 #3 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.

The ECM also includes replacement of incandescent lamps with LED lamps. The retrofit of existing incandescent fixtures with 3 watt Endura Philips LED dimmable candelabra lamps will assist in reducing the facility's electric expenses.

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 ($):	$6,764
NJ Smart Start Equipment Incentive ($):	$420
Net Installation Cost ($):	$6,344
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$727
Total Yearly Savings ($/Yr):	$727
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.7
Simple Lifetime ROI	71.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$10,905
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	$2,334.88

ECM #2: Lighting Upgrade – Gymnasium

Description:

The gymnasium at Clifton Elementary School #3 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 ($):	$5,050
NJ Smart Start Equipment Incentive ($):	$500
Net Installation Cost ($):	$4,550
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$136
Total Yearly Savings ($/Yr):	$136
Estimated ECM Lifetime (Yr):	15
Simple Payback	33.5
Simple Lifetime ROI	-55.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,040
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	($2,926.44)

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at Clifton Elementary School #3 is currently lit via incandescent flood lamps, metal halide down-lights and high pressure sodium spot lights. 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 lamps on the exterior with PAR38 LED lamps.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$530
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$530
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$518
Total Yearly Savings ($/Yr):	$518
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.0
Simple Lifetime ROI	1366.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$7,770
Internal Rate of Return (IRR)	98%
Net Present Value (NPV)	$5,653.85

ECM #4: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Elementary School #3 are left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

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

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

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

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

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

Energy Savings Calculations:

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

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

Rebates and Incentives:

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

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,300
NJ Smart Start Equipment Incentive ($):	$660
Net Installation Cost ($):	$4,640
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$675
Total Yearly Savings ($/Yr):	$675
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.9
Simple Lifetime ROI	118.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$10,125
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	$3,418.11

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

Description:

Currently, Clifton Public School #3 uses a pneumatic control system with manual boiler start-up controls. This system is very old and offers little more than an on/off cycling control of the heating system.

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

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 5% of the electricity and 5% 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.

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

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

DDC ENERGY MANAGEMENT SYSYEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Nat Gas Usage (Therms)	16,752	-	
Existing Electricity Usage (kWh)	34,887	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	5%	
Gas Cost ($/Therm)	*$0.99*	$0.99	
Electricity Cost ($/kWh)	*$0.168*	$0.168	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Usage (Therms)	16,752	15,077	1,675
Electricity Usage (kWh)	34,887	33,143	1,744
Nat Gas Cost ($)	$16,584	$14,926	$1,658
Electricity Cost ($)	$5,861	$5,568	$293
Energy Cost ($)	$22,446	$20,494	$1,952
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 estimated to be $143,680 based on 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.

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

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$143,680
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$143,680
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,952
Total Yearly Savings ($/Yr):	$1,952
Estimated ECM Lifetime (Yr):	15
Simple Payback	73.6
Simple Lifetime ROI	-79.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$29,280
Internal Rate of Return (IRR)	-15%
Net Present Value (NPV)	($120,377.15)

ECM #6: Steam Boiler Replacement

Description:

There are two existing Rock Mills steam boilers which are used as the primary source of heat for Clifton Public School #3. These boilers were built in 1995 and have not yet surpassed the typical useful life of a fire-tube steam boiler, however, they appear to have lots of corrosion around their casing, and are operating at less than their nominal efficiency. This makes them good candidates for replacement with new boilers.

New steam boilers could substantially improve the operating efficiency of the heating system of the building. The peak efficiency of newer steam boilers tops out at 85%. The existing boiler's efficiency is approximately 65%, which makes the new boilers an 20% increase in efficiency.

This ECM includes installation of two gas fired boilers to replace the existing Rock Mills steam fire-tube boilers. The basis for this calculation is the Cleaver Brooks Clearfire H horizontal steam boiler. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

STEAM BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Boilers	New Steam Boilers	
Existing Nat Gas (Therms)	14,343	0	
Boiler Efficiency (%)	65%	85%	20%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	932	932	
Gas Cost ($/Therm)	0.99	0.99	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	14,343	10,968	3,375
Energy Cost ($)	$14,200	$10,858	$3,341
COMMENTS:			

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$136,259
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$136,259
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,341
Total Yearly Savings ($/Yr):	$3,341
Estimated ECM Lifetime (Yr):	25
Simple Payback	40.8
Simple Lifetime ROI	-38.7%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$83,525
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($78,082.05)

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 eleven (11) steam traps. 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 ($):	$38,815
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$38,815
Maintenance Savings ($/Yr):	($2,400)
Energy Savings ($/Yr):	$3,498
Total Yearly Savings ($/Yr):	$1,098
Estimated ECM Lifetime (Yr):	10
Simple Payback	35.4
Simple Lifetime ROI	-71.7%
Simple Lifetime Maintenance Savings	($24,000)
Simple Lifetime Savings	$10,978
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	($29,450.36)

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 ($):	$32,625
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$32,625
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$294
Total Yearly Savings ($/Yr):	$294
Estimated ECM Lifetime (Yr):	15
Simple Payback	111.0
Simple Lifetime ROI	-86.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$4,410
Internal Rate of Return (IRR)	-19%
Net Present Value (NPV)	($29,115.25)

REM #1: 28.67 kW Solar System

Description:

The Clifton Elementary School #3 has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 28.67 kilowatt solar array could be installed. The array will produce approximately 33,130 kilowatt-hours annually that will reduce the overall electric usage of the facility by 31%.

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}):	28.67
Electric Generation (KWH/Yr):	33,130
Installation Cost ($):	$182,262
SREC Revenue ($/Yr):	$6,331
Energy Savings ($/Yr):	$5,566
Total Yearly Savings ($/Yr):	$11,896
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	15.3
Analysis Period Electric Savings ($):	$103,519
Analysis Period SREC Revenue ($):	$91,707
Net Present Value (NPV)	($62,534.65)

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 #3

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^{n_i}}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^{n_i}}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	Lighting Upgrade - General	$3,124	$3,640	$420	$6,344	$727	$0	$727	15	$10,905	$0	71.9%	8.7	7.69%	$2,334.88
ECM #2	Lighting Upgrade - Gym	$2,250	$2,800	$500	$4,550	$136	$0	$136	15	$2,040	$0	-55.2%	33.5	-8.68%	($2,926.44)
ECM #3	Lighting Upgrade - Exterior	$450	$80	$0	$530	$518	$0	$518	15	$7,770	$0	1366.0%	1.0	97.73%	$5,653.85
ECM #4	Lighting Controls Upgrade	$3,450	$1,850	$660	$4,640	$675	$0	$675	15	$10,125	$0	118.2%	6.9	11.83%	$3,418.11
ECM #5	DDC Controls Upgrade	$143,680	$0	$0	$143,680	$1,952	$0	$1,952	15	$29,280	$0	-79.6%	73.6	-15.43%	($120,377.15)
ECM #6	Boiler Upgrade	$54,010	$82,249	$0	$136,259	$3,341	$0	$3,341	25	$83,525	$0	-38.7%	40.8	-3.46%	($78,082.05)
ECM #7	Steam Trap Replacement	$10,615	$28,200	$0	$38,815	$3,498	($2,400)	$1,098	10	$10,978	-$24,000	-71.7%	35.4	-18.16%	($29,450.36)
ECM #8	Condensate Reciever and Pumps	$15,000	$17,625	$0	$32,625	$294	$0	$294	15	$4,410	$0	-86.5%	111.0	-18.16%	($29,115.25)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	28.67 KW PV System	$182,262	$0	$0	$182,262	$5,566	$6,331	$11,896	15	$178,447	$94,959	-2.1%	15.3	-0.26%	($40,242.69)

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 ≥ 16 $600 per ton, EER ≥ 18 $750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	$65 - $155 per hp
Chilled-Water Pumps	$60 per VFD rated hp
Compressors	$5,250 to $12,500 per drive
Cooling Towers ≥ 10 hp	$60 per VFD rated hp
Boiler Fans ≥ 5 HP	$65 to $155 per hp
Boiler Feed Water Pumps ≥ 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 ≤ 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 ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	$70 per fixture

Prescriptive Lighting - LED

LED 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 (Expires 3/1/2013)	$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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
3-Clifton BOE - PS 3

Building ID: 3477562
For 12-month Period Ending: February 28, 2013[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 11, 2013

Facility
3-Clifton BOE - PS 3
365 Washington Avenue
Clifton, NJ 07011

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: 1931
Gross Floor Area (ft²): 46,335

Energy Performance Rating[2] (1-100) 77

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	363,108
Natural Gas (kBtu)[4]	1,660,907
Total Energy (kBtu)	2,024,015

Energy Intensity[4]

Site (kBtu/ft²/yr)	44
Source (kBtu/ft²/yr)	64

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	140

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	57
National Median Source EUI	84
% Difference from National Median Source EUI	-24%
Building Type	K-12 School

Stamp of Certifying Professional

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

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

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	3-Clifton BOE - PS 3	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	365 Washington Avenue, Clifton, NJ 07011	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Elementary School 3 (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	46,335 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	68	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	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".		☐
Percent Cooled	0 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/08/2013	02/07/2013	10,644.00
12/08/2012	01/07/2013	10,068.00
11/08/2012	12/07/2012	9,638.00
10/08/2012	11/07/2012	9,639.00
09/08/2012	10/07/2012	9,639.00
08/08/2012	09/07/2012	5,044.00
07/08/2012	08/07/2012	5,044.00
06/08/2012	07/07/2012	8,932.00
05/08/2012	06/07/2012	9,600.00
04/08/2012	05/07/2012	8,728.00
03/08/2012	04/07/2012	9,940.00

electric Consumption (kWh (thousand Watt-hours))	**96,916.00**
electric Consumption (kBtu (thousand Btu))	**330,677.39**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**330,677.39**
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)
01/08/2013	02/07/2013	6,462.45
12/08/2012	01/07/2013	3,615.48
11/08/2012	12/07/2012	2,218.03
10/08/2012	11/07/2012	570.44
09/08/2012	10/07/2012	5.54
08/08/2012	09/07/2012	6.65
07/08/2012	08/07/2012	0.00
06/08/2012	07/07/2012	5.51
05/08/2012	06/07/2012	6.62
04/08/2012	05/07/2012	873.09
03/08/2012	04/07/2012	1,140.96

gas Consumption (therms)	**14,904.77**
gas Consumption (kBtu (thousand Btu))	**1,490,477.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**1,490,477.00**
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
3-Clifton BOE - PS 3
365 Washington Avenue
Clifton, NJ 07011

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

3-Clifton BOE - PS 3	
Gross Floor Area Excluding Parking: (ft^2)	46,335
Year Built	1931
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Elementary School 3	
Space Type	K-12 School
Gross Floor Area (ft^2)	46,335
Open Weekends?	No
Number of PCs	68
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	0
Percent Heated	100
Months °	10
High School?	No
School District °	clifton

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 02/28/2013)	**Baseline** (Ending Date 02/28/2013)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	77	77	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	44	44	45	N/A	57
Source ($kBtu/ft^2$)	64	64	65	N/A	84
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	140	140	143	N/A	184
$kgCO_2e/ft^2$/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.

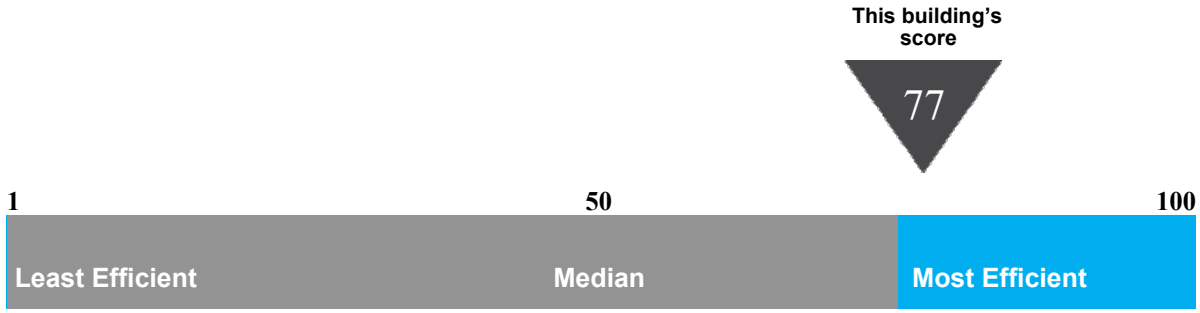
Statement of Energy Performance

2013

3-Clifton BOE - PS 3
365 Washington Avenue
Clifton, NJ 07011

Portfolio Manager Building ID: 3477562

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 64 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

EPA United States Environmental Protection Agency

Date Generated: 04/11/2013

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #3

AC Units

Tag	UV	UV	
Unit Type	Unit Ventilators	Unit Ventilators	
Qty	14	4	
Location	Classrooms	Auditorium	
Area Served	Classrooms	Auditorium	
Manufacturer	Nesbitt	Nesbitt	
Model #	-	-	
Serial #	-	-	
Cooling Type	N/A	N/A	
Cooling Capacity (Tons)	N/A	N/A	
Cooling Efficiency (SEER/EER)	N/A	N/A	
Heating Type	Steam	Steam	
Heating Input (MBH)	-	-	
Efficiency	-	-	
Fuel	-	-	
Approx Age	30	30	
ASHRAE Service Life	15	15	
Remaining Life	(15)	(15)	
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #3

Boilers

Tag	B-1	B-2	
Unit Type	Steam Boiler	Steam Boiler	
Qty	1	1	
Location	Boiler Room	Boiler Room	
Area Served	Building Heat	Building Heat	
Manufacturer	Rockmills	Rockmills	
Model #	MP-70	MP-70	
Serial #	9524	9525	
Input Capacity (Btu/Hr)	2,857,600	2,857,600	
Rated Output Capacity (Btu/Hr)	2,343,300	2,343,300	
Approx. Efficiency %	80.0%	80.0%	
Fuel	Natural Gas	Natural Gas	
Approx Age	18	18	
ASHRAE Service Life	25	25	
Remaining Life	7	7	
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #3

Domestic Water Heaters

Tag			
Unit Type	DHW Heater	DHW Heater	DHW Heater
Qty	1	1	1
Location	Boiler Room	Kitchen	Auditorium Restroom
Area Served	Building DHW	Kitchen	Auditorium Restroom
Manufacturer	Rheem	Rheem	RUUD
Model #	22V40F1	81VP20S	PEP6-1
Serial #	RHLN1006404528	RH 0412607795	RU 1096312994
Size (Gallons)	40	20	6
Input Capacity (MBH/KW)	37 (MBH)	4 (kW)	4 (kW)
Recovery (Gal/Hr)	32.2	16	16
Efficiency %	71%	100%	100%
Fuel	Natural Gas	Electric	Electric
Approx Age	7	1	17
ASHRAE Service Life	10	10	10
Remaining Life	3	9	(7)
Comments			

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

Domestic Water Hea

Tag		
Unit Type	DHW Heater	
Qty	1	
Location	Janitor's Closet	
Area Served	Janitor's Closet	
Manufacturer	Ariston	
Model #	GL 4Ti	
Serial #	N*360503735110308003 6793	
Size (Gallons)	4	
Input Capacity (MBH/KW)	1.5 (kW)	
Recovery (Gal/Hr)	6	
Efficiency %	100.00%	
Fuel	Electric	
Approx Age	-	
ASHRAE Service Life	10	
Remaining Life	-	
Comments		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #3

Pumps

Tag			
Unit Type	Condensate Return Pumps		
Qty	1 Skid, 2 Pumps		
Location	Boiler Room		
Area Served	Boilers 1 and 2		
Manufacturer	National Heating Inc		
Model #	CG36		
Serial #	-		
Horse Power	2		
Flow	-		
Motor Info	Marathon		
Electrical Power	460 V 3 Ph		
RPM	3425		
Motor Efficiency %	-		
Approx Age	18		
ASHRAE Service Life	20		
Remaining Life	2		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Transformers

Tag			
Unit Type			
Qty			
Location			
Manufacturer			
Catalog #			
Serial #			
Rating (kVA)			
Electrical (V/H/P)			
Impedance (%)			
Approx Age			
ASHRAE Service Life			
Remaining Life			
Comments			

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

APPENDIX E

CEG Project #: 9C12066
Facility Name: School #3
Address: 365 Washington Avenue
City, State, Zip Clifton, New Jersey

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
7	1 - Main Entry	2200	40 W A-Lamp Incandescent	1	40	4	0.16	352	Re-Lamp	9w CFL Screw Base	1	9	4	0.04	79	0.12	273	$46	0	No New Controls	0	0.0%	0	$0
1	1 - Main Corridor	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	16	1.31	2,886	Existing to Remain	Existing to Remain	3	82	0	1.31	2,886	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	1 - #17 Nurse	1800	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	4	0.33	590	Existing to Remain	Existing to Remain	3	82	0	0.33	590	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	118	$20
1	1 - #18 Classroom	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	9	0.74	1,033	Existing to Remain	Existing to Remain	3	82	0	0.74	1,033	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	207	$35
10	1 - Closet by #18	1000	2x4 Pendant Wrap 4-Lamp 32 W T8	4	109	1	0.11	109	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	72	0.04	37	$6	0	No New Controls	0	0.0%	0	$0
8	1 - Closet by #18 Toilet	1000	100 W A-Lamp Incandescent	1	100	1	0.10	100	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23	0.08	77	$13	0	No New Controls	0	0.0%	0	$0
9	1 - Mechanical Room	1000	300 W A-Lamp Incandescent	1	300	1	0.30	300	Re-Lamp	42w CFL Screw Base	1	42	1	0.04	42	0.26	258	$43	0	No New Controls	0	0.0%	0	$0
2	1 - Office #19	1800	1x4 Surface Wrap 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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	84	$14
2	1 - Office #20	1800	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	8	0.46	835	Existing to Remain	Existing to Remain	2	58	0	0.46	835	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	167	$28
11	1 - Auditorium	1800	Chandalier 16-Lamp 28 W CFL Covered	16	448	4	1.79	3,226	Existing to Remain	Existing to Remain	16	448	0	1.79	3,226	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
12	1 - Auditorium	1800	Screw-in 20 W CFL Covered	1	20	24	0.48	864	Existing to Remain	Existing to Remain	1	20	0	0.48	864	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
7	1 - Small Grouo #1	1000	40 W A-Lamp Incandescent	1	40	1	0.04	40	Re-Lamp	9w CFL Screw Base	1	9	1	0.01	9	0.03	31	$5	0	No New Controls	0	0.0%	0	$0
7	1 - Special Education #2	1000	40 W A-Lamp Incandescent	1	40	2	0.08	80	Re-Lamp	9w CFL Screw Base	1	9	2	0.02	18	0.06	62	$10	0	No New Controls	0	0.0%	0	$0
12	1 - Auditorium Men's Toilet	2200	Screw-in 20 W CFL Covered	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
12	1 - Auditorium Women's Toilet	2200	Screw-in 20 W CFL Covered	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
12	1 - Auditorium Entrance	2200	Screw-in 20 W CFL Covered	1	20	10	0.20	440	Existing to Remain	Existing to Remain	1	20	0	0.20	440	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
13	1 - Auditorium Entrance	2200	Chandlier 4-Lamp Flame 20 W Incandescent	4	80	1	0.08	176	Re-Lamp	Philips Endura LED 3w Dimmable Candelabra Base	1	12	1	0.01	26	0.07	150	$25	0	No New Controls	0	0.0%	0	$0
3	1 - Boy's Restroom	2200	2x4 Surface Wrap 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	$27	0	No New Controls	0	0.0%	0	$0
1	1 - Classroom #5	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
1	1 - Classcrroom #6	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39

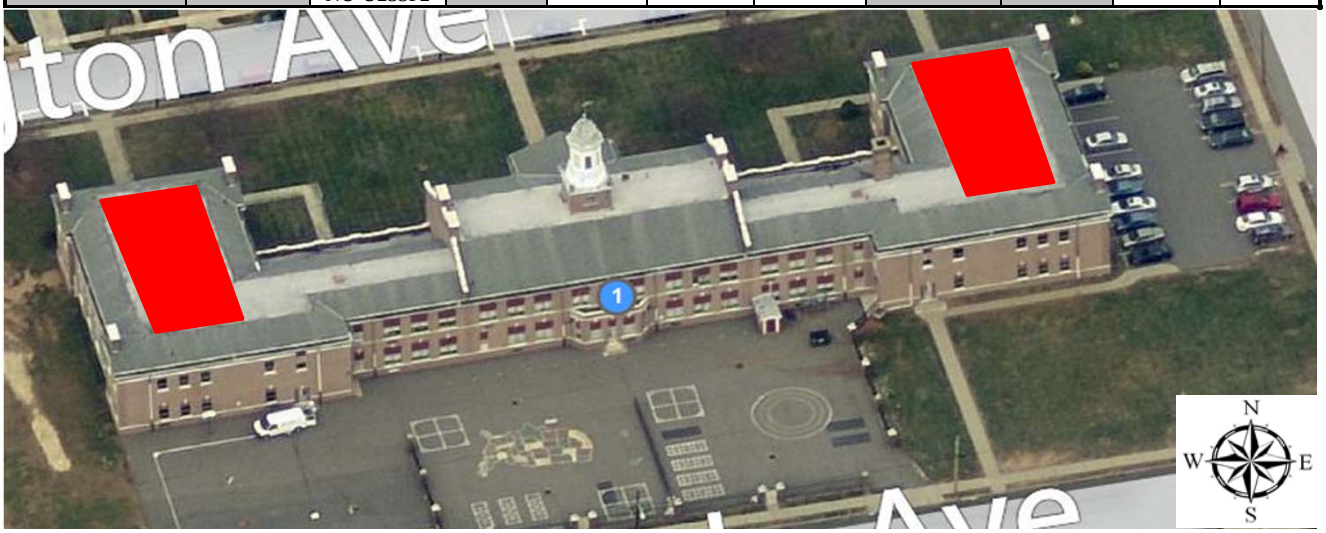
			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
1	1 - Classroom #7	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	12	0.98	1,378	Existing to Remain	Existing to Remain	3	82	0	0.98	1,378	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	276	$46
1	1 - Classroom #8	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	7	0.57	804	Existing to Remain	Existing to Remain	3	82	0	0.57	804	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$27
1	1 - Classroom #9	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
7	1 - Classroom #8 Storage & Toilet	1000	40 W A-Lamp Incandescent	1	40	3	0.12	120	Re-Lamp	9w CFL Screw Base	1	9	3	0.03	27	0.09	93	$16	0	No New Controls	0	0.0%	0	$0
3	1 - Girl's Restroom	2200	2x4 Surface Wrap 4-Lamp 32 W T8	4	109	5	0.55	1,199	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	5	0.36	792	0.19	407	$68	0	No New Controls	0	0.0%	0	$0
4	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/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	8	0.58	806	0.30	414	$70	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	161	$27
6	1 - Classroom #10 Storage	1000	Phillips Screw-in 28 W CFL Covered	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
14	1 - Classroom #10 Storage	1000	1x2 Surface Wrap F20 T12	2	44	1	0.04	44	Re-Lamp / Re-Ballast	Sylvania Lamp FO17/841/XP/ECO Sylvania Ballast QHE2X32T8/UNV ISL-SC	2	34	1	0.03	34	0.01	10	$2	0	No New Controls	0	0.0%	0	$0
2	1 - Kitchen #11	1600	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	1	0.06	93	Existing to Remain	Existing to Remain	2	58	0	0.06	93	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	1 - Classroom #16	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
2	1 - Teacher's Room #15	1600	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	4	0.23	371	Existing to Remain	Existing to Remain	2	58	0	0.23	371	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	74	$12
1	1 - Small Group #14	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	4	0.33	459	Existing to Remain	Existing to Remain	3	82	0	0.33	459	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	92	$15
1	1 - I.M.C. #13	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	8	0.66	918	Existing to Remain	Existing to Remain	3	82	0	0.66	918	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	184	$31
5	1 - Gymnasium #12	1800	250 W HID MH High Bay	1	285	10	2.85	5,130	Remove & Replace New Fixture	2x4, 4 Lamp, 54w T5, (2) 2/54 Elect. Ballast, Singlepoint Mnt., High Bay, Wire Guard, Lens	4	240	10	2.40	4,320	0.45	810	$136	0	No New Controls	0	0.0%	0	$0
6	1 - Gym Storage	1000	Phillips Screw-in 28 W CFL Covered	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	1 - Gym Stair	1800	100 W A-Lamp Incandescent	1	100	1	0.10	180	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	41	0.08	139	$23	0	No New Controls	0	0.0%	0	$0
12	1 - Gym Entry	1800	Screw-in 20 W CFL Covered	1	20	3	0.06	108	Existing to Remain	Existing to Remain	1	20	0	0.06	108	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
8	1 - Teacher's Room #15 Toilet	1000	100 W A-Lamp Incandescent	1	100	1	0.10	100	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23	0.08	77	$13	0	No New Controls	0	0.0%	0	$0
3	East Stairwell	2200	2x4 Surface Wrap 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	$14	0	No New Controls	0	0.0%	0	$0
1	East Stairwell	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	3	0.25	541	Existing to Remain	Existing to Remain	3	82	0	0.25	541	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	West Stairwell	2200	2x4 Surface Wrap 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	$14	0	No New Controls	0	0.0%	0	$0
1	West Stairwell	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	3	0.25	541	Existing to Remain	Existing to Remain	3	82	0	0.25	541	0.00	0	$0	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
1	Center Stairwell	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	5	0.41	902	Existing to Remain	Existing to Remain	3	82	0	0.41	902	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	2 - Main Corridor	2200	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	16	1.31	2,886	Existing to Remain	Existing to Remain	3	82	0	1.31	2,886	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
15	2 - BSF Room	1400	2x4 Surface Wrap 4-Lamp 34 W T12	4	160	1	0.16	224	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	101	0.09	123	$21	0	No New Controls	0	0.0%	0	$0
6	2 - Upper Aud Storage	1000	Phillips Screw-in 28 W CFL Covered	1	28	2	0.06	56	Existing to Remain	Existing to Remain	1	28	0	0.06	56	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	2 - Storage Room	1000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	116	Existing to Remain	Existing to Remain	2	58	0	0.12	116	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	2 - Classroom #4	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
1	2 - Classroom #5	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
1	2 - Classroom #6	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
1	2 - Classroom #7	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
1	2 - Classroom #8	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
16	2 - Supply Closet #9	1000	1x4 Surface Wrap 2-Lamp 34 W T12	2	80	2	0.16	160	Re-Lamp / Re-Ballast	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	2	49	2	0.10	98	0.06	62	$10	0	No New Controls	0	0.0%	0	$0
8	2 - Storage Room	1000	100 W A-Lamp Incandescent	1	100	1	0.10	100	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23	0.08	77	$13	0	No New Controls	0	0.0%	0	$0
1	2 - Classroom #12	1400	2x4 Recessed Prismatic 3-Lamp 32 W T8	3	82	10	0.82	1,148	Existing to Remain	Existing to Remain	3	82	0	0.82	1,148	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	230	$39
2	2 - Storage #13	1000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	116	Existing to Remain	Existing to Remain	2	58	0	0.12	116	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
4	2 - Classroom #14	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	$87	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	202	$34
8	0 - Basement Hallway	1000	100 W A-Lamp Incandescent	1	100	3	0.30	300	Re-Lamp	23w CFL Screw Base	1	23	3	0.07	69	0.23	231	$39	0	No New Controls	0	0.0%	0	$0
17	0 - Old Bomb Shelter	1000	2x4 Recessed Prismatic 4-Lamp 34 W T12	4	160	10	1.60	1,600	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	720	0.88	880	$148	0	No New Controls	0	0.0%	0	$0
18	0 - Old Bomb Shelter	1000	1x4 Recessed Prismatic 2-Lamp 34 W T12	2	80	1	0.08	80	Re-Lamp / Re-Ballast	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	2	49	1	0.05	49	0.03	31	$5	0	No New Controls	0	0.0%	0	$0
2	0 - Boiler Room	1000	1x4 Surface 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
12	2 - Audtorium Balcony #2	1800	Screw-in 20 W CFL Covered	1	20	6	0.12	216	Existing to Remain	Existing to Remain	1	20	0	0.12	216	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
19	2 - Projection Room #3	1000	65 W Pendant Flood Lamp	1	65	1	0.07	65	Re-Lamp	15w LED PAR38 Sylvania LED15PAR38/SG/830/SP10	1	15	1	0.02	15	0.05	50	$8	0	No New Controls	0	0.0%	0	$0
20	Exterior	4000	70 W HPS Spot Light Wall Mount	1	78	5	0.39	1,560	Re-Lamp	15w LED PAR38 Sylvania LED15PAR38/SG/830/SP10	1	15	5	0.08	300	0.32	1,260	$212	0	No New Controls	0	0.0%	0	$0

			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
21	Exterior (Gym/Aud Entry)	4000	100 W Metal Halide HID Downlight	1	113	2	0.23	904	Re-Lamp	15w LED PAR38 Sylvania LED15PAR38/SG/830/SP10	1	15	2	0.03	120	0.20	784	$132	0	No New Controls	0	0.0%	0	$0
22	Exterior	4000	2-Lamp 150 W Flood Lamp	2	300	1	0.30	1,200	Re-Lamp	20w LED PAR38 Sylvania LED20PAR38/DIM/830/FL40	2	40	1	0.04	160	0.26	1,040	$175	0	No New Controls	0	0.0%	0	$0
23	Exterior	4000	23 W CFL Spolt Light Wall Mount	1	23	1	0.02	92	Existing to Remain	Existing to Remain	1	23	0	0.02	92	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
	TOTAL					**351**	**30**	**49,719**					**81**	**26**	**41,500**	**5**	**8,219**	**$1,381**			**21**	**4**	**4,020**	**$675**

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 #3	3000	SHARP NU-U235F2	122	17.5	2,140	28.67	33,130	23.2	5,112	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 #3
Location:
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$182,262
Annual kWh Production	33,130
Annual Energy Cost Reduction	$5,566
Average Annual SREC Revenue	$6,331

Simple Payback: **15.32** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.168**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	33,130	$5,566	$0	$8,283	$10,725	$7,731	($4,608)	($4,608)
2	$0	32,964	$5,733	$0	$8,241	$10,249	$8,208	($4,482)	($9,091)
3	$0	32,800	$5,905	$0	$8,200	$9,742	$8,714	($4,352)	($13,442)
4	$0	32,636	$6,082	$0	$8,159	$9,205	$9,251	($4,216)	($17,658)
5	$0	32,472	$6,264	$334	$8,118	$8,634	$9,822	($4,408)	($22,066)
6	$0	32,310	$6,452	$333	$6,462	$8,028	$10,428	($5,875)	($27,941)
7	$0	32,148	$6,646	$331	$6,430	$7,385	$11,071	($5,712)	($33,653)
8	$0	31,988	$6,845	$329	$6,398	$6,702	$11,754	($5,543)	($39,196)
9	$0	31,828	$7,051	$328	$6,366	$5,978	$12,479	($5,368)	($44,564)
10	$0	31,669	$7,262	$326	$4,750	$5,208	$13,249	($6,770)	($51,334)
11	$0	31,510	$7,480	$325	$4,727	$4,391	$14,066	($6,574)	($57,908)
12	$0	31,353	$7,704	$323	$4,703	$3,523	$14,933	($6,372)	($64,280)
13	$0	31,196	$7,936	$321	$4,679	$2,602	$15,854	($6,163)	($70,443)
14	$0	31,040	$8,174	$320	$3,104	$1,624	$16,832	($7,498)	($77,942)
15	$0	30,885	$8,419	$318	$3,088	$586	$17,870	($7,267)	($85,209)
	Totals:	479,928	$103,519	$3,589	$91,707	$94,584	$182,262	($85,209)	($619,334)

Net Present Value (NPV) **($62,535)**

APPENDIX G

STEAM TRAP REPLACEMENT ANALYSIS

Calculation Assumptions		
Description	**Value**	**Units**
Ann. Gas Usage	16,752	Therm
Less DHW Gas Usage	2,409	Therm
Less Other Gas Usage	0	Therm
Net Heating Gas Usage	14,343	Therm
Est. Steam Production	998,054	lbs
Boiler Efficiency	70%	
Makeup Water	50	°F
Condenstate Return	200	°F
30% Makeup		
Feedwater Enthalpy	155	btu/lb
Steam Enthalpy	1161	btu/lb
Steam Production Conversion	69.58	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)	$0.99	
Trap Failure Rate	15.00%	

Building Area	Estimated Quantity
Boiler Plant	1
Classroom UV	18
Radiators	30
TOTAL	49

STEAM TRAP LOSS CALCULATION

Steam Trap Sizes	Trap Orifice Diamter (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	48	7	245,846	3,533	$3,498
1" Trap	1/4"	54.70	1	0	0	0	$0
1 -1/2" Trap	3/8"	123.00	0	0	0	0	$0
TOTAL			**49**	**7**	**245,846**	**3,533**	**$3,498**

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. $0.168	COND LOSS QT/MIN	ANNUAL HTG $ SAV	**TOTAL $ ENERGY SAV (E&G)**	EQUIP.& INST. COST	TOTAL COST NOTE 2
CP-x	COND. PUMP		4	78.5%	4	4,933	85.5%	4,529	404	$68	0.25	$226	$294	$22,500	$32,625
TOTALS=										**$68**		**$226**	**$ 294**		**$32,625**

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