CLIFTON PUBLIC SCHOOLS
PUBLIC SCHOOL #15

700 GREGORY AVENUE
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 & 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: 728006947
Account No: 55 028 694 05
Third Party Utility Provider: Champion Energy Services LLC
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	15,800	61.2	$2,428
Apr-12	13,160	54.4	$2,110
May-12	13,440	57.2	$2,663
Jun-12	12,320	58.8	$2,494
Jul-12	6,480	25.2	$1,440
Aug-12	7,000	63.6	$1,948
Sep-12	12,720	61.6	$1,995
Oct-12	15,520	60.0	$2,163
Nov-12	13,640	60.0	$2,163
Dec-12	18,040	66.4	$2,553
Jan-13	20,760	81.6	$2,926
Feb-13	20,880	71.6	$2,907
Totals	**169,760**	**81.6 Max**	**$27,790**

AVERAGE DEMAND **60.1 KW average**
AVERAGE RATE **$0.164** **$/kWh**

Figure 1
Electricity Usage Profile

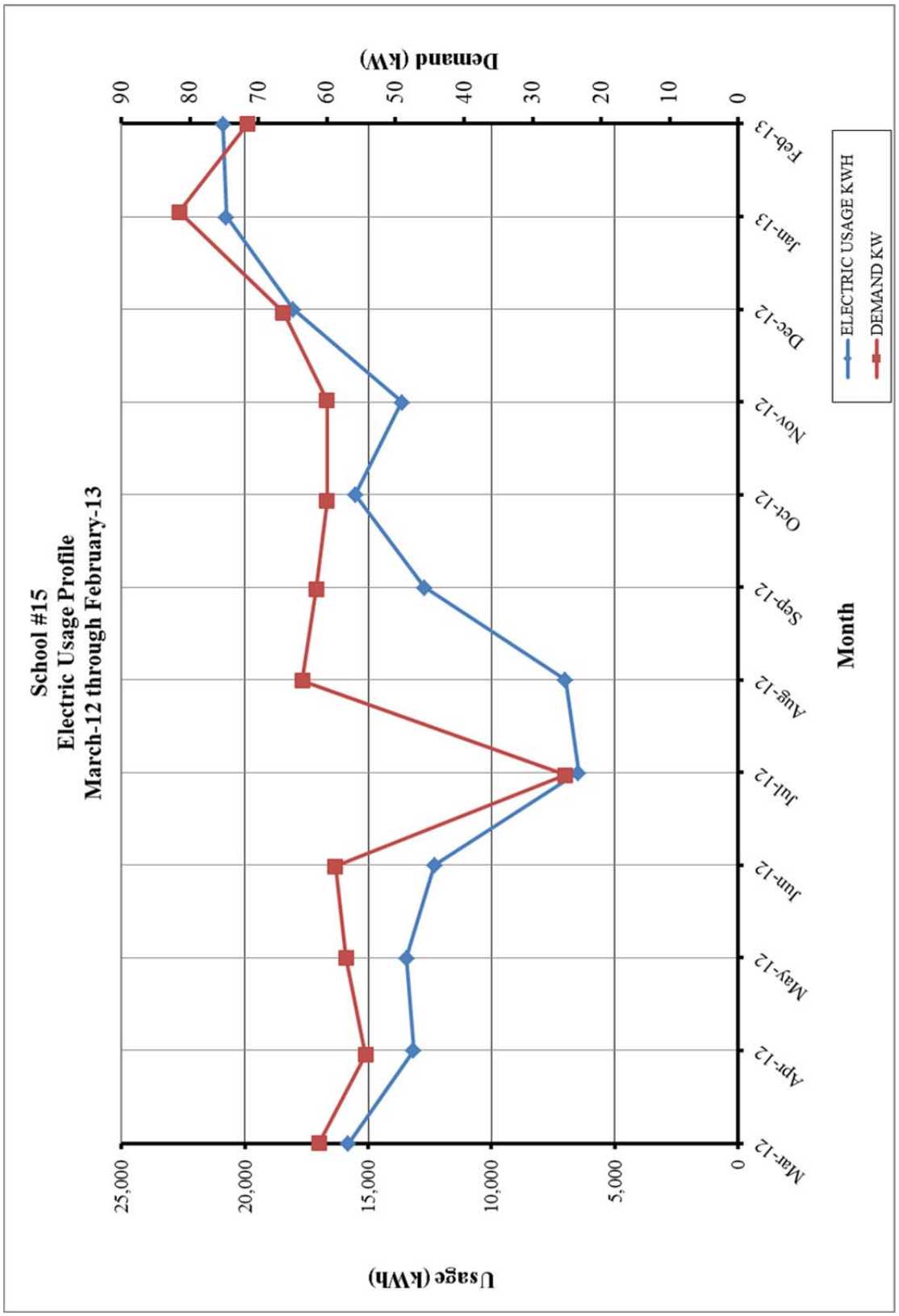
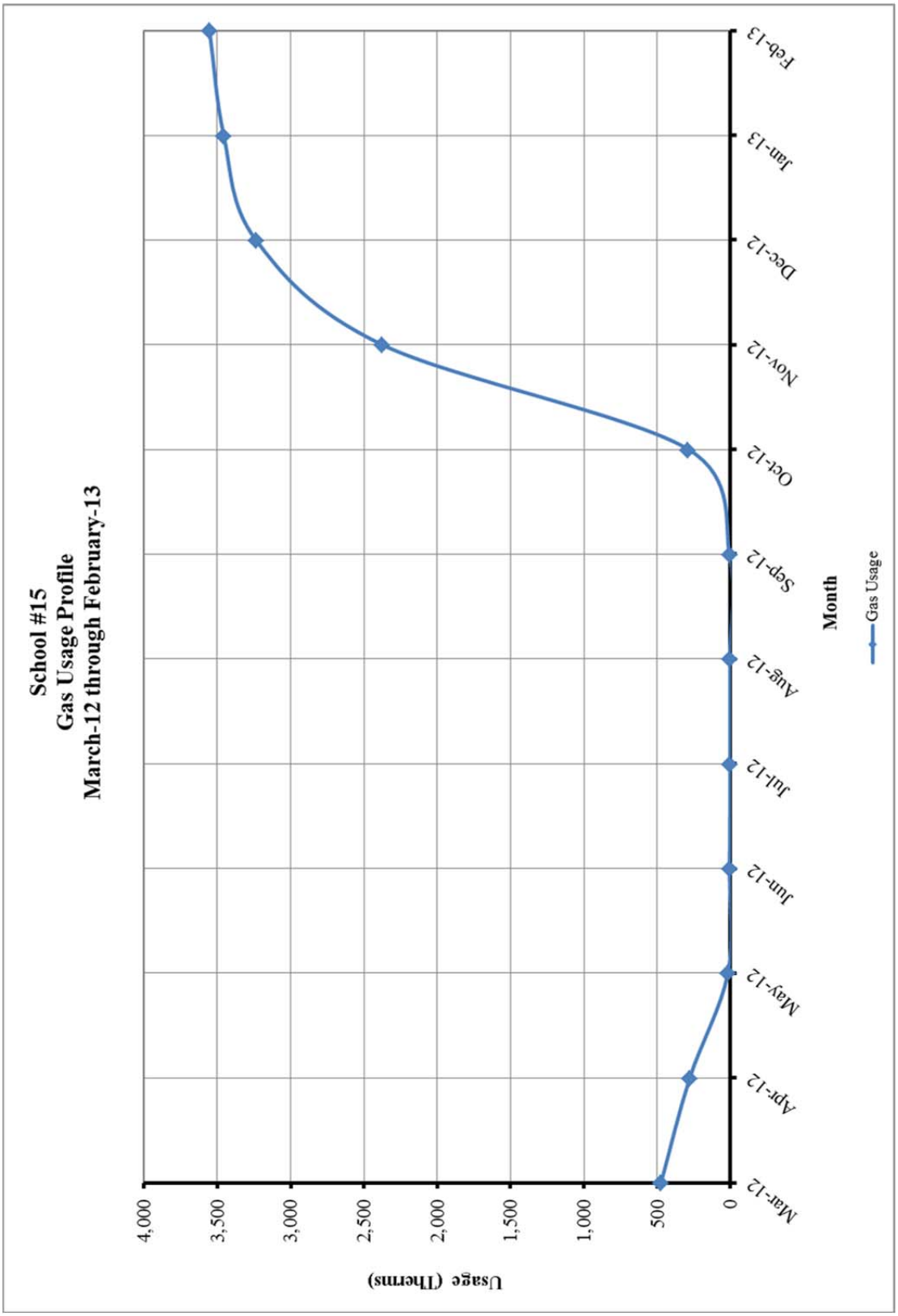


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: GSG (HTG), LVG		
Meter No: 2521991, 3274855		
Account No: 55 028 694 05		
Third Party Utility Provider: Hess		
TPS Meter No: 446575/447972		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-12	473.70	$484.78
Apr-12	277.80	$279.26
May-12	17.80	$119.10
Jun-12	6.24	$113.87
Jul-12	3.15	$112.26
Aug-12	2.20	$111.56
Sep-12	7.30	$114.42
Oct-12	289.30	$289.28
Nov-12	2,379.40	$2,694.98
Dec-12	3,238.70	$3,081.19
Jan-13	3,457.60	$3,237.61
Feb-13	3,554.70	$3,356.61
TOTALS	**13,707.89**	**$13,994.91**
AVERAGE RATE:	**$1.02**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

School #15 is located at 700 Gregory Avenue in Clifton, New Jersey. This 35,460 SF school was built in 1921 with major additions/renovations in 1968 and 1998. The building is a two-story facility with a basement for Pre-K classes and is comprised of administration offices, general classrooms, kindergarten classrooms, nurse's office, kitchen serving area, all-purpose room/stage, custodial office/supplies, faculty room, boiler rooms, storage rooms, and mechanical/electrical rooms.

Occupancy Profile

The typical hours of operation for School #15 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, and nighttime cleaning staff present until 10:00 pm. The school's enrollment is approximately 347 students and has 37 teachers, support staff, and administrative personnel.

Building Envelope

Exterior walls for this school are brick-faced with original stone work a steel & 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 well maintained. Typical windows throughout the school are double-section, double pane, operable, ¼" clear glass with white aluminum frames. The building roof is built-up Bitchumen roof with asphalt cap sheet rigid roof insulation on a deck surface.

HVAC Systems

School #15 HVAC systems consists of two (2) steam boilers, one (1) hot water boiler, two in-line heating hot water pumps, two (2) ceiling-mounted gym heating & ventilation units, classroom heating and ventilating units, and approximately four window air conditioning unit.

Two of the boilers are gas-fired, cast iron sectional, steam boilers approximately 37 years old with an input of 2,713 MBH each and an output of 1,689 lbs. /hr. at 212°F. Manufactured by Weil McLain and having an existing efficiency of approximately 65%, these boilers feed steam radiators and steam coils throughout the facility. As outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook, the estimated service life for a commercial cast iron, sectional, steam boiler is 30 years. Steam condensate is returned to a pump and receiver unit that then pumps the hot water to the boilers. The third boiler is an H B Smith gas-fired, cast iron sectional, hot water boiler that is approximately 29 years old with an input of 946 MBH and an output of 747 MBH. Hot water is circulated via two (2) Bell & Gossett in-line, centrifugal pumps rated at 80 GPM with 1 HP motors. These pumps supply hot water to classroom unit ventilators, fin-tube radiators, cabinet/unit heaters, etc.

The two (2) ceiling-mounted, heating & ventilation units in the gym are Dunham-Bush central air handlers with outside air intake capabilities.

Fresh air is supplied to the classrooms via the unit ventilators, outside air intake louvers for the storage and mechanical rooms and operable windows.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. There are also several roof exhausters for the gym, offices, storage rooms, mechanical rooms, and classrooms/corridors.

HVAC System Controls

The steam boilers are controlled by a Heat-Timer Model MULTI-MOD with full modulation sequencing controls and an outside temperature reset controller also by Heat-Timer (Model MPC). The various steam valves in the boiler plant are controlled by 1957 vintage Powers pneumatic valve actuators and on/off switches. Some of the controls have proportional band logic but the sensors/controls are far out of calibration. Each unit ventilator in the classrooms is controlled by a Powers thermostat on the opposite wall with a temperature control dial that allows the occupant local temperature control. The steam radiators are controlled by a manual thermostatic valve.

The hot water boiler is controlled by 1990s vintage Powers pneumatic valve actuators and on/off switches. Some of the controls have proportional band logic but the sensors/controls are far out of calibration. The hot water supply temperature is reset via an outside air thermostat. Each unit ventilator in the classrooms feed by this boiler plant is controlled by a Powers thermostat on the opposite wall with a temperature control dial that allows the occupant local temperature control. The hot water cabinet/unit heaters are controlled by local thermostats.

Domestic Hot Water

Domestic hot water for the kitchen/all-purpose room is supplied by a Mor-Flo Industries electric hot water heater with a rating of 4.5 kW and a 50-gallon storage capacity. The restrooms in most of the building are supplied hot water by a Rheem gas-fired hot water heater located in the basement mechanical room. The unit has an input of 38 MBH with a 40-gallon capacity and a thermal efficiency of 80%. The nurse's office has a small Rheem electric hot water heater with 6-gallon storage capacity and uses 2 kW of electric power. The fourth unit is a Rheem electric hot water heater with a 30-gallon capacity and rated at 4.5 kW. This unit serves the 1st floor West End bathrooms.

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 a TurboAir Deluxe Energy Star freezer & refrigerator units along with a portable heated rack cabinet and a milk refrigerator owned by the vendor.

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 SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrade - General	$1,353	$12,192	$1,200	$10,992	8.1
Lighting Upgrade - APR	$188	$5,000	$0	$5,000	26.7
Lighting Controls Upgrade	$1,941	$7,300	$865	$6,435	3.3
~~Burner Controls Upgrade~~	~~$524~~	~~$42,000~~	~~$0~~	~~$42,000~~	~~80.2~~
Water Conservation	$1,355	$238	$0	$238	0.2
Steam Trap Replacements	$2,093	$28,720	$0	$28,720	13.7
~~Condensate Receiver Replacement~~	~~$267~~	~~$36,750~~	~~$0~~	~~$36,750~~	~~137.6~~
~~Thermostatic Steam Vavles/Control~~	~~$1,571~~	~~$37,500~~	~~$0~~	~~$37,500~~	~~23.9~~
~~DDC Controls Upgrade~~	~~$1,500~~	~~$225,120~~	~~$0~~	~~$225,120~~	~~150.1~~
Design / Construction Extras (15%)		$8,018		*$8,018*	
Total Project	**$6,930**	**$61,468**	**$2,065**	**$59,403**	**8.6**

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

Table 2
ECM Energy 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	$1,353	$12,192	$1,200	$10,992	8.1
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Water Conservation	$1,355	$238	$0	$238	0.2
Steam Trap Replacements	$2,093	$28,720	$0	$28,720	13.7
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Design / Construction Extras (15%)		$8,018		*$8,018*	
Total Project	**$6,930**	**$61,468**	**$2,065**	**$59,403**	**8.6**

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

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	$1,353	$12,192	$1,200	$10,992	8.1
Lighting Upgrade - APR	$188	$5,000	$0	$5,000	26.7
Lighting Controls Upgrade	$1,941	$7,300	$865	$6,435	3.3
~~Burner Controls Upgrade~~	~~$524~~	~~$42,000~~	~~$0~~	~~$42,000~~	~~80.2~~
Water Conservation	$1,355	$238	$0	$238	0.2
Steam Trap Replacements	$2,093	$28,720	$0	$28,720	13.7
~~Condensate Receiver Replacement~~	~~$267~~	~~$36,750~~	~~$0~~	~~$36,750~~	~~137.6~~
~~Thermostatic Steam Vavles/Control~~	~~$1,571~~	~~$37,500~~	~~$0~~	~~$37,500~~	~~23.9~~
~~DDC Controls Upgrade~~	~~$1,500~~	~~$225,120~~	~~$0~~	~~$225,120~~	~~150.1~~
Design / Construction Extras (15%)		$8,018		*$8,018*	
Total Project	**$6,930**	**$61,468**	**$2,065**	**$59,403**	**8.6**

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 #15 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. Finally, there are some fixtures that can be retrofitted to the Super T-8 lamp and Ballast system along with a reflector that would produce an economical payback period.

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 ($):	$12,192
NJ Smart Start Equipment Incentive ($):	$1,200
Net Installation Cost ($):	$10,992
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,353
Total Yearly Savings ($/Yr):	$1,353
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.1
Simple Lifetime ROI	84.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$20,295
Internal Rate of Return (IRR)	9%
Net Present Value (NPV)	$5,160.03

ECM #2: Lighting Upgrade – All-Purpose Room

Description:

The All-Purpose Room at Clifton Elementary School #15 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 ($):	$5,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$188
Total Yearly Savings ($/Yr):	$188
Estimated ECM Lifetime (Yr):	15
Simple Payback	26.7
Simple Lifetime ROI	-43.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$2,814
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($2,760.25)

ECM #3: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Elementary School #15 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 #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$7,300
NJ Smart Start Equipment Incentive ($):	$865
Net Installation Cost ($):	$6,435
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,941
Total Yearly Savings ($/Yr):	$1,941
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.3
Simple Lifetime ROI	352.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$29,115
Internal Rate of Return (IRR)	30%
Net Present Value (NPV)	$16,736.53

ECM #4: Steam Boiler Burner & Controls Upgrade

Description:

The majority of the heating is provided to the Clifton Elementary School #15 facility by Weil McLain 65 Boiler Horsepower (BHP) natural gas-fired boilers that produces steam for the heating season. The boilers are 1976 vintage and currently should be capable of achieving an efficiency rating of 60 to 65 percent while operating. Given the limitations of the current system burner and controls and the vast improvement in boiler controls today over what was available then, it is recommended that a burner and new controls upgrade be performed.

This ECM will install new Cleaver Brooks Profire burner 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. These burners can also be equipped with parallel positioning for further control.

Energy Savings Using Hand Calculations:

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

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$42,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$42,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$524
Total Yearly Savings ($/Yr):	$524
Estimated ECM Lifetime (Yr):	21
Simple Payback	80.2
Simple Lifetime ROI	-73.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$11,004
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	($33,922.53)

ECM #5: Water Conservation

Description:

The facility utilizes standard plumbing fixtures. The typical sink aerator consumption only meets the minimum federally required standard for water efficiency. New fixtures and aerators are available that use less water than today's requirements and can add up to significant water reduction over a long period.

This ECM includes the replacement of the existing sink aerators with low flow sink aerators in the restrooms.

Energy Savings Calculations:

Faucets:

$$\text{Water Consumption} = \text{Occupancy}\left(\frac{\text{Days}}{\text{Yr}}\right) \times \text{Use}\left(\frac{\text{min}}{\text{Day}}\right) \times \textit{FixtureQuantity} \times \text{Fixture}\left(\frac{\text{Gal}}{\text{Min}}\right)$$

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

$$\text{Water Heating Usage (kWh)} = \frac{\text{Gallons}}{\text{year}} \times 8.33\frac{\text{Btu}}{\text{gal}} \times \Delta\text{T (50°F)} \times \frac{1}{\text{Heater Eff (95\%)}} \times \frac{\text{kW}}{3412\ \text{Btu}}$$

$$\text{Water Heating Usage (therm)} = \frac{\text{Gallons}}{\text{year}} \times 8.33\frac{\text{Btu}}{\text{gal}} \times \Delta\text{T (50°F)} \times \frac{1}{\text{Heater Eff (80\%)}} \times \frac{\text{therm}}{100{,}000\ \text{Btu}}$$

LOW FLOW WATER SAVING DEVICES			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Quantity of Sinks	8	8	
Flow Rate (GPM)	2.2	1.0	1.2
Device Usage (min per day)	30	30	
Facility Operation (days / year)	150	150	
Electric Rate ($/kWh)	$0.164	$0.164	
Natural Gas Rate ($/therm)	$1.020	$1.020	
Water Rate ($/1000gal)	$5.000	$5.000	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	10,174	4,624	5,549
Natural Gas Usage (Therm)	412	187	225
Water Usage (gallons)	79,200	36,000	43,200
Energy Cost ($)	$2,485	$1,130	$1,355
COMMENTS:			

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$238
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$238
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,355
Total Yearly Savings ($/Yr):	$1,355
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.2
Simple Lifetime ROI	8439.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$20,325
Internal Rate of Return (IRR)	569%
Net Present Value (NPV)	$15,937.90

ECM #6: Steam Trap Replacement Program

Description:

Steam traps are required for the proper operation of steam distributions systems. Traps are mechanical devices installed on steam pipes to remove condensate from steam flow. A typical school can have well over one hundred steam traps. Unfortunately steam traps have a tendency to leak. On average 20% of steam traps are leaking in existing installations. Steam traps only have an average life of five (5) years.

This ECM would replace approximately eight (8) 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 #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$28,720
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$28,720
Maintenance Savings ($/Yr):	($1,795)
Energy Savings ($/Yr):	$3,888
Total Yearly Savings ($/Yr):	$2,093
Estimated ECM Lifetime (Yr):	10
Simple Payback	13.7
Simple Lifetime ROI	-27.1%
Simple Lifetime Maintenance Savings	(17950)
Simple Lifetime Savings	$20,930
Internal Rate of Return (IRR)	-5%
Net Present Value (NPV)	($10,866.29)

ECM #7: 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 #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$36,750
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$36,750
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$267
Total Yearly Savings ($/Yr):	$267
Estimated ECM Lifetime (Yr):	15
Simple Payback	137.6
Simple Lifetime ROI	-89.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$4,005
Internal Rate of Return (IRR)	-20%
Net Present Value (NPV)	($33,562.57)

ECM #8: New Thermostatic Steam Valves/Control

Description:

This facility has steam radiators and unit ventilators on the perimeter walls of the school. Due to the equipment age, the two-way valves and controls do not function properly so the rooms are often overheated and the occupants are forced to use the windows to control the heat further increasing energy costs. During our site survey, we counted a total of 26 existing valves that would be excellent candidates for replacement with these new high-efficiency, thermostatic two-way valves/controls.

This measure would install the newest generation of thermostatic valves on the steam pipe feeding each classroom unit or radiator which would improve control of the heating. Thermostatic controls are self-contained and are suitable for radiators, fin-tubes, baseboards or convector units. These new thermostatic valves have the capability of setting an upper limit to prevent overheating of the spaces. The valves include a remote sensor for accurately measuring the return air temperature for better heating control.

Energy Savings Calculations:

In our experience, we have seen a 15% to 20% reduction in heating steam use from installation of new thermostatic valves/controls. The energy cost to heat the spaces controlled by these valves is estimated to be approximately $10,476**.** Therefore, the annual energy cost savings for this ECM would be approximately 15% of $10,476 or $1,571.

The basis of design is the ISTEC 2000 Series Thermostatic Valve/Control or equal which has a total installation cost (including valve, sensor, calibration, piping changes, etc.) of $1,500 per unit. Replacement of 25 existing older control valves x $1,500/unit for the new thermostatic valves/controls = $37,500.

Final quantities and sizes will be confirmed during the engineering phase of the project.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$37,500
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$37,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,571
Total Yearly Savings ($/Yr):	$1,571
Estimated ECM Lifetime (Yr):	10
Simple Payback	23.9
Simple Lifetime ROI	-58.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$15,710
Internal Rate of Return (IRR)	-13%
Net Present Value (NPV)	($24,099.05)

ECM #9: Digital Energy Management System (DDC EMS)

Description:

Currently, Clifton Elementary School #15 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. 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 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.

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

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)	10,271	-	
Existing Electricity Usage (kWh)	55,218	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	5%	
Gas Cost ($/Therm)	*$1.02*	$1.02	
Electricity Cost ($/kWh)	*$0.164*	$0.164	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Usage (Therms)	10,271	9,244	1,027
Electricity Usage (kWh)	55,218	52,457	2,761
Nat Gas Cost ($)	$10,477	$9,429	$1,048
Electricity Cost ($)	$9,056	$8,603	$453
Energy Cost ($)	$19,532	$18,032	$1,500
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 $7.11 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 #9 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$225,120
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$225,120
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,500
Total Yearly Savings ($/Yr):	$1,500
Estimated ECM Lifetime (Yr):	15
Simple Payback	150.1
Simple Lifetime ROI	-90.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$22,500
Internal Rate of Return (IRR)	-21%
Net Present Value (NPV)	($207,213.10)

REM #1: 39.01 kW Solar System

Description:

The Clifton Elementary School #15 has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 39.01 kilowatt solar array could be installed. The array will produce approximately 45,078 kilowatt-hours annually that will reduce the overall electric usage of the facility by 26.55%.

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}):	39.01
Electric Generation (KWH/Yr):	45,078
Installation Cost ($):	$245,753
SREC Revenue ($/Yr):	$8,614
Energy Savings ($/Yr):	$7,393
Total Yearly Savings ($/Yr):	$16,007
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	15.4
Analysis Period Electric Savings ($):	$137,498
Analysis Period SREC Revenue ($):	$124,780
Net Present Value (NPV)	($85,015.18)

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

E. Turn off computers when not in use. Ensure computers are not running in screen saver mode.

F. Replace older style CRT monitors with newer energy efficient LCD/LED monitors.

G. Ensure classroom televisions are turned off at the end of the day and while not in use.

H. 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 #15

ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^{n_i}}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^{n_i}}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade - General	$5,722	$6,470	$1,200	$10,992	$1,353	$0	$1,353	15	$20,295	$0	84.6%	8.1	8.87%	$5,160.03
ECM #2	Lighting Upgrade - APR	$1,800	$3,200	$0	$5,000	$188	$0	$188	15	$2,814	$0	-43.7%	26.7	-6.45%	($2,760.25)
ECM #3	Lighting Controls Upgrade	$4,800	$2,500	$865	$6,435	$1,941	$0	$1,941	15	$29,115	$0	352.4%	3.3	29.54%	$16,736.53
ECM #4	Burner Controls Upgrade	$22,000	$20,000	$0	$42,000	$524	$0	$524	21	$11,004	$0	-73.8%	80.2	-9.91%	($33,922.53)
ECM #5	Water Conservation	$160	$78	$0	$238	$1,355	$0	$1,355	15	$20,325	$0	8439.9%	0.2	569.33%	$15,937.90
ECM #6	Steam Trap Replacements	$7,720	$21,000	$0	$28,720	$3,888	($1,795)	$2,093	10	$20,930	-$17,950	-27.1%	13.7	-5.37%	($10,866.29)
ECM #7	Condensate Receiver Replacement	$15,000	$21,750	$0	$36,750	$267	$0	$267	15	$4,005	$0	-89.1%	137.6	-20.03%	($33,562.57)
ECM #8	Thermostatic Steam Vavles/Control	$37,500	$0	$0	$37,500	$1,571	$0	$1,571	10	$15,710	$0	-58.1%	23.9	-13.33%	($24,099.05)
ECM #9	DDC Controls Upgrade	$225,120	$0	$0	$225,120	$1,500	$0	$1,500	15	$22,500	$0	-90.0%	150.1	-20.62%	($207,213.10)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	39.01 KW PV System	$245,753	$0	$0	$245,753	$7,393	$8,614	$16,007	15	$240,098	$129,206	-2.3%	15.4	-0.29%	($54,668.59)

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
12-Clifton BOE - PS 15

Building ID: 3477585
For 12-month Period Ending: February 28, 2013[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: April 11, 2013

Facility
12-Clifton BOE - PS 15
700 Gregory Avenue
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: 1921
Gross Floor Area (ft²): 35,460

Energy Performance Rating[2] (1-100) 48

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	572,388
Natural Gas (kBtu)[4]	1,306,987
Total Energy (kBtu)	1,879,375

Energy Intensity[4]

Site (kBtu/ft²/yr)	53
Source (kBtu/ft²/yr)	93

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	151

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	52
National Median Source EUI	91
% Difference from National Median Source EUI	2%
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	12-Clifton BOE - PS 15	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	700 Gregory Avenue, Clifton, NJ 07013	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 15 (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	35,460 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	62 (Default)	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	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	20,760.00
12/08/2012	01/07/2013	18,040.00
11/08/2012	12/07/2012	13,640.00
10/08/2012	11/07/2012	15,520.00
09/08/2012	10/07/2012	12,720.00
08/08/2012	09/07/2012	7,000.00
07/08/2012	08/07/2012	6,480.00
06/08/2012	07/07/2012	12,320.00
05/08/2012	06/07/2012	13,440.00
04/08/2012	05/07/2012	13,160.00
03/08/2012	04/07/2012	15,800.00
Electric Consumption (kWh (thousand Watt-hours))		**148,880.00**
Electric Consumption (kBtu (thousand Btu))		**507,978.56**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**507,978.56**
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	3,457.60
12/08/2012	01/07/2013	3,238.70
11/08/2012	12/07/2012	2,379.40
10/08/2012	11/07/2012	289.30
09/08/2012	10/07/2012	7.30
08/08/2012	09/07/2012	2.20
07/08/2012	08/07/2012	3.15
06/08/2012	07/07/2012	6.24
05/08/2012	06/07/2012	17.80
04/08/2012	05/07/2012	277.80
03/08/2012	04/07/2012	473.70

gas Consumption (therms)	**10,153.19**
gas Consumption (kBtu (thousand Btu))	**1,015,319.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**1,015,319.00**
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
12-Clifton BOE - PS 15
700 Gregory Avenue
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

12-Clifton BOE - PS 15	
Gross Floor Area Excluding Parking: (ft^2)	35,460
Year Built	1921
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Elementary School 15	
Space Type	K-12 School
Gross Floor Area (ft^2)	35,460
Open Weekends?	No
Number of PCs [d]	62
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	0
Percent Heated	100
Months [o]	10
High School?	No
School District [o]	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	48	48	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	53	53	41	N/A	52
Source ($kBtu/ft^2$)	93	93	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					
$MtCO_2e$/year	151	151	116	N/A	149
$kgCO_2e/ft^2$/year	4	4	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.

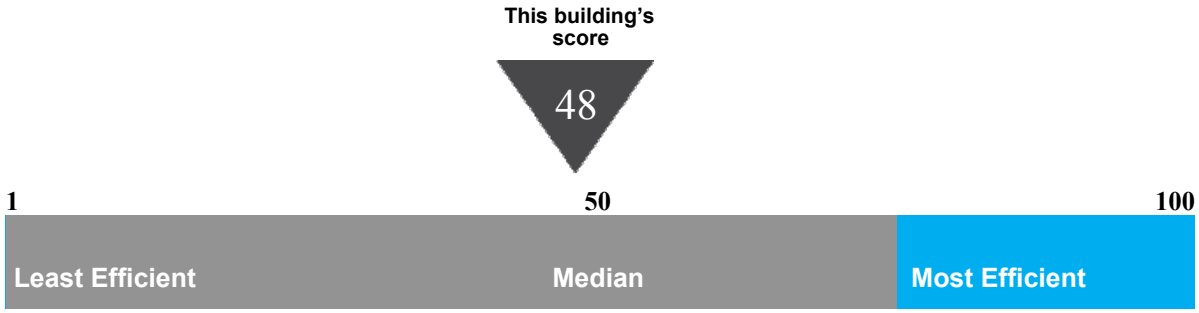
Statement of Energy Performance

2013

12-Clifton BOE - PS 15
700 Gregory Avenue
Clifton, NJ 07013

Portfolio Manager Building ID: 3477585

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 93 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 #15

Boilers

Tag		
Unit Type	Cast Iron Sectional	Steam Cast Iron Sectional
Qty	1	2
Location	CR Boiler Room	Boiler Room #2
Area Served	All Purpose Room Area	Steam Loop
Manufacturer	HB Smith	Weil McLain
Model #	2500L Smith Mills	988
Serial #	-	Series 1
Input Capacity (Btu/Hr)	946 MBH	2713 (gas)
Rated Output Capacity (Btu/Hr)	747 MBH	2176 (gas IBR) / 1689 (steam)
Approx. Efficiency %	70% (Existing)	65% (Existing)
Fuel	Natural Gas	Natural Gas
Approx Age	29	37
ASHRAE Service Life	35	35
Remaining Life	6	(2)
Comments	Power Flame Burner: MN:C1-G-12 SN:98233359	Power Flame Burner: MN:WCR2-G-20B SN:080726802

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #15

Domestic Water Heaters

Tag		
Unit Type	Electric Domestic Hot Water Heater	Electric Domestic Hot Water Heater
Qty	1	1
Location	All Purpose Room Mech Room	Bathroom
Area Served	Kitchen	Single Bathroom
Manufacturer	Mor-Flo Industries	Rheem
Model #	EFR90-52DL	81VP6S
Serial #	9250116872	1208600630
Size (Gallons)	50 Gallons	6 Gallons
Input Capacity (MBH/KW)	4500 Watts	2000 Watts
Recovery (Gal/Hr)	58	-
Efficiency %	98%	98%
Fuel	Electric	Electric
Approx Age	21	5
ASHRAE Service Life	12	12
Remaining Life	(9)	7
Comments		

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

Domestic Water Heate

Tag		
Unit Type	Electric Domestic Hot Water Heater	Gas Fired Domestic Hot Water Heater
Qty	1	1
Location	Janitor Area	Basement Mechanical Room
Area Served	1st FL West end Bathroom	Domestic Hot Water
Manufacturer	Rheem	Rheem
Model #	81V30D D	22V40F1
Serial #	RH1102F13284	RHLN0106421240
Size (Gallons)	30 Gallons	40 Gallons
Input Capacity (MBH/KW)	4500 Watts	38 MBH
Recovery (Gal/Hr)	48	32.2
Efficiency %	98%	80.00%
Fuel	Electric	Natural Gas
Approx Age	11	7
ASHRAE Service Life	12	12
Remaining Life	1	5
Comments		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #15

Pumps

Tag			
Unit Type	Condensate Receiver	In-Line Centrifugal	In-Line Centrifugal
Qty	1	1	1
Location	Basement Mechanical Room	Basement Mechanical Room	Basement Mechanical Room
Area Served	Steam System	Heating Hot Water System	Heating Hot Water System
Manufacturer	Vent-Rite Valve Corp	Bell & Gossett	Bell & Gossett
Model #	PSB117DN	-	-
Serial #	57638	-	-
Horse Power	1/3 HP	1 HP	1 HP
Flow	117 Gallon Consensate Receiver	80 GPM	80 GPM
Motor Info	AO Smith	MagneTeK Century AC motor	MagneTeK Century AC motor
Electrical Power	115/230	230/115	230/115
RPM	3450	1725 RPM	1725 RPM
Motor Efficiency %	75.5%	82.5%	82.5%
Approx Age	15	5	5
ASHRAE Service Life	18	15	15
Remaining Life	3	5	5
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #15

AHUs

Tag	HV-1	HV-2
Unit Type	Central Air Handler	Central Air Handler
Qty	1	1
Location	Gym Ceiling	Gym Ceiling
Area Served	Gym	Gym
Manufacturer	Dunham-Bush	Dunham-Bush
Model #	-	-
Unit Size	-	-
Heating Type	Hot Water Coil	Hot Water Coil
Heating Input (MBH)	-	-
Supply Fan (HP)	Unknown	Unknown
Electrical (V/H/P)	230/115	230/115
Approx Age	Unknown	Unknown
ASHRAE Service Life	20	20
Remaining Life	Unknown	Unknown
Comments	A. O. Smith E-Plus Fan Motor	A. O. Smith E-Plus Fan Motor

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12066
Facility Name: School #15
Address: 700 Gregory Avenue
City, State, Zip Clifton, NJ 07013

			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, $
5	All Purpose Room	2600	250w Metal Halide Pendant	1	295	8	2.36	6,136	Remove & Replace New Fixture	2x4, 4 Lamp, 54w T5, (2) 2/54 Elect. Ballast, Singlepoint Mnt., High Bay, Wire Guard, Lens	4	240	8	1.92	4,992	0.44	1,144	$188	0	No New Controls	0	0.0%	0	$0
221.14	APR Mechanical Room	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	2	62	2	0.12	149	Existing To Remain	Existing To Remain	2	62	0	0.12	149	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Warming Kitchen	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	4	0.25	645	Existing To Remain	Existing To Remain	2	62	0	0.25	645	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.21	Boys Restroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	1	0.11	283	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	187	0.04	96	$16	0	No New Controls	0	0.0%	0	$0
247.21	Boys Restroom	2600	2x2, 4 Lamp, F17 T8, 17w, Elect. Ballast, Wall Mnt., Prismatic Lens	4	60	1	0.06	156	De-Lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO17/841/XP/ECO Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	47	1	0.05	122	0.01	34	$6	0	No New Controls	0	0.0%	0	$0
242.21	Girls Restroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	1	0.11	283	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	187	0.04	96	$16	0	No New Controls	0	0.0%	0	$0
247.21	Girls Restroom	2600	2x2, 4 Lamp, F17 T8, 17w, Elect. Ballast, Wall Mnt., Prismatic Lens	4	60	1	0.06	156	De-Lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO17/841/XP/ECO Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	47	1	0.05	122	0.01	34	$6	0	No New Controls	0	0.0%	0	$0
3	Janitor Closet	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
222.21	APR Hallway	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	7	0.43	1,302	Existing To Remain	Existing To Remain	2	62	0	0.43	1,302	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	APR Hallway	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	186	Existing To Remain	Existing To Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Main Hallway	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	16	0.99	2,976	Existing To Remain	Existing To Remain	2	62	0	0.99	2,976	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.21	Main Hallway	3000	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	2	0.22	654	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	432	0.07	222	$36	0	No New Controls	0	0.0%	0	$0
221.11	Main Hallway	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing To Remain	Existing To Remain	2	62	0	0.12	372	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.22	Addition Hallway 1F	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	8	0.50	1,488	Existing To Remain	Existing To Remain	2	62	0	0.50	1,488	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.22	Addition Hallway 2F	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	6	0.37	1,116	Existing To Remain	Existing To Remain	2	62	0	0.37	1,116	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.22	Addition Stairs 1	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	3	0.19	558	Existing To Remain	Existing To Remain	2	62	0	0.19	558	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.22	Addition Stairs 2	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	3	0.19	558	Existing To Remain	Existing To Remain	2	62	0	0.19	558	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.22	K1 Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	4	109	11	1.20	3,117	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	11	0.79	2,059	0.41	1,058	$174	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	412	$68
222.22	K1 Classroom Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	K1 Classroom Storage	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	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, $
242.22	K2 Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	4	109	11	1.20	3,117	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	11	0.79	2,059	0.41	1,058	$174	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	412	$68
222.22	K2 Classroom Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	K2 Classroom Storage	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
242.22	K3 Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	4	109	9	0.98	2,551	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	9	0.65	1,685	0.33	866	$142	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	337	$55
242.21	K3 Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	2	0.22	567	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	374	0.07	192	$32	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	75	$12
222.22	K3 Classroom Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	K3 Classroom Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.22	K4 Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	4	109	11	1.20	3,117	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	11	0.79	2,059	0.41	1,058	$174	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	412	$68
222.22	K4 Classroom Restroom	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	K4 Classroom Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.14	Classroom 5	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	2	62	6	0.37	967	Existing To Remain	Existing To Remain	2	62	0	0.37	967	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Faculty Restroom	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Classroom	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	3	0.19	484	Existing To Remain	Existing To Remain	2	62	0	0.19	484	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	97	$16
221.11	Hallway	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	186	Existing To Remain	Existing To Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
211.11	Main Office	2600	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	1	33	4	0.13	343	Existing To Remain	Existing To Remain	1	33	0	0.13	343	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	69	$11
221.11	Classroom	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.11	Copy Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	322	Existing To Remain	Existing To Remain	2	62	0	0.12	322	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	64	$11
222.21	Main Entrance	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	186	Existing To Remain	Existing To Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Small Classroom	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	4	0.25	645	Existing To Remain	Existing To Remain	2	62	0	0.25	645	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$21
3	Under Stairs Closet	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
221.21	Classroom	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95

			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, $
222.21	Boys Restroom	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	4	0.25	645	Existing To Remain	Existing To Remain	2	62	0	0.25	645	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.11	Janitor Area	1200	2x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	72	3	0.22	259	Existing To Remain	Existing To Remain	3	72	0	0.22	259	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Janitor Area	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing To Remain	Existing To Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Stairs	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing To Remain	Existing To Remain	2	62	0	0.12	372	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Stairs	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	372	Existing To Remain	Existing To Remain	2	62	0	0.12	372	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Classroom 11	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
222.21	Classroom 12	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	7	0.43	1,128	Existing To Remain	Existing To Remain	2	62	0	0.43	1,128	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	226	$37
221.21	Classroom 13	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
3	Classroom 13 Storage	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
221.21	Media Center	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
3	Media Center Storage	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
222.21	Classroom 15	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	6	0.37	967	Existing To Remain	Existing To Remain	2	62	0	0.37	967	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	193	$32
221.11	Classroom 16	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Classroom 1	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Teachers Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	5	0.31	806	Existing To Remain	Existing To Remain	2	62	0	0.31	806	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	161	$26
221.21	2F Classroom 2	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Classroom 3	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Classroom 4	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Nurse	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	4	0.25	645	Existing To Remain	Existing To Remain	2	62	0	0.25	645	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	2F Classroom 5	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
242.21	2F Classroom 6	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	15	1.64	4,251	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	15	1.08	2,808	0.56	1,443	$237	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	562	$92

			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, $
242.21	2F Classroom 7	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	15	1.64	4,251	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	15	1.08	2,808	0.56	1,443	$237	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	562	$92
221.21	2F Classroom 8	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
2	2F Classroom 8 Restroom	1200	26w CFL	1	26	1	0.03	31	Existing To Remain	Existing To Remain	1	26	0	0.03	31	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
3	2F Classroom 8 Storage	1200	100w Incandescent	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	28	0.08	92	$15	0	No New Controls	0	0.0%	0	$0
222.21	Front Stairs	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	186	Existing To Remain	Existing To Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Front Stairs	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	186	Existing To Remain	Existing To Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Storage above front stairs	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	2	0.12	149	Existing To Remain	Existing To Remain	2	62	0	0.12	149	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	2F Classroom 9	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.21	2F Classroom 10	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	18	1.12	2,902	Existing To Remain	Existing To Remain	2	62	0	1.12	2,902	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	580	$95
221.11	Stairs	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	3	0.19	558	Existing To Remain	Existing To Remain	2	62	0	0.19	558	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
	TOTAL					**469**	**35**	**89,485**					**95**	**31**	**80,094**	**4**	**9,392**	**$1,540**			**27**	**6**	**11,834**	**$1,941**

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 #15	4075	SHARP NU-U235F2	166	17.5	2,912	39.01	45,078	31.6	6,955	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 #15**
Location: **Clifton, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$245,753
Annual kWh Production	45,078
Annual Energy Cost Reduction	$7,393
Average Annual SREC Revenue	$8,614

Simple Payback: **15.35** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.164**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/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	45,078	$7,393	$0	$11,270	$14,462	$10,424	($6,223)	($6,223)
2	$0	44,853	$7,615	$0	$11,213	$13,819	$11,067	($6,058)	($12,281)
3	$0	44,628	$7,843	$0	$11,157	$13,136	$11,750	($5,886)	($18,167)
4	$0	44,405	$8,078	$0	$11,101	$12,411	$12,474	($5,706)	($23,873)
5	$0	44,183	$8,321	$455	$11,046	$11,642	$13,244	($5,974)	($29,847)
6	$0	43,962	$8,570	$453	$8,792	$10,825	$14,060	($7,976)	($37,823)
7	$0	43,742	$8,827	$451	$8,748	$9,958	$14,928	($7,760)	($45,583)
8	$0	43,524	$9,092	$448	$8,705	$9,037	$15,848	($7,537)	($53,120)
9	$0	43,306	$9,365	$446	$8,661	$8,060	$16,826	($7,306)	($60,426)
10	$0	43,090	$9,646	$444	$6,463	$7,022	$17,864	($9,220)	($69,646)
11	$0	42,874	$9,935	$442	$6,431	$5,920	$18,965	($8,961)	($78,607)
12	$0	42,660	$10,233	$439	$6,399	$4,750	$20,135	($8,693)	($87,300)
13	$0	42,446	$10,540	$437	$6,367	$3,509	$21,377	($8,416)	($95,715)
14	$0	42,234	$10,857	$435	$4,223	$2,190	$22,696	($10,241)	($105,956)
15	$0	42,023	$11,182	$433	$4,202	$790	$24,095	($9,934)	($115,890)
	Totals:	653,009	$137,498	$4,883	$124,780	$127,532	$245,753	($115,890)	($840,457)

Net Present Value (NPV) **($85,015)**

APPENDIX G

STEAM TRAP REPLACEMENT ANALYSIS

Calculation Assumptions		
Description	**Value**	**Units**
Ann. Gas Usage	13,708	Therm
Less DHW Gas Usage	615	Therm
Less Other Gas Usage	0	Therm
Net Heating Gas Usage	13,093	Therm
Est. Steam Production	976,110	lbs
Boiler Efficiency	75%	
Makeup Water	50	°F
Condenstate 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)	$1.02	
Trap Failure Rate	15.00%	

Building Area	Estimated Quantity
Boiler Plant	4
Air Handlers	5
Condensate Pumps	1
Various Classrooms	25
TOTAL	35

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	25	4	131,703	1,767	$1,802
1" Trap	1/4"	54.70	5	1	46,933	630	$642
1 -1/2" Trap	3/8"	123.00	5	1	105,534	1,416	$1,444
TOTAL			**35**	**5**	**284,170**	**3,812**	**$3,888**

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. $0.164	COND LOSS QT/MIN	ANNUAL HTG $ SAV	**TOTAL $ ENERGY SAV (E&G)**	EQUIP.& INST. COST	TOTAL COST NOTE 2
CP-x	COND. PUMP		1	75.5%	11	3,526	77.0%	3,458	69	$11	0.25	$256	$267	$15,000	$21,750
TOTALS=										**$11**		**$256**	**$ 267**		**$21,750**

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 $1.02/THERM AND 70% EFFICIENT BOILER PLANT