CLIFTON PUBLIC SCHOOLS
CLIFTON BOARD OF EDUCATION OFFICE

745 CLIFTON 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:	General Service Gas Heating (GSG HTG), 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: 258000561, 278003702
Account No: 65 898 219 09, 66 241 907 01
Third Party Utility Provider: Champion Energy Services L
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	21,640	61.9	$3,364
Apr-12	13,840	60.1	$2,493
May-12	19,780	83.3	$4,006
Jun-12	25,790	87.4	$4,717
Jul-12	26,985	96.9	$4,984
Aug-12	25,185	96.1	$4,761
Sep-12	21,200	89.5	$3,355
Oct-12	19,660	64.3	$3,086
Nov-12	19,020	58.2	$2,960
Dec-12	19,260	76.9	$3,069
Jan-13	22,010	65.9	$3,338
Feb-13	21,190	63.4	$3,284
Totals	**255,560**	**96.9 Max**	**$43,417**

AVERAGE DEMAND **75.3 KW average**
AVERAGE RATE **$0.170** **$/kWh**

Figure 1
Electricity Usage Profile

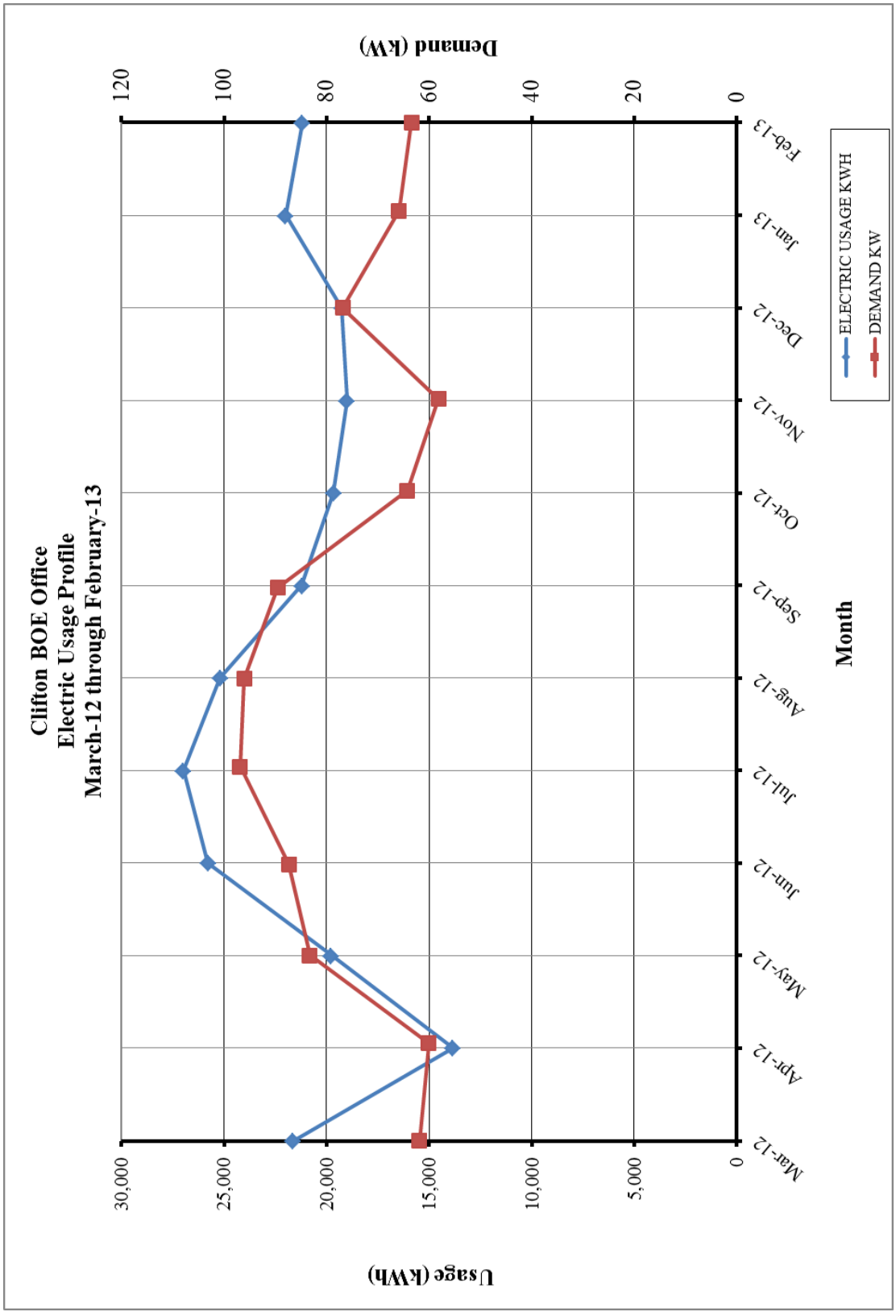
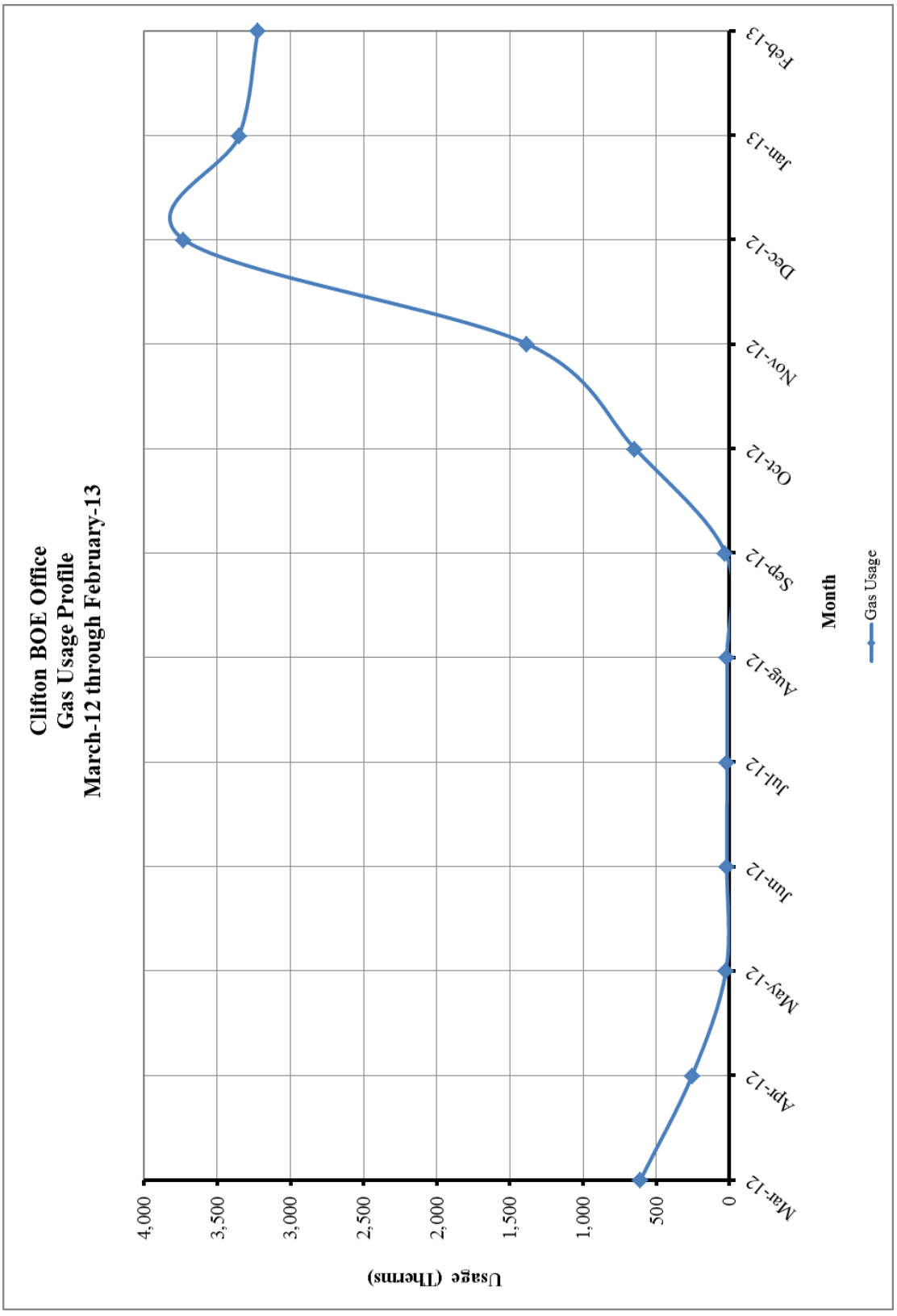


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: GSG (HTG), LVG		
Meter No: 1864148, 252714		
Account No: 65 898 219 09, 66 241 907 01		
Third Party Utility Provider: Hess		
TPS Meter No: 446575/446943, 446944		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-12	608.61	$485.88
Apr-12	254.84	$287.72
May-12	24.04	$126.59
Jun-12	17.77	$123.42
Jul-12	15.76	$122.40
Aug-12	16.79	$123.38
Sep-12	28.41	$131.73
Oct-12	648.37	$915.36
Nov-12	1,383.12	$1,527.68
Dec-12	3,731.16	$3,289.05
Jan-13	3,349.08	$2,965.30
Feb-13	3,223.20	$2,974.76
TOTALS	**13,301.15**	**$13,073.27**
AVERAGE RATE:	**$0.98**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Lester Herrschaft Administration Building is located at 745 Clifton Avenue in Clifton, New Jersey. This 40,000 SF building was built in 1925 with an expansion/renovation in 1957. The building is a two-story plus basement facility comprised of administration offices, School Board of Education (BOE) rooms, kitchen area, boiler room, conference rooms, storage rooms, and mechanical/electrical rooms.

Occupancy Profile

The typical hours of operation for the BOE Building are Monday through Friday between 8:00 am and 5:00 pm. Additional evening hours include BOE meetings, sub-committee meetings, and other similar events. Maintenance staff is present in the building as early as 6:00 am, and nighttime cleaning staff present until 10:00 pm.

Building Envelope

Exterior walls for this facility are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the building are in good condition and appear to be well maintained. Typical windows throughout the school are double pane, operable, ¼" clear glass with aluminum frames. The building roof is pitched with shingles and the amount of roof insulation is unknown.

HVAC Systems

The BOE Building HVAC systems consists of one (1) fire-tube steam boiler, office heating and ventilating units with steam coils, floor-mounted & ceiling-mounted steam radiators, three (3) split air handlers with air-cooled condenser units, and approximately 20 window air conditioning units.

The steam boiler is a gas-fired, fire-tube unit that is approximately 20 years old with an input of 2,858 MBH and an output of 2,415 lbs. /hr. at 212°F. This Model MP 70 steam boiler manufactured by Rockmills Steel Products has an existing efficiency of approximately 75% and feeds steam radiators & steam coils throughout the facility. Steam condensate is returned to a pump and receiver unit that then pumps the hot water to the boiler.

Fresh air is supplied to the office spaces, conference rooms and other such spaces via the heating & ventilation units, outside air intake louvers for the storage and mechanical rooms and operable windows.

There are three (3) split air handlers that provide cooling to the BOE rooms, IDF room, and the phone room. The oldest unit is a Westinghouse Model BWE120 10-Ton unit located in the attic which is over 30 years old and in very poor condition. The two (2) smaller units are an ICP and an American Standard both rated at 3.5-Tons each and are 4 and 6 years old respectively. The air-cooled condensers that support these three (3) units are located outdoors on pads. There are an additional twenty (20) window AC units that provide cooling for some of the offices. Most of these units are candidates for replacement.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. There are also several roof exhausters for the offices, storage rooms, mechanical rooms, and corridors. Air is exhausted from the office spaces by the unit ventilators.

HVAC System Controls

The steam boiler is 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 office spaces 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/convectors are controlled by a manual thermostatic valve.

Domestic Hot Water

Domestic hot water for the facility is supplied by two (2) Rheem Guardian Model 22V40F1 gas-fired, hot water heaters with a capacity of 40 gallons each and an input of 38 MBH (natural gas).

Lighting

Refer to the **Investment Grade Lighting Audit Appendix** for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. The list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment in some cases if a manufactures date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Refer to the **Major Equipment List Appendix** for this facility.

IV. ENERGY CONSERVATION MEASURES

Energy Conservation Measures are developed specifically for this facility. The energy savings and calculations are highly dependent on the information received from the site survey and interviews with operations personnel. The assumptions and calculations should be reviewed by the owner to ensure accurate representation of this facility. The following ECMs were analyzed:

Table 1
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Upgrade - General	$5,296	$1,082	4.9	206.5%
ECM #2	Lighting Controls Upgrade	$5,155	$1,097	4.7	219.2%
ECM #3	Burner Controls	$51,000	$610	83.6	-74.9%
ECM #4	Split System Replacement	$17,000	$1,157	14.7	2.1%
ECM #5	Window AC Replacements	$6,250	$849	7.4	35.8%
ECM #6	Thermostatic Vavles/Controls	$37,500	$1,830	20.5	-51.2%
ECM #7	DDC Controls Upgrade	$110,600	$2,435	45.4	-67.0%
ECM #8	Water Conservation	$357	$655	0.5	2652.1%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	63.45 KW PV System	$426,244	$26,003	16.4	-8.5%
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	2.7	6,364	-
ECM #2	Lighting Controls Upgrade	-	6,453	-
ECM #3	Burner Controls	-	-	622
ECM #4	Split System Replacement	3.4	6,807	-
ECM #5	Window AC Replacements	5.9	4,714	-
ECM #6	Thermostatic Vavles/Controls	-	-	1,867
ECM #7	DDC Controls Upgrade	-	7,146	1,245
ECM #8	Water Conservation	-	-	337 (64,800 Gallons of Water)
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	63.45 KW PV System	63.5	72,014	0

Table 3
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrade - General	$1,082	$5,836	$540	$5,296	4.9
Lighting Controls Upgrade	$1,097	$6,000	$845	$5,155	4.7
~~Burner Controls~~	~~$610~~	~~$51,000~~	~~$0~~	~~$51,000~~	~~83.6~~
Split System Replacement	$1,157	$17,000	$0	$17,000	14.7
Window AC Replacements	$849	$6,250	$0	$6,250	7.4
Thermostatic Vavles/Controls	$1,830	$37,500	$0	$37,500	20.5
~~DDC Controls Upgrade~~	~~$2,435~~	~~$110,600~~	~~$0~~	~~$110,600~~	~~45.4~~
Water Conservation	$655	$357	$0	$357	0.5
Design / Construction Extras (15%)		$10,941		*$10,941*	
Total Project	**$6,670**	**$83,884**	**$1,385**	**$82,499**	**12.4**

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 Administration Building 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 ($):	$5,836
NJ Smart Start Equipment Incentive ($):	$540
Net Installation Cost ($):	$5,296
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,082
Total Yearly Savings ($/Yr):	$1,082
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.9
Simple Lifetime ROI	206.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$16,230
Internal Rate of Return (IRR)	19%
Net Present Value (NPV)	$7,620.85

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Administration Building 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 #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,000
NJ Smart Start Equipment Incentive ($):	$845
Net Installation Cost ($):	$5,155
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,097
Total Yearly Savings ($/Yr):	$1,097
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.7
Simple Lifetime ROI	219.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$16,455
Internal Rate of Return (IRR)	20%
Net Present Value (NPV)	$7,940.91

ECM #3: Steam Boiler Burner & Controls Upgrade

Description:

The majority of the heating is provided to the Clifton Board of Education Administration Offices facility by a Rockmill 70 Boiler Horsepower (BHP) natural gas-fired boiler that produces steam for the heating season. The boiler is 1993 vintage and currently should be capable of achieving an efficiency rating of 70 to 75 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 #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$51,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$51,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$610
Total Yearly Savings ($/Yr):	$610
Estimated ECM Lifetime (Yr):	21
Simple Payback	83.6
Simple Lifetime ROI	-74.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$12,810
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	($41,596.84)

ECM #4: Replace AC Units with High Efficiency Units

Description:

The Clifton BOE Administration building utilizes split system cooling only units to cool several spaces within the building. The unit suggested to be replaced has capacity ranging of 10 tons. Please refer to the **Major Equipment List Appendix** for further information about these units. The unit is approximately thirty years old and has surpassed its ASHRAE service life of fifteen years.

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

This ECM includes one-for-one replacement of the older split system unit with new higher efficiency system which include new evaporator coils and refrigerant lines as well as an indoor unit. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacements for this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	**SERVICE FOR**	**NUMBER OF UNITS**	**COOLING CAPACITY, BTU/HR**	**TOTAL CAPACITY, TONS**	**REPLACE UNIT WITH**
SS	AHU-1	1	120,000	10.0	Carrier 38AUZ
Total		**1**	**120,000.0**	**10.0**	

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

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	**COOLING CAPACITY, BTU/Hr**	**ANNUAL COOLING HOURS**	**EXISTING UNITS SEER**	**SPLIT UNITS SEER**	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
SS	120,000	2,000	8.5 EER	11.2 EER	1	6,807	3.4
Total					1	6,807	3.4

Project Cost

Summary of cost, savings and payback for this ECM is below.

COST & SAVINGS SUMMARY						
ECM INPUTS	**INSTALLED COST**	**# OF UNITS**	**TOTAL COST**	**NET COST**	**ENERGY SAVING**	**PAY BACK YEARS**
SS	$17,000	1	$17,000	$17,000	$1,157	14.7
Total	$17,000	1	$17,000	$17,000	$1,157	14.7

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$17,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$17,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,157
Total Yearly Savings ($/Yr):	$1,157
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.7
Simple Lifetime ROI	2.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$17,355
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($3,187.81)

ECM #5: Window AC Unit Replacement

Description:

Cooling is provided to several offices via window air conditioning units. These units vary in size, capacity and efficiency. The units have been fixed or replaced on an "as needed" basis throughout the building. These window AC units are old and inefficient.

It is recommended to utilize the energy star ratings as a minimum standard for replacing any window unit that is in need of replacement. Existing units that are old but still working should be considered for replacement if the efficiency is below 8.0 to 8.5 EER. Window AC units that are over 10 years old are very likely to fall in this efficiency range.

This ECM shows the savings and payback for replacing inefficient window air conditioners with new, Energy Star rated units. Qualifying product list can be found at Energy Star website at: www.energystar.gov/products. Although energy star rated products provide a valuable benchmark, it is recommended to consider even higher EER ratings for potential AC unit replacements where available.

Energy Savings Calculations:

Average Summer Electric Cost: $0.18/kWh (June through September)
Typical AC Unit Size: 6,000-12,000 BTU/HR

Estimated Full Load Hours of Unit: 800/Year

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

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

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

The following table depicts the replacement plan for the window air conditioning units:

ENERGY SAVINGS CALCULATIONS									
Capacity BTU/H	**Amount of Units**	**Full Load Hrs**	**Typical Eff. (10 Yrs & Older) EER**	**New Eff. EER**	**Energy Savings kWh**	**Demand Savings kW**	**Cooling Cost Savings**	**Net Installed Cost**	**Simple Payback**
6,000	3	800	8	10.7	151	0.19	$27	$300	11.0
8,000	7	800	8	10.8	1452	1.81	$261	$2,450	9.4
12,000	10	800	8	10.8	3111	3.89	$560	$3,500	6.3
Total	20	-	-	-	4,714	5.9	$848.6	$6,250.0	7.4

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,250
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$6,250
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$849
Total Yearly Savings ($/Yr):	$849
Estimated ECM Lifetime (Yr):	10
Simple Payback	7.4
Simple Lifetime ROI	35.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$8,486
Internal Rate of Return (IRR)	6%
Net Present Value (NPV)	$988.73

ECM #6 New Thermostatic Steam Valves/Controls

Description:

This facility has steam radiators and unit ventilators on the perimeter walls of the building. 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 25 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 office 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 $12,199**.** Therefore, the annual energy cost savings for this ECM would be approximately 15% of $12,199 or $1,830.

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 #6 - 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):	$1,830
Total Yearly Savings ($/Yr):	$1,830
Estimated ECM Lifetime (Yr):	10
Simple Payback	20.5
Simple Lifetime ROI	-51.2%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$18,300
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	($21,889.73)

ECM #7: Digital Energy Management System (DDC EMS)

Description:

Currently, the Clifton Board of Education Administration office 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)	12,448	-	
Existing Electricity Usage (kWh)	142,913	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	5%	
Gas Cost ($/Therm)	*$0.98*	$0.98	
Electricity Cost ($/kWh)	*$0.170*	$0.170	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Usage (Therms)	12,448	11,203	1,245
Electricity Usage (kWh)	142,913	135,767	7,146
Nat Gas Cost ($)	$12,199	$10,979	$1,220
Electricity Cost ($)	$24,295	$23,080	$1,215
Energy Cost ($)	$36,494	$34,060	$2,435
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 $2.77 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 #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$110,600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$110,600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,435
Total Yearly Savings ($/Yr):	$2,435
Estimated ECM Lifetime (Yr):	15
Simple Payback	45.4
Simple Lifetime ROI	-67.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$36,525
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	($81,531.13)

ECM #8: 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:

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

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

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

LOW FLOW WATER SAVING DEVICES			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Quantity of Sinks	12	12	
Flow Rate (GPM)	2.2	1.0	1.2
Device Usage (min per day)	30	30	
Facility Operation (days / year)	150	150	
Natural Gas Rate ($/therm)	$0.980	$0.980	
Water Rate ($/1000gal)	$5.000	$5.000	
ENERGY SAVINGS CALCULATIONS			
Natural Gas Usage (Therm)	619	281	337
Water Usage (gallons)	118,800	54,000	64,800
Energy Cost ($)	$1,200	$546	$655
COMMENTS:			

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$357
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$357
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$655
Total Yearly Savings ($/Yr):	$655
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.5
Simple Lifetime ROI	2652.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$9,825
Internal Rate of Return (IRR)	183%
Net Present Value (NPV)	$7,462.35

REM #1: 63.45 kW Solar System

Description:

The Clifton Board of Education Administration Building has available parking lot space that could accommodate a significant amount of solar generation. Based on the available areas a 63.45 kilowatt solar array could be installed. The array will produce approximately 72,014 kilowatt-hours annually that will reduce the overall electric usage of the facility by 28.18%.

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}):	63.45
Electric Generation (KWH/Yr):	72,014
Installation Cost ($):	$426,244
SREC Revenue ($/Yr):	$13,761
Energy Savings ($/Yr):	$12,242
Total Yearly Savings ($/Yr):	$26,003
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	16.4
Analysis Period Electric Savings ($):	$227,695
Analysis Period SREC Revenue ($):	$199,341
Net Present Value (NPV)	($168,227.75)

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

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Clifton Public Schools – Board of Education Office

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY														
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (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)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade - General	$2,676	$3,160	$540	$5,296	$1,082	$0	$1,082	15	$16,230	$0	206.5%	4.9	18.91%	$7,620.85
ECM #2	Lighting Controls Upgrade	$3,600	$2,400	$845	$5,155	$1,097	$0	$1,097	15	$16,455	$0	219.2%	4.7	19.88%	$7,940.91
ECM #3	Burner Controls	$26,000	$25,000	$0	$51,000	$610	$0	$610	21	$12,810	$0	-74.9%	83.6	-10.17%	($41,596.84)
ECM #4	Split System Replacement	$9,000	$8,000	$0	$17,000	$1,157	$0	$1,157	15	$17,355	$0	2.1%	14.7	0.26%	($3,187.81)
ECM #5	Window AC Replacements	$6,250	$0	$0	$6,250	$849	$0	$849	10	$8,486	$0	35.8%	7.4	5.99%	$988.73
ECM #6	Thermostatic Vavles/Controls	$37,500	$0	$0	$37,500	$1,830	$0	$1,830	10	$18,300	$0	-51.2%	20.5	-11.29%	($21,889.73)
ECM #7	DDC Controls Upgrade	$110,600	$0	$0	$110,600	$2,435	$0	$2,435	15	$36,525	$0	-67.0%	45.4	-11.46%	($81,531.13)
ECM #8	Water Conservation	$240	$117	$0	$357	$655	$0	$655	15	$9,825	$0	2652.1%	0.5	183.47%	$7,462.35
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	63.45 KW PV System	$426,244	$0	$0	$426,244	$12,242	$13,761	$26,003	15	$390,047	$206,411	-8.5%	16.4	-1.09%	($115,819.86)

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
19-Clifton BOE - Board Of Education Building

Building ID: 3477619
For 12-month Period Ending: February 28, 2013[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 11, 2013

Facility
19-Clifton BOE - Board Of Education Building
745 Clifton 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: 1925
Gross Floor Area (ft²): 40,000

Energy Performance Rating[2] (1-100) 88

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	870,188
Natural Gas (kBtu)[4]	1,257,519
Total Energy (kBtu)	2,127,707

Energy Intensity[4]

Site (kBtu/ft²/yr)	53
Source (kBtu/ft²/yr)	106

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	190

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	92
National Median Source EUI	183
% Difference from National Median Source EUI	-42%
Building Type	Office

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	19-Clifton BOE - Board Of Education Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	745 Clifton 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.		☐
BOE Admin (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	40,000 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.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	50	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	100	Is this the number of personal computers in the Office?		☐
Percent Cooled	Less than 50%	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

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))
01/10/2013	02/09/2013	22,010.00
12/10/2012	01/09/2013	19,260.00
11/10/2012	12/09/2012	19,020.00
10/10/2012	11/09/2012	19,660.00
09/10/2012	10/09/2012	21,200.00
08/10/2012	09/09/2012	25,185.00
07/10/2012	08/09/2012	26,985.00
06/10/2012	07/09/2012	25,790.00
05/10/2012	06/09/2012	19,780.00
04/10/2012	05/09/2012	13,840.00
03/10/2012	04/09/2012	21,640.00
electric Consumption (kWh (thousand Watt-hours))		**234,370.00**
electric Consumption (kBtu (thousand Btu))		**799,670.44**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**799,670.44**
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)
01/10/2013	02/09/2013	3,349.08
12/10/2012	01/09/2013	3,731.16
11/10/2012	12/09/2012	1,383.12
10/10/2012	11/09/2012	648.37
09/10/2012	10/09/2012	28.41
08/10/2012	09/09/2012	16.79
07/10/2012	08/09/2012	15.76
06/10/2012	07/09/2012	17.77
05/10/2012	06/09/2012	24.04
04/10/2012	05/09/2012	254.84
03/10/2012	04/09/2012	608.61

gas Consumption (therms)	**10,077.95**
gas Consumption (kBtu (thousand Btu))	**1,007,795.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**1,007,795.00**
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
19-Clifton BOE - Board Of Education Building
745 Clifton 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

19-Clifton BOE - Board Of Education Building	
Gross Floor Area Excluding Parking: (ft^2)	40,000
Year Built	1925
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

BOE Admin	
Space Type	Office
Gross Floor Area (ft^2)	40,000
Weekly operating hours	40
Workers on Main Shift	50
Number of PCs	100
Percent Cooled	Less than 50%
Percent Heated	50% or more

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	88	88	75	N/A	50
Energy Intensity					
Site (kBtu/ft^2)	53	53	68	N/A	92
Source (kBtu/ft^2)	106	106	135	N/A	183
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	190	190	243	N/A	329
$kgCO_2e/ft^2$/year	5	5	6	N/A	9

More than 50% of your building is defined as Office. 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.

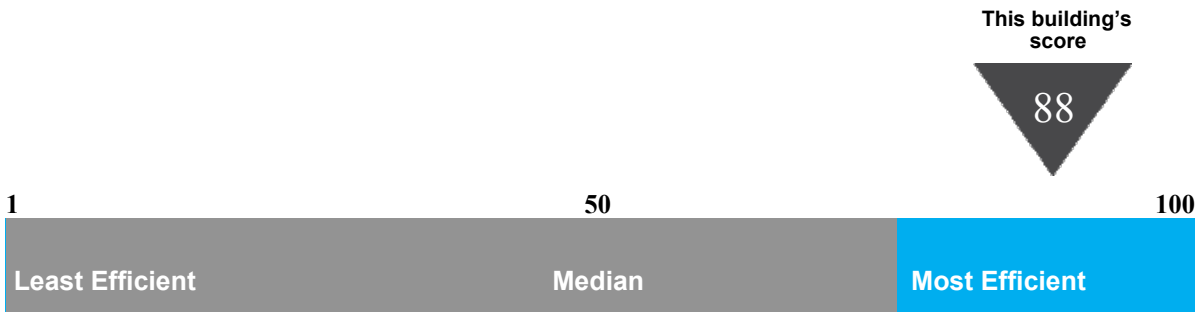
Statement of Energy Performance

2013

19-Clifton BOE - Board Of Education Building
745 Clifton Avenue
Clifton, NJ 07013

Portfolio Manager Building ID: 3477619

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 106 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

Lester Herrschaft Admin Building

AC Units

Tag	CU-1	CU-2	CU-3	
Unit Type	Air-Cooled Condenser	Air-Cooled Condenser	Air-Cooled Condenser	***Window AC Units***
Qty	1	1	1	20
Location	Outdoor Pad-Mounted	Outdoor Pad-Mounted	Outdoor Pad-Mounted	Perimeter Offices
Unit Served	AHU-1	AHU-2	AHU-3	N/A
Manufacturer	Westinghouse	ICP	American Standard	Various
Model #	-	N2A342AKA200	2A7C0042A3000…	Various
Cooling Type	DX Coil	DX Coil	DX Coil	DX Coil
Cooling Capacity	10-Tons	3.5 Tons	3.5 Tons	12,000 to 18,000BTUH
Cooling Efficiency (SEER/EER)	8.5 EER	13 SEER	10.8 Seer	7.0 to 10.8 SEER
Heating Type	N/A	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A	N/A
Fuel	Electric	Electric	Electric	Electric
Approx Age	30	4	9	12
ASHRAE Service Life	15	15	15	10
Remaining Life	(15)	11	6	(2)
Comments	***Very Poor Condition***			***Some Window Units are in Poor Condition***

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Lester Herrschaft Admin Building

AHUs

Tag	AHU-1	AHU-2	AHU-3
Unit Type	Split Air Handler	Split Air Handler	Split Air Handler
Qty	1	1	1
Location	Attic		IDF Closet
Area Served			IDF Closet
Manufacturer	Westinghouse	ICP	American Standard
Model #	BWE120C100C	EB2X42342	
Serial #	188012	-	-
Cooling Type	DX Coil	DX Coil	DX Coil
Cooling Capacity	10-Tons	3.5 Tons	3.5 Tons
Heating Type		N/A	N/A
Heating Input (MBH)		N/A	N/A
Supply Fan (HP)	2 HP	1/4 HP	1/4 HP
Return Fan (HP)	N/A	N/A	N/A
Electrical (V/H/P)	208V/1 Phase	208V/1 Phase	208V/1 Phase
Approx Age	30	4	6
ASHRAE Service Life	20	20	20
Remaining Life	(10)	16	14
Comments	***Very Poor Condition***		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Lester Herrschaft Admin Building

Boilers

Tag	B-1	
Unit Type	Fire-Tube Steam Boiler	
Qty	1	
Location	Boiler Room	
Area Served	Entire Facility	
Manufacturer	Rockmills Steel Products	
Model #	MP 70	
Serial #	293109	
Input Capacity (MBH)	2,858 MBH (gas)	
Rated Output Capacity (Lbs/Hr)	2,415 PPH @ 212 degrees F	
Approx. Efficiency %	75.0%	
Fuel	Gas-Fired	
Approx Age	20	
ASHRAE Service Life	25	
Remaining Life	5	
Comments	***IC Burner Model MPLG-30***	

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Lester Herrschaft Admin Building

Domestic Water Heaters

Tag	DHW-1	DHW-2
Unit Type	Domestic Hot Water Heater	Domestic Hot Water Heater
Qty	1	1
Location	Boiler Room	Mechanical Room
Area Served	-	-
Manufacturer	Rheem	Rheem
Model #	22V40F1	22V40F1
Serial #	RHLN0207423134	RHLN07084414914
Size (Gallons)	40 gallons	40 gallons
Input Capacity (MBH)	38 (gas)	38 (gas)
Recovery (Gal/Hr)	N/A	N/A
Efficiency %	80%	80%
Fuel	Natural Gas	Natural Gas
Approx Age	6	5
ASHRAE Service Life	15	15
Remaining Life	9	10
Comments		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Lester Herrschaft Admin Building

Pumps

Tag		
Unit Type	Condensate Pump/Receiver	Domestic Hot Water Pump
Qty	1	2
Location	Boiler Room	Boiler Room & Mechanical Room
Area Served	Steam Loop	Each DHW Heater
Manufacturer	National Pump & Controls	Bell & Gossett
Model #	-	NBF -12 FLW
Serial #	-	-
Horse Power	(2) 2 HP Motors	0
Flow	-	19 GPM
Motor Info	A. O. Smith	-
Electrical Power	208V/1 Phase	208V/1 Phase
RPM	3,450	-
Motor Efficiency %	82.5%	-
Approx Age	20	5
ASHRAE Service Life	15	15
Remaining Life	(5)	15
Comments	***Poor Condition***	

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

APPENDIX E

CEG Project #: 9C12066
Facility Name: Board Office
Address: 745 Clifton Ave
City, State, Zip Clifton, NJ

			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	OM - Break Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	161	Existing To Remain	Existing To Remain	2	62	0	0.06	161	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	32	$5
222.21	OM - Storage	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
221.11	OM - Office 1	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.	0.5	20.0%	64	$11
242.21	OM - Office 1	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	0.5	20.0%	37	$6
222.21	OM - Office Lobby	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
221.11	OM - Office 2	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	$22
221.11	OM - 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
221.21	Basement Hall	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	10	0.62	1,860	Existing To Remain	Existing To Remain	2	62	0	0.62	1,860	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Basement Hall	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
221.21	Computer 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.	0.5	20.0%	161	$27
222.21	Computer Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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.	0.5	20.0%	64	$11
222.21	Server room	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	4	0.25	298	Existing To Remain	Existing To Remain	2	62	0	0.25	298	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	Basement Side Hall	3000	60w Incandescent	1	60	1	0.06	180	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	39	0.05	141	$24	0	No New Controls	0	0.0%	0	$0
227.41	Basement Stair	3000	2x2, 2 Lamp, 17w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	2	33	2	0.07	198	Existing To Remain	Existing To Remain	2	33	0	0.07	198	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	Stair Storage	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
222.21	Office 1	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	Office 2	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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
217.41	Storage	1200	2x2, 1 Lamp, 17w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	1	18	1	0.02	22	Existing To Remain	Existing To Remain	1	18	0	0.02	22	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Storage	1200	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	Womens 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	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	Electrical	1200	28w CFL	1	28	1	0.03	34	Existing To Remain	Existing To Remain	1	28	0	0.03	34	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Electrical	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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
221.21	Sewer Room	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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
221.21	Board Conference Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	20	1.24	3,224	Existing To Remain	Existing To Remain	2	62	0	1.24	3,224	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	645	$110
221.11	Mens Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	161	Existing To Remain	Existing To Remain	2	62	0	0.06	161	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
227.41	Mens Room	2600	2x2, 2 Lamp, 17w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	2	33	1	0.03	86	Existing To Remain	Existing To Remain	2	33	0	0.03	86	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Special Services - Secretary	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	9	0.56	1,451	Existing To Remain	Existing To Remain	2	62	0	0.56	1,451	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Special Services - Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
221.11	Special Services - Copy Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface 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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	193	$33
221.11	Special Services - Office	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	$22
221.21	Special Services - Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
221.21	Conf Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	8	0.50	1,290	Existing To Remain	Existing To Remain	2	62	0	0.50	1,290	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	258	$44
3	Kitchen	2600	Flood Lamp Incandescent 60w	1	60	4	0.24	624	Re-Lamp	13w CFL Screw Base	1	13	4	0.05	135	0.19	489	$83	0	No New Controls	0	0.0%	0	$0
242.21	Side Hall	3000	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	1	0.11	327	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	216	0.04	111	$19	0	No New Controls	0	0.0%	0	$0
242.21	Cameras	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
221.11	Stock Room	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	33	2.05	6,138	Existing To Remain	Existing To Remain	2	62	0	2.05	6,138	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.21	Stock Room	3000	1x4, 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
2	Stock Room	3000	60w Incandescent	1	60	1	0.06	180	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	39	0.05	141	$24	0	No New Controls	0	0.0%	0	$0
211.11	Stairs	3000	1x4, 1 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	1	33	1	0.03	99	Existing To Remain	Existing To Remain	1	33	0	0.03	99	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Stairs	3000	2x4, 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
222.21	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

			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	1F Landing	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
242.21	Large Classroom	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	25	2.73	7,085	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	25	1.80	4,680	0.93	2,405	$409	4	Dual Tech. Occupancy Sensor w/2 Powerpacks - Remote Mnt.	2	20.0%	936	$159
221.11	Kitchen	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	8	0.50	1,290	Existing To Remain	Existing To Remain	2	62	0	0.50	1,290	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Exit Area	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
2	Parents Room Stairs	2600	60w Incandescent	1	60	1	0.06	156	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	34	0.05	122	$21	0	No New Controls	0	0.0%	0	$0
221.21	Parents Room	2600	1x4, 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	$33
2	Stairs	3000	60w Incandescent	1	60	2	0.12	360	Re-Lamp	13w CFL Screw Base	1	13	2	0.03	78	0.09	282	$48	0	No New Controls	0	0.0%	0	$0
221.21	Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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
2	Restroom	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
221.11	Exit	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
2	Bathroom	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
242.21	HR - Main	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	4	0.44	1,134	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	4	0.29	749	0.15	385	$65	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	150	$25
221.11	HR - Main	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	161	Existing To Remain	Existing To Remain	2	62	0	0.06	161	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	0.5	20.0%	32	$5
221.11	HR - Office	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	$22
221.11	HR - Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	4	0.25	298	Existing To Remain	Existing To Remain	2	62	0	0.25	298	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Superintendant Lobby	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	14	0.87	2,257	Existing To Remain	Existing To Remain	2	62	0	0.87	2,257	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.21	Office	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	109	4	0.44	1,134	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast QHE2X32T8/UNV ISL-SC	3	72	4	0.29	749	0.15	385	$65	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	150	$25
3	Restroom	1200	Flood Lamp Incandescent 60w	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
4	Restroom	1200	Combination Exhaust Fan w/ 60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
3	Superintendant Office	2600	Flood Lamp Incandescent 60w	1	60	8	0.48	1,248	Re-Lamp	13w CFL Screw Base	1	13	8	0.10	270	0.38	978	$166	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	54	$9
5	Restroom	1200	3 Lamp Vanity Incandescent 60w	3	180	1	0.18	216	Re-Lamp	13w CFL Screw Base	3	39	1	0.04	47	0.14	169	$29	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, $
221.11	Business Office	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	16	0.99	2,579	Existing To Remain	Existing To Remain	2	62	0	0.99	2,579	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
4	Mens Room	1200	Combination Exhaust Fan w/ 60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
4	Womens Room	1200	Combination Exhaust Fan w/ 60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
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	0	No New Controls	0	0.0%	0	$0
222.21	Copy Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	0	No New Controls	0	0.0%	0	$0
222.21	Hall	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
222.21	Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
222.21	Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
221.11	Purchasing Office	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	14	0.87	2,257	Existing To Remain	Existing To Remain	2	62	0	0.87	2,257	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.34	Purchasing Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No 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
222.21	2F Hallway	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	12	0.74	2,232	Existing To Remain	Existing To Remain	2	62	0	0.74	2,232	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Payroll	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	8	0.50	1,290	Existing To Remain	Existing To Remain	2	62	0	0.50	1,290	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
222.21	Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
221.11	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
221.11	Assistant Superintendant	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	8	0.50	1,290	Existing To Remain	Existing To Remain	2	62	0	0.50	1,290	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	258	$44
221.11	Conference Room	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	129	$22
221.11	Assistant Superintendant Office	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	$22
221.11	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
232.21	Tech Center	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	15	1.29	3,354	Existing To Remain	Existing To Remain	3	86	0	1.29	3,354	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Conference Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	12	0.74	1,934	Existing To Remain	Existing To Remain	2	62	0	0.74	1,934	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	387	$66

			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, $
227.41	Lunch Entry	2600	2x2, 2 Lamp, 17w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	2	33	1	0.03	86	Existing To Remain	Existing To Remain	2	33	0	0.03	86	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Lunch Entry	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	0	No New Controls	0	0.0%	0	$0
227.41	Restroom	1200	2x2, 2 Lamp, 17w T8, Elect. Ballast, Wall Mnt., Prismatic Lens	2	33	1	0.03	40	Existing To Remain	Existing To Remain	2	33	0	0.03	40	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
2	Storage	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
221.11	Office 1	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	$22
221.11	Office 2	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	161	Existing To Remain	Existing To Remain	2	62	0	0.06	161	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	Office 2	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	62	1	0.06	161	Existing To Remain	Existing To Remain	2	62	0	0.06	161	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Registrar Office	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	0	No New Controls	0	0.0%	0	$0
222.21	Registrar Office	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	0	No New Controls	0	0.0%	0	$0
222.21	Conference Room	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	Office	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	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	129	$22
2	Storage	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
221.11	Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	12	0.74	893	Existing To Remain	Existing To Remain	2	62	0	0.74	893	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
1	Storage	1200	28w CFL	1	28	1	0.03	34	Existing To Remain	Existing To Remain	1	28	0	0.03	34	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.21	3F Hall	3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic 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
221.11	District Supervisor Office	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	$22
221.21	District Supervisor Office	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed 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	Director Curriculum	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	8	0.50	1,290	Existing To Remain	Existing To Remain	2	62	0	0.50	1,290	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	258	$44
221.11	Office	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
2	Storage	1200	60w Incandescent	1	60	1	0.06	72	Re-Lamp	13w CFL Screw Base	1	13	1	0.01	16	0.05	56	$10	0	No New Controls	0	0.0%	0	$0
221.11	Tech Coordinator	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	12	0.74	1,934	Existing To Remain	Existing To Remain	2	62	0	0.74	1,934	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	387	$66

			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, $
221.11	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
	TOTAL					**444**	**29**	**74,313**					**64**	**27**	**67,950**	**2.74**	**6,364**	**$1,082**			**35**	**7**	**6,453**	**$1,097**

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
BOE Office	4500	SHARP NU-U235F2	270	17.5	4,736	63.45	72,014	51.4	11,313	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 - BOE Office**
Location: **Clifton, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$426,244
Annual kWh Production	72,014
Annual Energy Cost Reduction	$12,242
Average Annual SREC Revenue	$13,761

Simple Payback: **16.39** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.170**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	72,014	$12,242	$0	$18,004	$25,083	$18,080	($12,917)	($12,917)
2	$0	71,654	$12,610	$0	$17,913	$23,968	$19,195	($12,640)	($25,556)
3	$0	71,296	$12,988	$0	$17,824	$22,784	$20,379	($12,351)	($37,907)
4	$0	70,939	$13,378	$0	$17,735	$21,527	$21,636	($12,050)	($49,957)
5	$0	70,584	$13,779	$727	$17,646	$20,192	$22,970	($12,465)	($62,422)
6	$0	70,232	$14,192	$723	$14,046	$18,776	$24,387	($15,647)	($78,069)
7	$0	69,880	$14,618	$720	$13,976	$17,272	$25,891	($15,288)	($93,358)
8	$0	69,531	$15,057	$716	$13,906	$15,675	$27,488	($14,916)	($108,274)
9	$0	69,183	$15,508	$713	$13,837	$13,979	$29,183	($14,530)	($122,804)
10	$0	68,837	$15,974	$709	$10,326	$12,179	$30,983	($17,573)	($140,376)
11	$0	68,493	$16,453	$705	$10,274	$10,268	$32,894	($17,141)	($157,518)
12	$0	68,151	$16,946	$702	$10,223	$8,239	$34,923	($16,696)	($174,214)
13	$0	67,810	$17,455	$698	$10,172	$6,085	$37,077	($16,235)	($190,448)
14	$0	67,471	$17,978	$695	$6,747	$3,799	$39,364	($19,132)	($209,581)
15	$0	67,134	$18,518	$691	$6,713	$1,371	$41,792	($18,623)	($228,204)
	Totals:	1,043,210	$227,695	$7,800	$199,341	$221,196	$426,244	($228,204)	($1,691,605)

Net Present Value (NPV) **($168,228)**