

**CLIFTON PUBLIC SCHOOLS
PUBLIC SCHOOL #11**

**147 MERSELIS
CLIFTON, NEW JERSEY 07011**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power Service (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

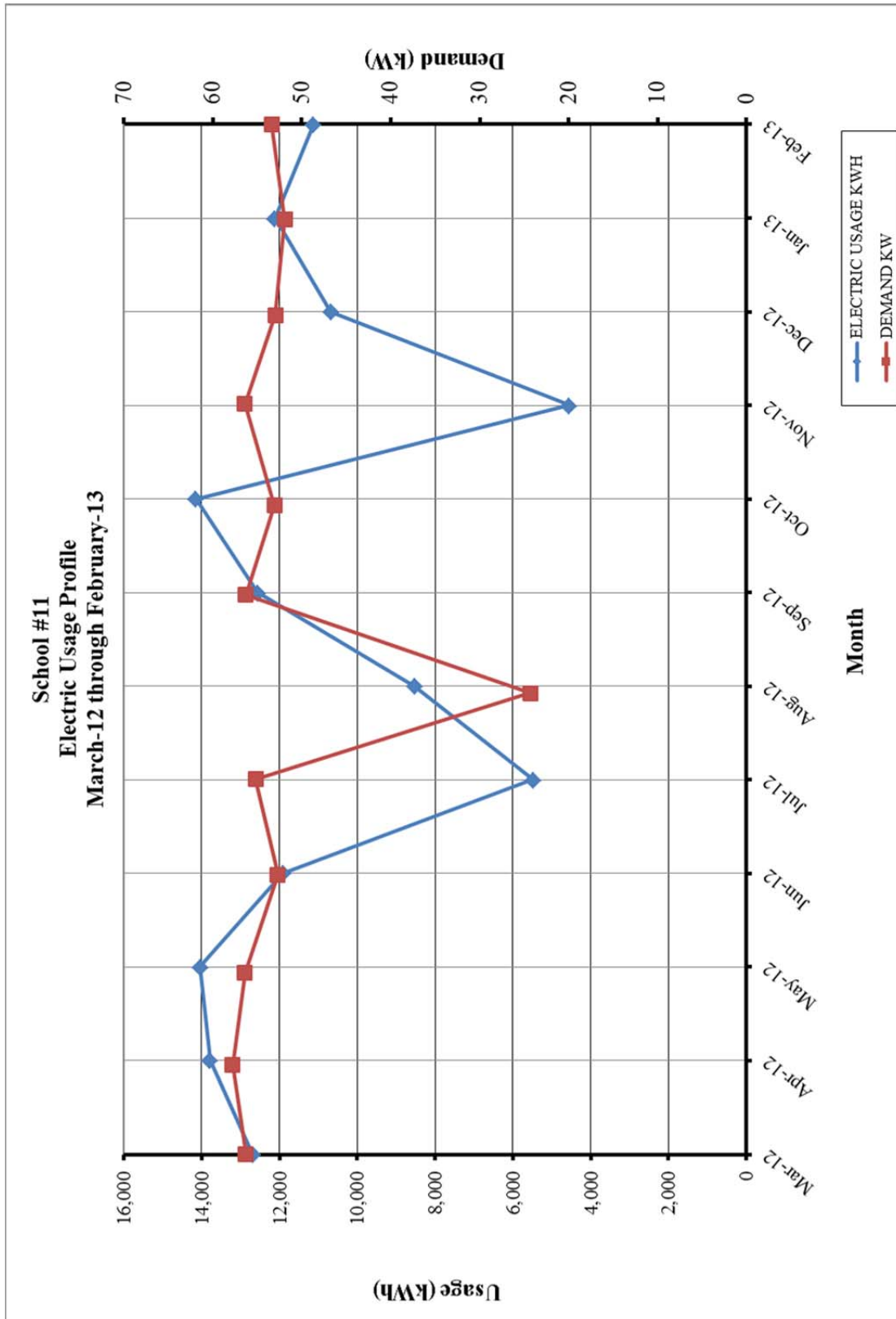
The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts 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: 678000979			
Account No: 66 067 751 08			
Third Party Utility Provider: Champion Energy Services LLC			
TPS Meter / Acct No: -			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	12,690	56.3	\$2,121
Apr-12	13,785	57.8	\$2,121
May-12	14,040	56.4	\$2,236
Jun-12	11,910	52.7	\$1,974
Jul-12	5,490	55.2	\$1,287
Aug-12	8,535	24.3	\$1,254
Sep-12	12,570	56.3	\$1,569
Oct-12	14,145	53.1	\$1,718
Nov-12	4,560	56.4	\$723
Dec-12	10,680	53.0	\$1,353
Jan-13	12,120	51.9	\$1,572
Feb-13	11,130	53.4	\$1,441
Totals	131,655	57.8 Max	\$19,368
AVERAGE DEMAND 52.2 KW average AVERAGE RATE \$0.147 \$/kWh			

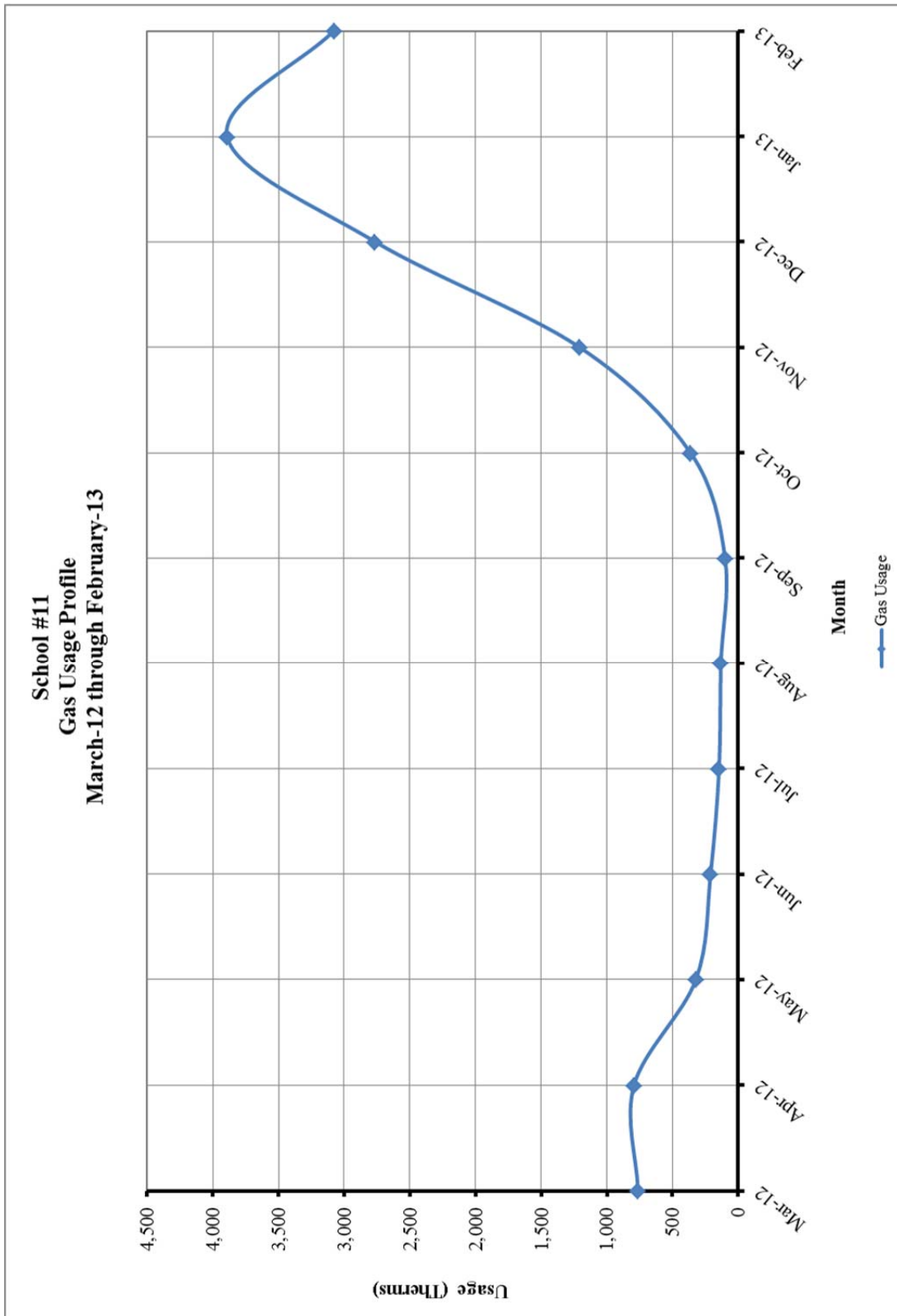
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: LVG		
Meter No: 2344819		
Account No: 66 067 751 08		
Third Party Utility Provider: Hess		
TPS Meter No: 446575/446933		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Mar-12	763.75	\$594.82
Apr-12	793.73	\$494.08
May-12	321.98	\$258.64
Jun-12	210.97	\$215.25
Jul-12	146.01	\$184.37
Aug-12	132.23	\$178.67
Sep-12	100.84	\$156.75
Oct-12	365.21	\$719.77
Nov-12	1,210.88	\$1,379.63
Dec-12	2,765.99	\$2,547.52
Jan-13	3,892.17	\$3,343.33
Feb-13	3,077.04	\$2,379.65
TOTALS	13,780.81	\$12,452.47
AVERAGE RATE:	\$0.90	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The School #11 Elementary School is located at 147 Merselis Avenue in Clifton, New Jersey. The 56,946 SF school was built in 1905 with an addition in 1926. The building is a two-story facility with a basement comprised of administration offices, general classrooms, nurse's office, kitchen serving area, all-purpose room, stage, cafeteria, custodial office/supplies, faculty work room, boiler room, storage rooms, library/media center and mechanical/electrical rooms.

Occupancy Profile

The typical hours of operation for School #11 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 470 students and has 31 teachers, support staff, and administrative personnel.

Building Envelope

Exterior walls for this school are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the school are in good condition and appear to be well maintained. Typical windows throughout the school are double-section, double pane, operable, 1/4" clear glass with wood frames but the gymnasium differs only with aluminum frames. The building roof is pitched with shingles around the edges which transition into a flat, built up rubber roof. The gymnasium has a flat built-up, rubber roof. The amount of roof insulation is unknown.

HVAC Systems

School #11 HVAC system consists of two steam boilers, classroom radiation heating, classroom unit ventilators, window air conditioning units and a steam condensate return pump.

The boilers are gas-fired steam boilers approximately 87 years old with an input of 4,200 MBH (gas) and an output of 3,024 lbs. /hr. at 212°F. Manufactured by H.B. Smith and having an existing efficiency of approximately 65%. Steam condensate is returned to a receiver/pump unit manufactured by National Pump & Controls Inc.

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

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters or side wall exhausters. There are also several roof exhausters for the offices, storage rooms, mechanical rooms, and corridors.

HVAC System Controls

The steam boilers are controlled by manual on/off switching.

Domestic Hot Water

Domestic hot water for the facility is supplied by a two Rheem hot water heaters. There is a Model 22V40F1 with 40 gallon capacity and an input of 38 MBH. The other heater is Rheem model 42V50-40F with capacity of 50 gallons and an input of 40 MBH (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.

Miscellaneous

The kitchen is equipped with EPCO portable heated rack cabinets.

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	\$36,566	\$4,305	8.5	76.6%
ECM #2	Lighting Upgrade - MPR	\$5,000	\$172	29.1	-48.4%
ECM #3	Lighting Controls Upgrade	\$7,795	\$1,300	6.0	150.2%
ECM #4	Burner Controls	\$51,000	\$477	106.9	-80.4%
ECM #5	Pipe & Valve Insulation	\$14,400	\$1,572	9.2	172.9%
ECM #6	Replace Steam Condensate Receiver	\$36,750	\$271	135.6	-88.9%
ECM #7	Steam Trap Replacement	\$25,355	\$1,953	13.0	-23.0%
ECM #8	Thermostatic Steam Vavles/Control	\$39,000	\$1,328	29.4	-65.9%
ECM #9	DDC Controls Upgrade	\$234,920	\$996	235.9	-93.6%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	58.05 KW PV System	\$361,407	\$22,679	15.9	-5.9%
Notes:	A. Cost takes into consideration applicable NJ Smart Start TM incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade - General	11.5	29,285	-
ECM #2	Lighting Upgrade - MPR	0.5	1,170	-
ECM #3	Lighting Controls Upgrade	-	8,842	-
ECM #4	Burner Controls	-	-	492
ECM #5	Pipe & Valve Insulation	-	-	1,602
ECM #6	Replace Steam Condensate Receiver	-	86	287
ECM #7	Steam Trap Replacement	-	-	4,261
ECM #8	Thermostatic Steam Vavles/Control	-	-	1,476
ECM #9	DDC Controls Upgrade	-	338	983
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	58.05 KW PV System	58.0	67,080	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	\$4,305	\$40,556	\$3,990	\$36,566	8.5
Lighting Upgrade - MPR	\$172	\$5,500	\$500	\$5,000	29.1
Lighting Controls Upgrade	\$1,300	\$8,900	\$1,105	\$7,795	6.0
Burner Controls	\$477	\$51,000	\$0	\$51,000	106.9
Pipe & Valve Insulation	\$1,572	\$14,400	\$0	\$14,400	9.2
Replace Steam Condensate Receiver	\$271	\$36,750	\$0	\$36,750	135.6
Steam Trap Replacement	\$1,953	\$25,355	\$0	\$25,355	13.0
Thermostatic Steam Valves/Control	\$1,328	\$39,000	\$0	\$39,000	29.4
DDC Controls Upgrade	\$996	\$234,920	\$0	\$234,920	235.9
<i>Design / Construction Extras (15%)</i>		\$14,207		\$14,207	
Total Project	\$9,302	\$108,918	\$5,595	\$103,323	11.1

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 #11 is provided with fluorescent fixtures with older generation, 700 series and 741/ECO 32W T8 lamps and electronic ballasts. Although these T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. Concord Engineering recommends that most of these fixtures remain unmodified due to the extensive costs which will be incurred if these fixtures are to be re-lamped and re-ballasted which results in a long payback period. For other areas that are over lit, Concord Engineering recommends that the fixture be retrofitted with new Super T-8 lamps/reflector, de-lamped to the appropriate light levels, and a new high-efficiency electronic ballast be installed

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 26-Watt CFL for a 100-Watt incandescent lamp. A CFL can be chosen to screw right into your existing fixtures, or hardwired into your existing fixtures. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. The energy usage of an incandescent compared to a compact fluorescent approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$40,556
NJ Smart Start Equipment Incentive (\$):	\$3,990
Net Installation Cost (\$):	\$36,566
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,305
Total Yearly Savings (\$/Yr):	\$4,305
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.5
Simple Lifetime ROI	76.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$64,575
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	\$14,826.81

ECM #2: Lighting Upgrade – Multi-Purpose Room

Description:

The Multi-Purpose Room at Clifton Elementary School #11 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 (\$):	\$5,500
NJ Smart Start Equipment Incentive (\$):	\$500
Net Installation Cost (\$):	\$5,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$172
Total Yearly Savings (\$/Yr):	\$172
Estimated ECM Lifetime (Yr):	15
Simple Payback	29.1
Simple Lifetime ROI	-48.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$2,580
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	(\$2,946.68)

ECM #3: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Clifton Elementary School #11 are left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

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

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

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

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

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

Energy Savings Calculations:

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

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

Rebates and Incentives:

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

Smart Start Incentive

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

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$8,900
NJ Smart Start Equipment Incentive (\$):	\$1,105
Net Installation Cost (\$):	\$7,795
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,300
Total Yearly Savings (\$/Yr):	\$1,300
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.0
Simple Lifetime ROI	150.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$19,500
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	\$7,724.32

ECM #4: STEAM BOILER BURNER & CONTROLS UPGRADE

Description:

The majority of the heating is provided to the Clifton Elementary School #11 by H.B. Smith 87 Boiler Horsepower (BHP) natural gas-fired boilers that produce steam for the heating season. The boilers are 1926 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 (\$):	\$51,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$51,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$477
Total Yearly Savings (\$/Yr):	\$477
Estimated ECM Lifetime (Yr):	21
Simple Payback	106.9
Simple Lifetime ROI	-80.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$10,017
Internal Rate of Return (IRR)	-12%
Net Present Value (NPV)	(\$43,647.03)

ECM #5: Valve Blanket Insulation

Description:

The boiler plant at Clifton Elementary School #11, supplies steam to the steam unit ventilators throughout the system. The piping remains heated at around 212°F continuously during this period (approximately 6 months). Un-insulated valves have significant heat losses due to the exposure of the steel and copper piping to the surrounding air. Insulated valves have a heat loss which is a small fraction of the heat loss from un-insulated valves. It was identified that insulation for the large steam valves in the boiler room were missing.

Based on the site survey following valves were identified for insulation:

- Seven (7) 6” steel valves/fittings in the boiler room

Valve blankets are designed to provide insulation value over large valves that must remain accessible. This ECM includes installation of valve blankets on all exposed boiler system valves.

Energy Savings Calculations:

Heat Loss for un-insulated steel piping is based on ASHRAE 2009 Fundamentals – “Insulation for Mechanical Systems”.

$$\begin{aligned} \text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \text{ per Linear FT} \\ &= \frac{1}{R - \text{Value}} \times \text{Pipe Dia (FT)} \times 3.14 \\ &\times (\text{Pipe Temp (}^\circ\text{F)} - \text{Ambient Temp (}^\circ\text{F)}) \end{aligned}$$

$$\text{Heat Loss } \frac{\text{BTU}}{\text{HR}} = \text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \text{ per Linear FT} \times \text{Length of Uninsulated Pipe}$$

$$\text{Energy Use, Therms} = \frac{\text{Heat Loss } \frac{\text{BTU}}{\text{HR}} \times \text{Operating Hrs}}{\text{Heating System Eff. (\%)} \times \text{Fuel Heat Value } \frac{\text{BTU}}{\text{Therm}}}$$

$$\text{Heating Energy Cost Savings} = \text{Energy Use, Therms} \times \text{Cost of Nat Gas} \left(\frac{\$}{\text{Therm}} \right)$$

Qty.	Size	Description	Surface Temp.	Area (Ea.) (Sq.ft.)	Bare Heat Loss (BTU/Hr/SF)	Bare Heat Loss (BTU/Hr)	Bare Heat Loss (mmBtu)	Insulated Heat Loss (BTU/Hr/SF)	Insulated Heat Loss (BTU/Hr)	Insulated Heat Loss (mmBtu)	Fuel Savings (mmBtu/yr)	Fuel Savings (\$/yr)
Mechanical Room												
8	6"	Gate Valve	220	8.80	448.00	31,539.20	126.16	36.40	2,562.79	10.25	115.91	\$1,043.15
1	3"	Return Plug Valve	220	2.40	448.00	1,075.20	4.30	36.40	87.37	0.35	3.95	\$35.56
2	2"	Control Valve	220	3.40	448.00	3,046.40	12.19	36.40	247.54	0.99	11.20	\$100.76
2	3"	Strainer	220	4.80	448.00	4,300.80	17.20	36.40	349.47	1.40	15.81	\$142.25
2	4"	x 3" Reducer	220	0.59	448.00	528.64	2.11	36.40	42.96	0.17	1.94	\$17.48
1	6"	Control Valve	220	6.10	448.00	2,732.80	10.93	36.40	222.06	0.89	10.04	\$90.39
2	4"	Steam Trap	220	4.80	448.00	4,300.80	17.20	36.40	349.47	1.40	15.81	\$142.25
18	TOTAL						190.1			15.4	174.6	\$1,572

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$14,400
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$14,400
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,572
Total Yearly Savings (\$/Yr):	\$1,572
Estimated ECM Lifetime (Yr):	25
Simple Payback	9.2
Simple Lifetime ROI	172.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$39,300
Internal Rate of Return (IRR)	10%
Net Present Value (NPV)	\$12,973.47

ECM #6: 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 G** for detailed energy savings calculations.

Energy Savings Summary:

ECM #6 - 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):	\$271
Total Yearly Savings (\$/Yr):	\$271
Estimated ECM Lifetime (Yr):	15
Simple Payback	135.6
Simple Lifetime ROI	-88.9%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$4,065
Internal Rate of Return (IRR)	-20%
Net Present Value (NPV)	(\$33,514.82)

ECM #7: 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 15% of steam traps are leaking in existing installations. Steam traps only have an average life of five (5) years.

This ECM would replace approximately seven (7) 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 H** for a detailed analysis.

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$25,355
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$25,355
Maintenance Savings (\$/Yr):	(\$1,201)
Energy Savings (\$/Yr):	\$3,154
Total Yearly Savings (\$/Yr):	\$1,953
Estimated ECM Lifetime (Yr):	10
Simple Payback	13.0
Simple Lifetime ROI	-23.0%
Simple Lifetime Maintenance Savings	(\$12,010)
Simple Lifetime Savings	\$19,530
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$8,695.51)

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 \$8,850. Therefore, the annual energy cost savings for this ECM would be approximately 15% of \$8,850 or \$1,328.

The basis of design is the ISTECH 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 26 existing older control valves x \$1,500/unit for the new thermostatic valves/controls = \$39,000.

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

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$39,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$39,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,328
Total Yearly Savings (\$/Yr):	\$1,328
Estimated ECM Lifetime (Yr):	10
Simple Payback	29.4
Simple Lifetime ROI	-65.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$13,280
Internal Rate of Return (IRR)	-16%
Net Present Value (NPV)	(\$27,671.89)

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

Description:

Currently, Clifton Elementary School #11 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 override 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.

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

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

DDC ENERGY MANAGEMENT SYSTEM CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Nat Gas Usage (Therms)	9,833	-	
Existing Electricity Usage (kWh)	6,758	-	
Energy Savings, Nat Gas	-	10%	
Energy Savings, Electricity	-	5%	
Gas Cost (\$/Therm)	\$0.97	\$0.97	
Electricity Cost (\$/kWh)	\$0.124	\$0.124	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Nat Gas Usage (Therms)	9,833	8,850	983
Electricity Usage (kWh)	6,758	6,420	338
Nat Gas Cost (\$)	\$9,538	\$8,584	\$954
Electricity Cost (\$)	\$838	\$796	\$42
Energy Cost (\$)	\$10,376	\$9,380	\$996
COMMENTS:			

Demand savings due to implementation of this ECM is minimal.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately \$4.13 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 (\$):	\$234,920
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$234,920
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$996
Total Yearly Savings (\$/Yr):	\$996
Estimated ECM Lifetime (Yr):	15
Simple Payback	235.9
Simple Lifetime ROI	-93.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$14,940
Internal Rate of Return (IRR)	-24%
Net Present Value (NPV)	(\$223,029.82)

REM #1: 58.05 kW Solar System**Description:**

The Clifton Elementary School #11 has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 58.05 kilowatt solar array could be installed. The array will produce approximately 67,080 kilowatt-hours annually that will reduce the overall electric usage of the facility by 50.95%.

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}):	58.05
Electric Generation (KWH/Yr):	67,080
Installation Cost (\$):	\$361,407
SREC Revenue (\$/Yr):	\$12,818
Energy Savings (\$/Yr):	\$9,861
Total Yearly Savings (\$/Yr):	\$22,679
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	15.9
Analysis Period Electric Savings (\$):	\$183,399
Analysis Period SREC Revenue (\$):	\$185,684
Net Present Value (NPV)	(\$137,276.79)

V. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy. While the District is already performing many of these functions through routine maintenance it is important to continue to address these items as they provide an energy savings benefit.

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

APPENDIX A

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Clifton Public Schools – School #11

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade - General	\$19,076	\$21,480	\$3,990	\$36,566	\$4,305	\$0	\$4,305	15	\$64,575	\$0	76.6%	8.5	8.13%	\$14,826.81
ECM #2	Lighting Upgrade - MPR	\$2,250	\$3,250	\$500	\$5,000	\$172	\$0	\$172	15	\$2,580	\$0	-48.4%	29.1	-7.32%	(\$2,946.68)
ECM #3	Lighting Controls Upgrade	\$5,800	\$3,100	\$1,105	\$7,995	\$1,300	\$0	\$1,300	15	\$19,500	\$0	150.2%	6.0	14.49%	\$7,724.32
ECM #4	Burner Controls	\$26,000	\$25,000	\$0	\$51,000	\$477	\$0	\$477	21	\$10,017	\$0	-80.4%	106.9	-11.64%	(\$43,647.03)
ECM #5	Pipe & Valve Insulation	\$14,400	\$0	\$0	\$14,400	\$1,572	\$0	\$1,572	25	\$39,300	\$0	172.9%	9.2	9.88%	\$12,973.47
ECM #6	Replace Steam Condensate Receiver	\$15,000	\$21,750	\$0	\$36,750	\$271	\$0	\$271	15	\$4,065	\$0	-88.9%	135.6	-19.92%	(\$33,514.82)
ECM #7	Steam Trap Replacement	\$6,755	\$18,600	\$0	\$25,355	\$3,154	(\$1,201)	\$1,953	10	\$19,530	-\$12,010	-23.0%	13.0	-4.48%	(\$8,695.51)
ECM #8	Thermostatic Steam Vavles/Control	\$39,000	\$0	\$0	\$39,000	\$1,328	\$0	\$1,328	10	\$13,280	\$0	-65.9%	29.4	-15.95%	(\$27,671.89)
ECM #9	DDC Controls Upgrade	\$234,920	\$0	\$0	\$234,920	\$996	\$0	\$996	15	\$14,940	\$0	-93.6%	235.9	-23.60%	(\$223,029.82)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	58.05 KW PV System	\$361,407	\$0	\$0	\$361,407	\$9,861	\$12,818	\$22,679	15	\$340,181	\$192,269	-5.9%	15.9	-0.75%	(\$90,670.05)

- Notes: 1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the lifetime of ECM and Cn is the cash flow during each period.

APPENDIX B

Concord Engineering Group, Inc.

520 BURNT MILL ROAD
VOORHEES, NEW JERSEY 08043
PHONE: (856) 427-0200
FAX: (856) 427-6508



SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of February 11, 2013:

Electric Chillers

Water-Cooled Chillers	\$16 - \$170 per ton
Air-Cooled Chillers	\$8 - \$52 per ton

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Cooling

Gas Absorption Chillers	\$185 - \$400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

Unitary AC and Split Systems	\$73 - \$92 per ton
Air-to-Air Heat Pumps	\$73 - \$92 per ton
Water-Source Heat Pumps	\$81 per ton
Packaged Terminal AC & HP	\$65 per ton
Central DX AC Systems	\$40- \$72 per ton
Dual Enthalpy Economizer Controls	\$250
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	\$75 per thermostat
A/C Economizing Controls	≤ 5 tons \$85/unit; >5 tons \$170/unit

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	\$2.00 per MBH, but not less than \$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	\$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	\$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	\$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	\$1,200 - \$2,700
Low Intensity Infrared Heating	\$300 - \$500 per unit

Ground Source Heat Pumps

Closed Loop	\$450 per ton, EER \geq 16
	\$600 per ton, EER \geq 18
	\$750 per ton, EER \geq 20

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per VFD rated hp
Compressors	\$5,250 to \$12,500 per drive
Cooling Towers \geq 10 hp	\$60 per VFD rated hp
Boiler Fans \geq 5 HP	\$65 to \$155 per hp
Boiler Feed Water Pumps \geq 5 HP	\$60 to \$155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit \$55 – \$300 per hp New Hood \$55 - \$250 per hp

Natural Gas Water Heating

Gas Water Heaters \leq 50 gallons, 0.67 energy factor or better	\$50 per unit
Gas-Fired Water Heaters $>$ 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities (Expires 3/1/2013)	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities (Expires 3/1/2013)	\$25 per fixture (1-4 lamps)
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	\$15 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 per fixture
HID \geq 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID \geq 100w Replacement with new HID \geq 100w	\$70 per fixture

Prescriptive Lighting - LED

LED Display Case Lighting	\$30 per display case
LED Shelf-Mtd. Display & Task Lights	\$15 per linear foot
LED Portable Desk Lamp	\$20 per fixture
LED Wall-wash Lights	\$30 per fixture
LED Recessed Down Lights	\$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	\$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	\$150 per fixture
LED High-Bay-Aisle Lighting	\$150 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Linear Panels (1x4, 2x2, 2x4 Troffers only)	\$100 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Screw-based & Pin-based (PAR, MR, BR, R) Standards (A-Style) and Decorative Lamps	\$20 per lamp
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$30 per 4 foot \$42 per 5 foot \$65 per 6 foot
LED Retrofit Kits	To be evaluated through the customer measure path

Lighting Controls – Occupancy Sensors

Wall Mounted	\$20 per control
Remote Mounted	\$35 per control
Daylight Dimmers	\$25-\$50 per fixture
Occupancy Controlled hi-low Fluorescent Controls	\$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	\$75 per fixture controlled
Daylight Dimming	\$75 per fixture controlled

Premium Motors

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

Refrigeration Doors/Covers

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

Refrigeration Controls

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

Other Equipment Incentives

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1- 2007 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	\$0.16 KWh and \$1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and an IRR of at least 10%.

APPENDIX C



STATEMENT OF ENERGY PERFORMANCE

8-Clifton BOE - PS 11

Building ID: 3477567
 For 12-month Period Ending: February 28, 2013¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: April 11, 2013

Facility
 8-Clifton BOE - PS 11
 147 Merselis
 Clifton, NJ 07011

Facility Owner
 Clifton BOE
 745 Clifton Avenue
 Clifton, NJ 07013

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

Year Built: 1905
Gross Floor Area (ft²): 56,946

Energy Performance Rating² (1-100) 90

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	448,441
Natural Gas (kBtu) ⁴	1,334,073
Total Energy (kBtu)	1,782,514

Energy Intensity⁴

Site (kBtu/ft ² /yr)	31
Source (kBtu/ft ² /yr)	51

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	134
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Electric Distribution Utility

Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	51
National Median Source EUI	82
% Difference from National Median Source EUI	-38%
Building Type	K-12 School

Stamp of Certifying Professional

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

Meets Industry Standards⁵ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.

NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Building Name	8-Clifton BOE - PS 11	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	K-12 School	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	147 Merselis, Clifton, NJ 07011	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		<input type="checkbox"/>
Elementary School 11 (K-12 School)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	56,946 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		<input type="checkbox"/>
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		<input type="checkbox"/>
Number of PCs	100 (Default)	Is this the number of personal computers in the K12 School?		<input type="checkbox"/>
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		<input type="checkbox"/>
Presence of cooking facilities	No	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		<input type="checkbox"/>
Percent Cooled	0 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		<input type="checkbox"/>

High School?	No	Is this building a high school (teaching grades 10, 11, and/or 12)? If the building teaches to high school students at all, the user should check 'yes' to 'high school'. For example, if the school teaches to grades K-12 (elementary/middle and high school), the user should check 'yes' to 'high school'.		<input type="checkbox"/>
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ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: Electric (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/07/2013	02/06/2013	12,120.00
12/07/2012	01/06/2013	10,680.00
11/07/2012	12/06/2012	4,560.00
10/07/2012	11/06/2012	14,145.00
09/07/2012	10/06/2012	12,570.00
08/07/2012	09/06/2012	8,535.00
07/07/2012	08/06/2012	5,490.00
06/07/2012	07/06/2012	11,910.00
05/07/2012	06/06/2012	14,040.00
04/07/2012	05/06/2012	13,785.00
03/07/2012	04/06/2012	12,690.00
Electric Consumption (kWh (thousand Watt-hours))		120,525.00
Electric Consumption (kBtu (thousand Btu))		411,231.30
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		411,231.30
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: gas (therms) Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
01/07/2013	02/06/2013	3,892.17
12/07/2012	01/06/2013	2,765.99
11/07/2012	12/06/2012	1,210.88
10/07/2012	11/06/2012	365.21
09/07/2012	10/06/2012	100.84
08/07/2012	09/06/2012	132.23
07/07/2012	08/06/2012	146.01
06/07/2012	07/06/2012	210.97
05/07/2012	06/06/2012	321.98
04/07/2012	05/06/2012	793.73
03/07/2012	04/06/2012	763.75

gas Consumption (therms)	10,703.76
gas Consumption (kBtu (thousand Btu))	1,070,376.00
Total Natural Gas Consumption (kBtu (thousand Btu))	1,070,376.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	<input type="checkbox"/>

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	<input type="checkbox"/>

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	<input type="checkbox"/>

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
8-Clifton BOE - PS 11
147 Merselis
Clifton, NJ 07011

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

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

General Information

8-Clifton BOE - PS 11	
Gross Floor Area Excluding Parking: (ft ²)	56,946
Year Built	1905
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Elementary School 11	
Space Type	K-12 School
Gross Floor Area (ft ²)	56,946
Open Weekends?	No
Number of PCs ^d	100
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

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 02/28/2013)	Baseline (Ending Date 02/28/2013)	Rating of 75	Target	National Median
Energy Performance Rating	90	90	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	31	31	40	N/A	51
Source (kBtu/ft ²)	51	51	64	N/A	82
Energy Cost					
\$/year	N/A	N/A	N/A	N/A	N/A
\$/ft ² /year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO ₂ e/year	134	134	170	N/A	217
kgCO ₂ e/ft ² /year	2	2	3	N/A	3

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.

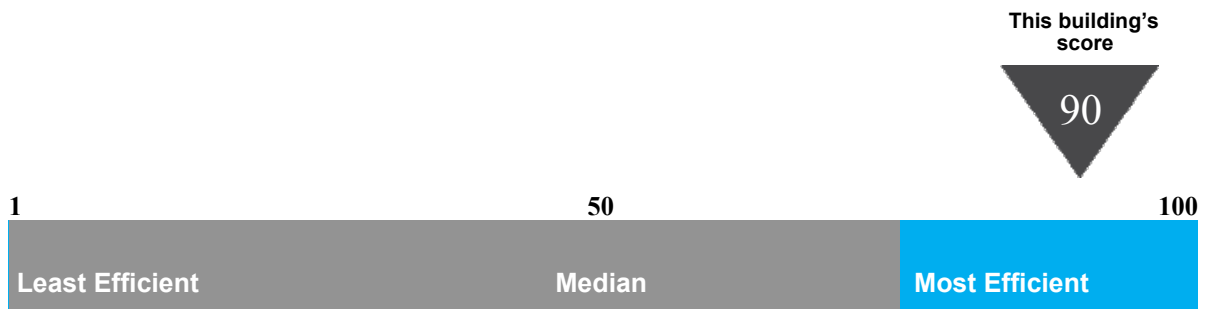
Statement of Energy Performance

2013

8-Clifton BOE - PS 11
147 Merselis
Clifton, NJ 07011

Portfolio Manager Building ID: 3477567

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 51 kBtu per square foot per year.*

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

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification



APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #11

AC Units

Tag			
Unit Type	Window AC Units		
Qty	4		
Location	Offices/Classrooms		
Area Served	Offices/Classrooms		
Manufacturer	Varies		
Model #	Varies		
Serial #	-		
Cooling Type	DX, R-22		
Cooling Capacity (Tons)	1-2 Tons		
Cooling Efficiency (SEER/EER)	8 SEER		
Heating Type	N/A		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Approx Age	5		
ASHRAE Service Life	15		
Remaining Life	10		
Comments	Estimated Values		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #11

AHUs

Tag			
Unit Type	Unit Ventilator	Air Handling Unit	
Qty	26	2	
Location	Basement Rooms	Gymnasium	
Area Served	Basement Rooms	Gymnasium	
Manufacturer	Nesbitt	-	
Model #	T0S312501L0T	-	
Serial #	-	-	
Cooling Type	N/A	N/A	
Cooling Capacity (Tons)	N/A	N/A	
Heating Type	Steam	Steam	
Heating Input (MBH)	-	-	
Supply Fan (HP)	1/3 HP Blower	-	
Return Fan (HP)	N/A	-	
Electrical (V/H/P)	120v	-	
Approx Age	10	20	
ASHRAE Service Life	15	15	
Remaining Life	5	(5)	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #11

Boilers

Tag			
Unit Type	Steam Cast Iron Sectional Boilers		
Qty	2		
Location	Boiler Room		
Area Served	Steam Loop		
Manufacturer	H.B. Smith		
Model #	No.44 Mills		
Serial #	-		
Input Capacity (Btu/Hr)	4200 MBH (Gas)		
Rated Output Capacity (Btu/Hr)	-		
Approx. Efficiency %	65.0%		
Fuel	Natural Gas		
Approx Age	87		
ASHRAE Service Life	35		
Remaining Life	(52)		
Comments	Gordon-Piatt Burner MN:S10.1-G0-30		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #11

Domestic Water Heaters

Tag			
Unit Type	Gas Fired Domestic Hot Water Heater	Gas Fired Domestic Hot Water Heater	
Qty	1	1	
Location	Boiler Room	Boiler Room	
Area Served	Domestic Hot Water Loop	Domestic Hot Water Loop	
Manufacturer	Rheem	Rheem	
Model #	22V40F1	42V50-40F	
Serial #	RHLN0310A08332	RHLN1204524406	
Size (Gallons)	40 Gallons	50 Gallons	
Input Capacity (MBH/KW)	38 MBH	40 MBH	
Recovery (Gal/Hr)	-	33.9 GPH	
Efficiency %	80%	80%	
Fuel	Natural Gas	Natural Gas	
Approx Age	3	9	
ASHRAE Service Life	12	12	
Remaining Life	9	3	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

School #11

Pumps

Tag			
Unit Type	Condensate Return		
Qty	1		
Location	Boiler Room		
Area Served	Steam Return		
Manufacturer	National Pump & Controls Inc.		
Model #	CVD 2020		
Serial #	2356		
Horse Power	1.5 HP		
Flow	-		
Motor Info	Leroy Somer		
Electrical Power	208-230/460/3/60		
RPM	3400 RPM		
Motor Efficiency %	78.0%		
Approx Age	30		
ASHRAE Service Life	15		
Remaining Life	(15)		
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12066
 Facility Name: School #11
 Address: 147 Merrell Avenue
 City, State, Zip: Clifton, New Jersey

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS					
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
9	0 - Playroom 1	2600	2x4 Surface Wrap 2-Lamp 32 W T8	2	58	8	0.46	1,206	Existing To Remain	Existing To Remain	2	58	0	0.46	0.00	1,206	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	241	\$35
2	0 - Playroom 1 Toilet	1200	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	67	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	67	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	0 - Cafeteria 2	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	6	0.65	1,700	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	6	0.43	432.00	1,123	0.22	577	\$85	0	No New Controls	0	0.0%	0	\$0
9	0 - Storage by 2	1200	2x4 Surface Wrap 2-Lamp 32 W T8	2	58	16	0.93	1,114	Existing To Remain	Existing To Remain	2	58	0	0.93	0.00	1,114	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
13	0 - Mech Room	1200	150 W Incandescent A-Lamp	1	150	3	0.45	540	Re-Lamp	42w CFL Screw Base	1	42	3	0.13	126.00	151	0.32	389	\$57	0	No New Controls	0	0.0%	0	\$0
11	0 - Mech Room	1200	Phillips 28 W CFL Screw-In Covered	1	28	3	0.08	101	Existing To Remain	Existing To Remain	1	28	0	0.08	0.00	101	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
6	0 - Toilet Room	1200	4' Surface Wrap 1-Lamp 32 W T8	1	28	3	0.08	101	Existing To Remain	Existing To Remain	1	28	0	0.08	0.00	101	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
8	0 - Maint Office	1200	1x4 Utility Surface 2-Lamp T8	2	58	1	0.06	70	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	70	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
12	0 - Maint Office	1200	100 W Incandescent A-Lamp	1	100	4	0.40	480	Re-Lamp	23w CFL Screw Base	1	23	4	0.09	92.00	110	0.31	370	\$54	0	No New Controls	0	0.0%	0	\$0
8	0 - Boiler Room	1200	1x4 Utility Surface 2-Lamp T8	2	58	3	0.17	209	Existing To Remain	Existing To Remain	2	58	0	0.17	0.00	209	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
12	0 - Boiler Room	1200	100 W Incandescent A-Lamp	1	100	2	0.20	240	Re-Lamp	23w CFL Screw Base	1	23	2	0.05	46.00	55	0.15	185	\$27	0	No New Controls	0	0.0%	0	\$0
3	0 - Cafeteria 4	2600	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	16	0.93	2,413	Existing To Remain	Existing To Remain	2	58	0	0.93	0.00	2,413	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
12	0 - Cafeteria 4	2600	100 W Incandescent A-Lamp	1	100	3	0.30	780	Re-Lamp	23w CFL Screw Base	1	23	3	0.07	69.00	179	0.23	601	\$88	0	No New Controls	0	0.0%	0	\$0
11	0 - Cafeteria 4	2600	Phillips 28 W CFL Screw-In Covered	1	28	2	0.06	146	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	146	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
6	0 - Restroom	2600	4' Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	146	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	146	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
10	0 - Electric Closet	1200	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	2	0.12	139	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	139	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	0 - Electric Closet	1200	Phillips 28 W CFL Screw-In Covered	1	28	1	0.03	34	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	34	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
13	0 - Electric Closet Toilet	1200	150 W Incandescent A-Lamp	1	150	1	0.15	180	Re-Lamp	42w CFL Screw Base	1	42	1	0.04	42.00	50	0.11	130	\$19	0	No New Controls	0	0.0%	0	\$0
3	0 - Storage Room 7	1200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	8	0.46	557	Existing To Remain	Existing To Remain	2	58	0	0.46	0.00	557	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	0 - 1.M.C. 5	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	24	0.67	1,747	Existing To Remain	Existing To Remain	1	28	0	0.67	0.00	1,747	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	349	\$51
3	0 - Cafeteria 6	2600	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	11	0.64	1,659	Existing To Remain	Existing To Remain	2	58	0	0.64	0.00	1,659	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0

Fixture Reference #	Location	Average Burn Hours	Description	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT					RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS							
				Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
2	0 - Caf Restroom	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	146	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	146	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
3	0 - Corridor	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	8	0.46	1,392	Existing To Remain	Existing To Remain	2	58	0	0.46	0.00	1,392	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	0 - Corridor	3000	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	168	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	168	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
12	0 - Stair 1	3000	100 W Incandescent A-Lamp	1	100	1	0.10	300	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	69	0.08	231	\$34	0	No New Controls	0	0.0%	0	\$0
12	0 - Stair 2	3000	100 W Incandescent A-Lamp	1	100	1	0.10	300	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	69	0.08	231	\$34	0	No New Controls	0	0.0%	0	\$0
12	0 - Stair 3	3000	100 W Incandescent A-Lamp	1	100	1	0.10	300	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	69	0.08	231	\$34	0	No New Controls	0	0.0%	0	\$0
12	0 - Stair 4	3000	100 W Incandescent A-Lamp	1	100	1	0.10	300	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	69	0.08	231	\$34	0	No New Controls	0	0.0%	0	\$0
1	1 - Classroom 1	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	9	0.98	2,551	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	9	0.65	648.00	1,685	0.33	866	\$127	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	337	\$50
5	1 - Classroom 1 Storage	2600	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	2	0.12	302	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	302	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	1 - Classroom 18	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	21	0.59	1,529	Existing To Remain	Existing To Remain	1	28	0	0.59	0.00	1,529	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	306	\$45
1	1 - Classroom 18 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
12	1 - Classroom 18 Storage	1200	100 W Incandescent A-Lamp	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	28	0.08	92	\$14	0	No New Controls	0	0.0%	0	\$0
1	1 - Classroom 2	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	0.5	20.0%	300	\$44
5	1 - Classroom 2	2600	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	2	0.12	302	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	302	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mt.	0.5	20.0%	60	\$9
2	1 - Classroom 17	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	21	0.59	1,529	Existing To Remain	Existing To Remain	1	28	0	0.59	0.00	1,529	0.00	0	\$0	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	306	\$45
1	1 - Classroom 17 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
12	1 - Classroom 17 Storage	1200	100 W Incandescent A-Lamp	1	100	1	0.10	120	Re-Lamp	23w CFL Screw Base	1	23	1	0.02	23.00	28	0.08	92	\$14	0	No New Controls	0	0.0%	0	\$0
1	1 - Nurses Office	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	112	\$17
3	1 - Nurses Office Toilet	1200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	1	0.06	70	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	70	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
10	1 - Office by 17	2600	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	4	0.23	603	Existing To Remain	Existing To Remain	2	58	0	0.23	0.00	603	0.00	0	\$0	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	121	\$18
1	1 - Classroom 4	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	1 - Classroom 5	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	1 - Classroom 6	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS							
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
1	1 - Classroom 7	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
2	1 - Stage 8	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	5	0.14	364	Existing To Remain	Existing To Remain	1	28	0	0.14	0.00	364	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
4	1 - Multi-Purpose 9	2600	250 W Metal Halide High Bay	1	285	10	2.85	7,410	Remove & Replace New Fixture	2x4, 4 Lamp, 54w T5, (2) 2/54 Elect. Ballast, Singlepoint Mt., High Bay, Wire Guard, Lens	4	240	10	2.40	2,400.00	6,240	0.45	1,170	\$172	0	No New Controls	0	0.0%	0	\$0
14	1 - Multi-Purpose 9	2600	300 W Incandescent A-Lamp	1	300	11	3.30	8,580	Existing To Remain	Existing To Remain	1	300	0	3.30	0.00	8,580	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
15	1 - Kitchen 10	2600	2x4 Surface Wrap 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
2	1 - Gym Boy's Restroom	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	146	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	146	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
2	1 - Gym Girl's Restroom	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	2	0.06	146	Existing To Remain	Existing To Remain	1	28	0	0.06	0.00	146	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
13	1 - Gym Janitor Closet	1200	150 W Incandescent A-Lamp	1	150	1	0.15	180	Re-Lamp	42w CFL Screw Base	1	42	1	0.04	42.00	50	0.11	130	\$19	0	No New Controls	0	0.0%	0	\$0
1	1 - Office 11	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	112	\$17
1	1 - Classroom 12	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	1 - Classroom 12 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	1 - Classroom 13	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	1 - Classroom 13 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	1 - Classroom 14	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	1 - Classroom 14 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	1 - Classroom 15	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
5	1 - Classroom 15 Storage	2600	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	1	0.06	151	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	151	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
5	1 - Classroom 15 Toilet	1200	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	1	0.06	70	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	70	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	1 - Small Group 16	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	112	\$17
3	1 - Office 11 Toilet	1200	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	1	0.06	70	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	70	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	1 - Corridor	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	23	2.51	7,521	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	23	1.66	1,656.00	4,968	0.85	2,553	\$375	0	No New Controls	0	0.0%	0	\$0
3	1 - Corridor	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	7	0.41	1,218	Existing To Remain	Existing To Remain	2	58	0	0.41	0.00	1,218	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 1	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	6	0.65	1,700	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	6	0.43	432.00	1,123	0.22	577	\$85	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	225	\$33

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS				PROPOSED LIGHTING CONTROLS						
			Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
1	2 - Classroom 1 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 2	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
2	2 - Classroom 2 Storage	2600	1x4 Surface Wrap 1-Lamp 32 W T8	1	28	1	0.03	73	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	73	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 17	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
5	2 - Classroom 17 Storage	2600	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	1	0.06	151	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	151	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 16	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
5	2 - Classroom 16 Storage	2600	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	1	0.06	151	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	151	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	2 - Office 3	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	112	\$17
5	2 - Office 3 Toilet	3000	2x4 Recessed Prismatic 2-Lamp 32 W T8	2	58	1	0.06	174	Existing To Remain	Existing To Remain	2	58	0	0.06	0.00	174	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
10	2 - Small Group 15	2600	1x4 Pendant Wrap 2-Lamp 32 W T8	2	58	4	0.23	603	Existing To Remain	Existing To Remain	2	58	0	0.23	0.00	603	0.00	0	\$0	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	121	\$18
1	2 - Classroom 4	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 5	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 6	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 7	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Teachers' Room 8	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mt.	1	20.0%	112	\$17
1	2 - Classroom 9	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 9 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 10	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 10 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 12	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 12 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0
1	2 - Classroom 13	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	8	0.87	2,267	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	8	0.58	576.00	1,498	0.30	770	\$113	5	Dual Technology Occupancy Sensor - Remote Mt.	1	20.0%	300	\$44
1	2 - Classroom 13 Storage	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	1	0.11	283	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	1	0.07	72.00	187	0.04	96	\$14	0	No New Controls	0	0.0%	0	\$0

Fixture Reference #	Location	Average Burn Hours	Description	EXISTING FIXTURES					PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
				Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$	
15	2 - Small Group 14	2600	2x4 Surface Wrap 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	112	\$17
1	2 - Small Group 18	2600	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	3	0.33	850	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	3	0.22	216.00	562	0.11	289	\$42	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	112	\$17
1	2 - Corridor	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	22	2.40	7,194	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	22	1.58	1,584.00	4,752	0.81	2,442	\$359	0	No New Controls	0	0.0%	0	\$0
1	Stair 1	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	654	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	2	0.14	144.00	432	0.07	222	\$33	0	No New Controls	0	0.0%	0	\$0
3	Stair 1	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	348	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	348	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	Stair 1	3000	Phillips 28 W CFL Screw-In Covered	1	28	1	0.03	84	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	Stair 2	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	654	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	2	0.14	144.00	432	0.07	222	\$33	0	No New Controls	0	0.0%	0	\$0
3	Stair 2	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	348	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	348	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	Stair 2	3000	Phillips 28 W CFL Screw-In Covered	1	28	1	0.03	84	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	Stair 3	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	654	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	2	0.14	144.00	432	0.07	222	\$33	0	No New Controls	0	0.0%	0	\$0
3	Stair 3	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	348	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	348	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	Stair 3	3000	Phillips 28 W CFL Screw-In Covered	1	28	1	0.03	84	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
1	Stair 4	3000	2x4 Recessed Prismatic 4-Lamp 32 W T8	4	109	2	0.22	654	De-lamp / Re-Lamp / Re-Ballast / Reflector	Sylvania Lamp FO28/841/XP/XL/SS/ECO3 Sylvania Ballast OHE2X32T8/UNV ISL-SC	3	72	2	0.14	144.00	432	0.07	222	\$33	0	No New Controls	0	0.0%	0	\$0
3	Stair 4	3000	1x4 Surface Wrap 2-Lamp 32 W T8	2	58	2	0.12	348	Existing To Remain	Existing To Remain	2	58	0	0.12	0.00	348	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
11	Stair 4	3000	Phillips 28 W CFL Screw-In Covered	1	28	1	0.03	84	Existing To Remain	Existing To Remain	1	28	0	0.03	0.00	84	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0
TOTAL							511	46	118,314				296	34		87,859	12	30,455	\$4,477			35	7	8,842	\$1,300

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 #11	6050	SHARP NU-U235F2	247	17.5	4,333	58.05	67,080	47.0	10,349	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 #11 Location: Clifton, NJ Description: Photovoltaic System 100% Financing - 15 year									
Simple Payback Analysis									
		Photovoltaic System 100% Financing - 15 year							
Total Construction Cost		\$361,407							
Annual kWh Production		67,080							
Annual Energy Cost Reduction		\$9,861							
Average Annual SREC Revenue		\$12,818							
Simple Payback:		15.94 Years							
Life Cycle Cost Analysis									
Analysis Period (years):		15				Financing %:		100%	
Discount Rate:		3%				Maintenance Escalation Rate:		3.0%	
Average Energy Cost (\$/kWh)		\$0.147				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	67,080	\$9,861	\$0	\$16,770	\$21,267	\$15,330	(\$9,966)	(\$9,966)
2	\$0	66,745	\$10,157	\$0	\$16,686	\$20,322	\$16,275	(\$9,754)	(\$19,721)
3	\$0	66,411	\$10,461	\$0	\$16,603	\$19,318	\$17,279	(\$9,533)	(\$29,254)
4	\$0	66,079	\$10,775	\$0	\$16,520	\$18,252	\$18,345	(\$9,302)	(\$38,556)
5	\$0	65,748	\$11,098	\$677	\$16,437	\$17,121	\$19,476	(\$9,739)	(\$48,295)
6	\$0	65,420	\$11,431	\$674	\$13,084	\$15,920	\$20,677	(\$12,756)	(\$61,051)
7	\$0	65,093	\$11,774	\$670	\$13,019	\$14,644	\$21,953	(\$12,475)	(\$73,525)
8	\$0	64,767	\$12,127	\$667	\$12,953	\$13,290	\$23,307	(\$12,183)	(\$85,709)
9	\$0	64,443	\$12,491	\$664	\$12,889	\$11,853	\$24,744	(\$11,881)	(\$97,589)
10	\$0	64,121	\$12,866	\$660	\$9,618	\$10,327	\$26,270	(\$14,773)	(\$112,363)
11	\$0	63,800	\$13,252	\$657	\$9,570	\$8,706	\$27,891	(\$14,432)	(\$126,795)
12	\$0	63,481	\$13,650	\$654	\$9,522	\$6,986	\$29,611	(\$14,079)	(\$140,874)
13	\$0	63,164	\$14,059	\$651	\$9,475	\$5,160	\$31,437	(\$13,714)	(\$154,588)
14	\$0	62,848	\$14,481	\$647	\$6,285	\$3,221	\$33,376	(\$16,479)	(\$171,067)
15	\$0	62,534	\$14,915	\$644	\$6,253	\$1,162	\$35,435	(\$16,073)	(\$187,139)
Totals:		971,735	\$183,399	\$7,266	\$185,684	\$187,549	\$361,407	(\$187,139)	(\$1,356,492)
Net Present Value (NPV)							(\$137,277)		

APPENDIX G

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. \$0.147	COND LOSS QT/MIN	ANNUAL HTG \$ SAV	TOTAL \$ ENERGY SAV (E&G)	EQUIP.& INST. COST	TOTAL COST NOTE 2
CP-x	COND. PUMP	1.5	82.5%	11	4,841	84.0%	4,754	86	\$13	0.25	\$258	\$271	\$15,000	\$21,750
TOTALS=									\$13		\$258	\$ 271		\$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 \$.9/THERM AND 70% EFFICIENT BOILER PLANT

APPENDIX H

STEAM TRAP REPLACEMENT ANALYSIS

Calculation Assumptions		
Description	Value	Units
Ann. Gas Usage	13,781	Therm
Less DHW Gas Usage	1,800	Therm
Less Other Gas Usage	0	Therm
Net Heating Gas Usage	11,981	Therm
Est. Steam Production	893,194	lbs
Boiler Efficiency	75%	
Makeup Water	50	°F
Condensate Return	200	°F
30% Makeup		
Feedwater Enthalpy	155	btu/lb
Steam Enthalpy	1161	btu/lb
Steam Production Conversion	74.55	lb / Th
Hours per Day On	8	
Days per Week	5.5	
Htg Months per Year	6	
Ann. System Operation	1,144	hrs / yr
Gas Cost (\$/Th)	\$0.90	
Trap Failure Rate	15.00%	

Building Area	Estimated Quantity
Boiler Plant	4
Air Handlers	2
Condensate Pumps	1
Various Classrooms	26
TOTAL	33

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	26	4	136,971	1,837	\$1,654
1" Trap	1/4"	54.70	2	0	18,773	252	\$227
1 -1/2" Trap	3/8"	123.00	5	1	105,534	1,416	\$1,274
TOTAL			33	5	261,278	3,505	\$3,154