CLIFTON PUBLIC SCHOOLS
WOODROW WILSON
MIDDLE SCHOOL

1400 VAN HOUTEN AVENUE
CLIFTON, NEW JERSEY 07011

FACILITY ENERGY REPORT

TABLE OF CONTENTS

I. HISTORIC ENERGY CONSUMPTION/COST 2

II. FACILITY DESCRIPTION 7

III. MAJOR EQUIPMENT LIST 9

IV. ENERGY CONSERVATION MEASURES 10

V. ADDITIONAL RECOMMENDATIONS 28

Appendix A – ECM Cost & Savings Breakdown

Appendix B – New Jersey Smart Start® Program Incentives

Appendix C – Portfolio Manager "Statement of Energy Performance"

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

Appendix F – Renewable / Distributed Energy Measures Calculations

Appendix G – Condensate Receiver Replacement Calculation

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:	Large Power & Lighting Secondary (LPLS)
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: PSEG
Rate: LPLS, GLP
Meter No: 778010951 / 626024541 / 728006936
Account No: 42 002 206 01 / 67 029 078 18 / 67 084 651 08
Third Party Utility Provider: Champion Energy Services LLC
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Mar-12	68,480	245.2	$10,883
Apr-12	41,640	196.8	$7,491
May-12	59,886	249.3	$11,730
Jun-12	53,080	235.6	$10,518
Jul-12	27,920	78.4	$5,959
Aug-12	34,880	224.8	$8,395
Sep-12	57,040	221.2	$8,977
Oct-12	49,726	193.3	$8,053
Nov-12	65,686	237.7	$9,715
Dec-12	66,726	234.9	$9,718
Jan-13	73,166	252.5	$10,617
Feb-13	66,292	254.1	$9,935
Totals	**664,522**	**254.1 Max**	**$111,991**

AVERAGE DEMAND **218.7 KW average**
AVERAGE RATE **$0.169** **$/kWh**

Figure 1
Electricity Usage Profile

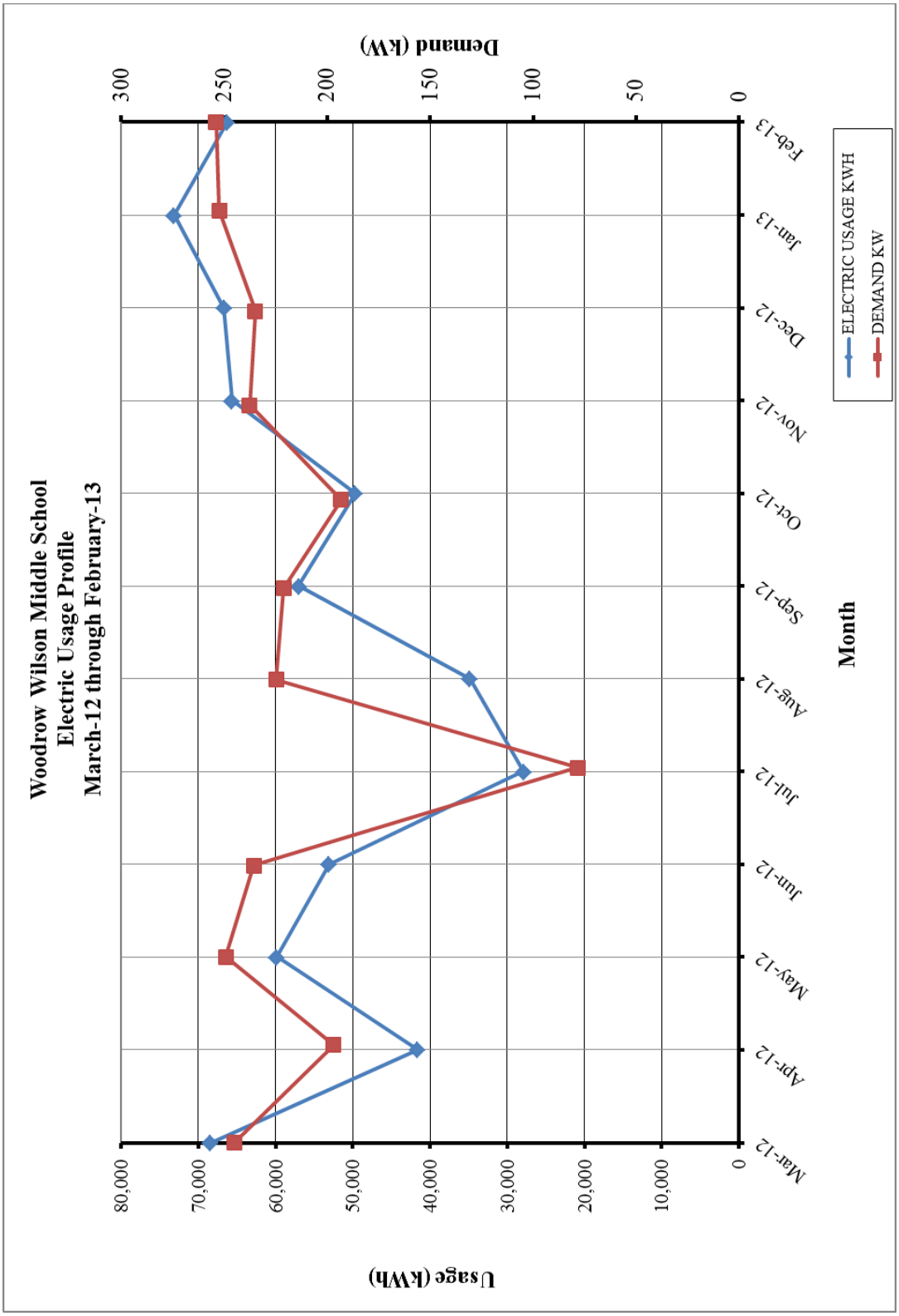
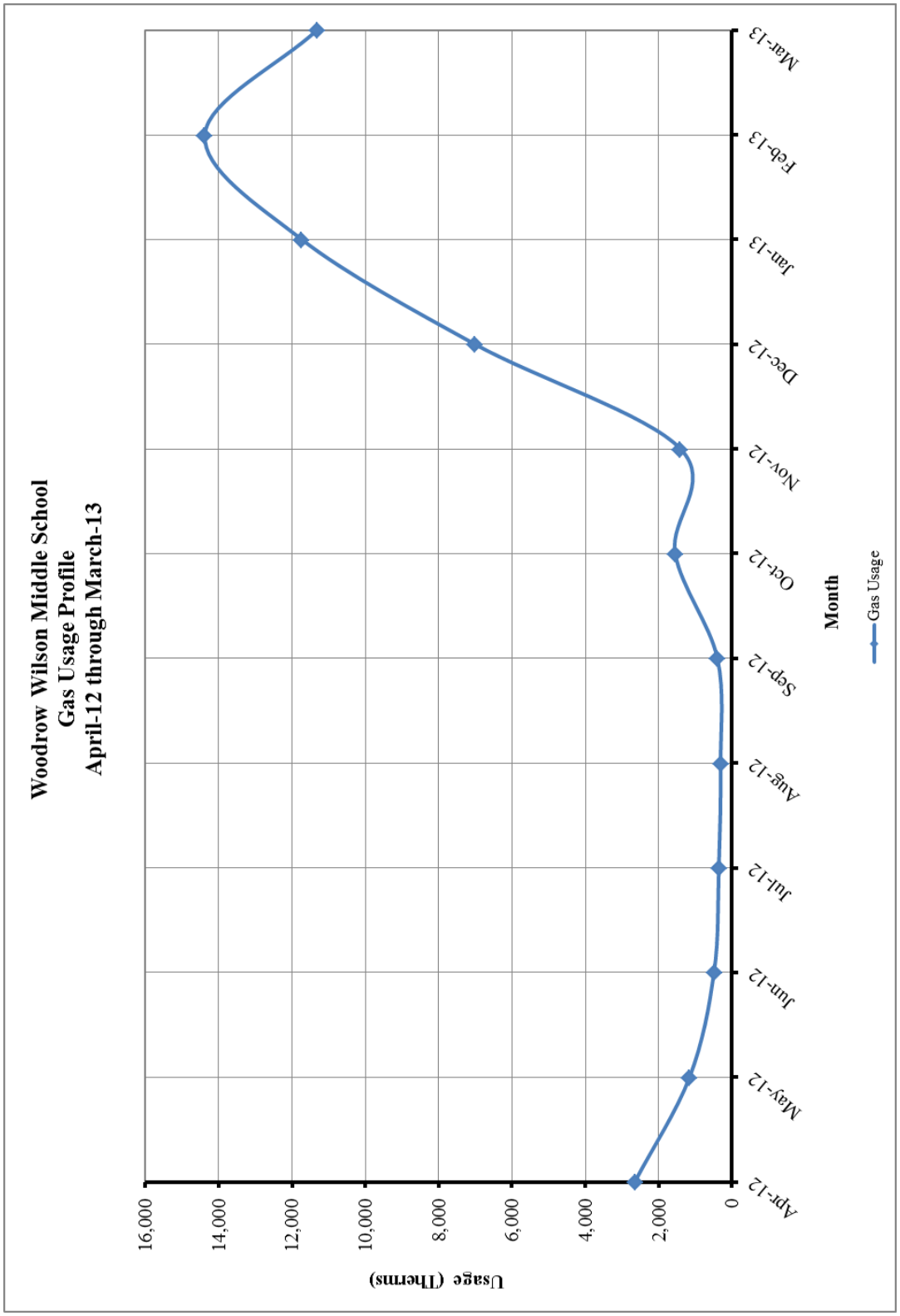


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSEG		
Rate: LVG		
Meter No: 2640074 / 3471125		
Account No: 67 098 334 02		
Third Party Utility Provider: HESS		
TPS Meter No: 446575/447978		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Apr-12	2,651.61	$1,621.04
May-12	1,157.03	$665.97
Jun-12	490.56	$347.99
Jul-12	361.18	$300.49
Aug-12	310.46	$281.86
Sep-12	401.91	$336.69
Oct-12	1,552.69	$971.84
Nov-12	1,410.86	$2,597.72
Dec-12	7,026.99	$6,749.11
Jan-13	11,743.12	$10,233.82
Feb-13	14,380.27	$12,108.31
Mar-13	11,313.62	$9,951.61
TOTALS	**52,800.30**	**$46,166.45**
AVERAGE RATE:	**$0.87**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Woodrow Wilson Middle School is located at 1400 Van Houten Avenue in Clifton, New Jersey. The 107,490 SF Middle School was built in 1955 with a 35,919 SF addition completed in 1996. The building is a two story facility comprised of classrooms, offices, cafeteria, auditorium, gym, media center and mechanical rooms.

Occupancy Profile

The typical hours of operation for the Middle School are Monday through Friday between 7:00 am and 4:00 pm. Maintenance staff is present in the building as early as 6:00 am. The school's enrollment is approximately 1,346 students, grades 6th through 8th, and has 100 teachers, support staff, and administrative personnel.

Building Envelope

Exterior walls for the middle school are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the school are in good condition and appear to be maintained. Typical windows throughout the school are double pane, operable, ¼" clear glass with aluminum frames. The roof is a flat, EPDM rubber roof on steel decking. The amount of insulation below the roof is unknown.

HVAC Systems

The middle school HVAC system consists of two steam boilers, four modular hot water boilers, five rooftop units, unit ventilators for the classrooms, and several split AC systems and window air conditioners spread throughout the facility.

The two main boilers are gas-fired Cleaver Brooks model CBI-700-200-015 packaged, fire tube, steam boilers. These boilers have an input rating of 8,165 MBH and an output rating of 6,695 MBH. These boilers serve the heat load for the original building via the steam radiators throughout the building and the steam heating coils in the unit ventilators and heating and ventilation units. The modular hot water boilers are Slant Fin cast iron sectional boilers. These gas-fired boilers have an input capacity of 300 MBH each for a total input capacity of 1,200 MBH, and an output capacity of 960 MBH. The modular hot water boilers serve the heat load in the addition via the hot water heating coils in the unit ventilators and heating and ventilation units. Hot water is circulated via two pumps rated for 85 GPM at 65' head with 3 horsepower motors.

Fresh air is supplied to the classrooms by unit ventilators. In the old building the unit ventilators are equipped with steam heating coils to heat the air as it enters the room. In the addition, most of the classrooms have two unit ventilators, one with a hot water heating coil, and the other with not heating coil. Some of the larger spaces have larger heating and ventilation units. They gym and auditorium both have two separate fan rooms each. The gym fans were not operational at the time of the site visit, and only one of the auditorium fans was operational. The multi-purpose room has a rooftop heating and ventilating unit with no thermostat and runs continuously when the building is occupied, which results in overheating of the space and the locker rooms.

In the newer addition, there are classrooms on the first and second floor with no exterior walls on which to place a unit ventilator. These rooms are served by Trane Voyager rooftop units that are DX cooling and gas fired heating units. There are also rooftop heating and ventilation units that serve the locker room areas.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. There are also several exhausters for some of the science classrooms and the kitchen. The addition classrooms have unit ventilators that act as exhaust fans for each room, these units are interlocked with the supply unit ventilator.

HVAC System Controls

The building HVAC systems are controlled by a pneumatic system. The compressor is located in the boiler room, and there are pneumatic control valves to control steam or hot water at each of the units.

Domestic Hot Water

Domestic hot water for the restrooms is provided by a Ruud model GX90-715A water heater and a domestic storage tank in the boiler room. The Ruud water heater has an input capacity of 715 MBH, and a recovery rating of 693.3 gallons per hour.

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 one walk-in freezer/refrigerator. The kitchen has multiple reach in refrigerators and warming carts.

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	$3,540	$2,180	1.6	823.7%
ECM #2	Lighting Upgrade - Gym/MPR/Aud	$25,800	$4,118	6.3	139.4%
ECM #3	Lighting Upgrade - Exterior	$6,255	$3,099	2.0	643.2%
ECM #4	Lighting Controls Upgrade	$25,875	$9,090	2.8	427.0%
ECM #5	DDC Controls Upgrade	$649,600	$6,585	98.6	-84.8%
ECM #6	Condensate Receiver Replacement	$36,250	$1,714	21.1	-29.1%
ECM #7	Vending Miser Controls	$700	$1,108	0.6	2274.3%
ECM #8	Window AC Unit Replacement	$2,050	$258	7.9	88.8%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	238.06 KW PV System	$1,421,766	$99,056	14.4	4.5%

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	4.2	12,901	-
ECM #2	Lighting Upgrade - Gym/MPR/Aud	8.3	24,364	-
ECM #3	Lighting Upgrade - Exterior	4.6	18,336	-
ECM #4	Lighting Controls Upgrade			-
ECM #5	DDC Controls Upgrade	-	15,623	4,534
ECM #6	Condensate Receiver Replacement	-	266	1,917
ECM #7	Vending Miser Controls	-	6,557	-
ECM #8	Window AC Unit Replacement	1.9	1,530	-
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	238.06 KW PV System	238.1	275,090	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	$2,180	$3,540	$0	$3,540	1.6
Lighting Upgrade - Gym/MPR/Aud	$4,118	$31,000	$5,200	$25,800	6.3
Lighting Upgrade - Exterior	$3,099	$6,255	$0	$6,255	2.0
Lighting Controls Upgrade	$9,090	$29,200	$3,325	$25,875	2.8
~~DDC Controls Upgrade~~	~~$6,585~~	~~$649,600~~	~~$0~~	~~$649,600~~	~~98.6~~
Condensate Receiver Replacement	$1,714	$36,250	$0	$36,250	21.1
Vending Miser Controls	$1,108	$700	$0	$700	0.6
Window AC Unit Replacement	$258	$2,050	$0	$2,050	7.9
Design / Construction Extras (15%)		$16,349		*$16,349*	
Total Project	**$21,567**	**$125,344**	**$8,525**	**$116,819**	**5.4**

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 Woodrow Wilson Middle School 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 ($):	$3,540
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$3,540
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,180
Total Yearly Savings ($/Yr):	$2,180
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.6
Simple Lifetime ROI	823.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$32,700
Internal Rate of Return (IRR)	62%
Net Present Value (NPV)	$22,484.70

ECM #2: Lighting Upgrade – Gym, Auditorium & Multi-Purpose Room

Description:

The Gym, Auditorium and Multi-Purpose room at Woodrow Wilson Middle School are currently lit via 400 and 250 watt Metal Halide HID fixtures. These spaces 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 six and four lamp, 54 watt high output fixtures.

This measure replaces all the HID, 400 and 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 ($):	$31,000
NJ Smart Start Equipment Incentive ($):	$5,200
Net Installation Cost ($):	$25,800
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,118
Total Yearly Savings ($/Yr):	$4,118
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.3
Simple Lifetime ROI	139.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$61,770
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	$23,360.42

ECM #3: Lighting Upgrade – Exterior Lighting

Description:

The exterior lighting at Woodrow Wilson Middle School is currently lit via high pressure sodium (HPS) wall packs, metal halide wall packs and incandescent flood lights. The exterior would be better served with more efficient LED lighting system. Concord Engineering recommends upgrading the lighting to an energy-efficient LED lighting system that includes LED lamps for the existing high pressure sodium, metal halide and incandescent lights on the exterior with LED Wall packs.

Energy Savings Calculations:

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$6,255
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$6,255
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,099
Total Yearly Savings ($/Yr):	$3,099
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.0
Simple Lifetime ROI	643.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$46,485
Internal Rate of Return (IRR)	49%
Net Present Value (NPV)	$30,740.66

ECM #4: Lighting Controls Upgrade – Occupancy Sensors

Description:

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

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

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

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

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

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

Energy Savings Calculations:

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

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

Rebates and Incentives:

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

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$29,200
NJ Smart Start Equipment Incentive ($):	$3,325
Net Installation Cost ($):	$25,875
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$9,090
Total Yearly Savings ($/Yr):	$9,090
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.8
Simple Lifetime ROI	427.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$136,350
Internal Rate of Return (IRR)	35%
Net Present Value (NPV)	$82,640.83

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

Description:

Currently, Woodrow Wilson Middle School uses a pneumatic control system. This system is very old and offers limited control options for the HVAC systems.

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

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

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 5% of the electricity and 5% for natural gas used for HVAC in this building.

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)	17,746	-	
Existing Electricity Usage (kWh)	2,824,538	-	
Energy Savings, Nat Gas	-	5%	
Energy Savings, Electricity	-	5%	
Gas Cost ($/Therm)	*$1.13*	$1.13	
Electricity Cost ($/kWh)	*$0.132*	$0.132	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Nat Gas Usage (Therms)	17,746	16,858	887
Electricity Usage (kWh)	2,824,538	2,683,311	141,227
Nat Gas Cost ($)	$20,053	$19,050	$1,003
Electricity Cost ($)	$372,839	$354,197	$18,642
Energy Cost ($)	$392,892	$373,247	$19,645
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 $4.53 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.

Cost of complete DDC System (not including the Admin Building) = ($4.53/SF x 143,409 SF) = $649,600.

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

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$649,600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$649,600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,585
Total Yearly Savings ($/Yr):	$6,585
Estimated ECM Lifetime (Yr):	15
Simple Payback	98.6
Simple Lifetime ROI	-84.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$98,775
Internal Rate of Return (IRR)	-18%
Net Present Value (NPV)	($570,988.70)

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 60^0F to 200^0F 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 ($):	$36,250
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$36,250
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,714
Total Yearly Savings ($/Yr):	$1,714
Estimated ECM Lifetime (Yr):	15
Simple Payback	21.1
Simple Lifetime ROI	-29.1%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$25,710
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	($15,788.38)

ECM #7: Vending Miser Controls

Description:

The Woodrow Wilson Middle School currently utilizes vending machines in select areas within the building. Vending machines are common within cafeteria's and faculty rooms which can be in use for a limited time during the day. The installation of the Vending Miser system will help reduce the operating hours of vending machines.

Cold beverage machines regularly operate inefficiently trying to maintain a constant cool temperature within the machine and snack machines with no cooling usually have lights that operate 24/7. The VendingMiser® system incorporates innovative energy-saving technology into a small plug-and-play device that in conjunction with a passive infrared sensor regulate the operation of the cold beverage and snack machines based on occupancy and room temperature. This ECM approximates the installation of three (3) of these control systems for the cold beverage machine.

Energy Savings Calculations:

Cold Drink and Snack Vending Machine Energy Conservation Project

Energy Analysis Prepared For:

Woodrow Wilson MS

www.VendingMiserStore.com

Input Variables	
Energy Costs ($0.000 per kwh)	$0.169
Facility Occupied Hours per Week	60
Number of Cold Drink Vending Machines	3
Number of Uncooled Snack Machines	1
Power Requirements of Cold Drink Machine (avg watts	427
Power Requirements of Snack Machine (avg watts)	100
VendingMiser Sale Price (for cold drink machines)	$200.00
OfficeMiser Sale Price (for snack machines)	$100.00

Savings Analysis

	Before	After	
Cold Drink Machines	$1,897.74	$884.57	Cost of Operation
	11,229	5,234	kWh
		53%	% Energy Savings
Snack Machines	$147.64	$52.73	Cost of Operation
	874	312	kWh
		64%	% Energy Savings

Project Summary

Present kWh	Projected kWh	kWh Savings per Year
12,103	5,546	6,557

Present Cost	Projected Costs	Annual Savings	Per Cent Savings	Total Project Cost	Break Even (Months)
$2,045.38	$937.30	$1,108.08	54%	$700.00	7.6

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$700
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$700
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,108
Total Yearly Savings ($/Yr):	$1,108
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.6
Simple Lifetime ROI	2274.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$16,620
Internal Rate of Return (IRR)	158%
Net Present Value (NPV)	$12,527.23

ECM #8: Window AC Unit Replacement

Description:

Cooling is provided to several classrooms 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. Some of these 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: $0.169/kWh
Typical AC Unit Size: 18,000 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	**Quantity**	**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**
12,000	2	800	8	11	622	0.78	$105	$800	7.6
18,000	2	800	8	11	908	1.14	$154	$1,250	8.1

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,050
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$2,050
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$258
Total Yearly Savings ($/Yr):	$258
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.9
Simple Lifetime ROI	88.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,870
Internal Rate of Return (IRR)	9%
Net Present Value (NPV)	$1,029.99

REM #1: 238.06 kW Solar System

Description:

The Woodrow Wilson Middle School has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 238.06 kilowatt solar array could be installed. The array will produce approximately 275,090 kilowatt-hours annually that will reduce the overall electric usage of the facility by 41.4%.

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}):	238.06
Electric Generation (KWH/Yr):	275,090
Installation Cost ($):	$1,421,766
SREC Revenue ($/Yr):	$52,565
Energy Savings ($/Yr):	$46,490
Total Yearly Savings ($/Yr):	$99,056
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	14.4
Analysis Period Electric Savings ($):	$864,667
Analysis Period SREC Revenue ($):	$761,474
Net Present Value (NPV)	($411,178.43)

V. ADDITIONAL RECOMMENDATIONS

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

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

B. Maintain all weather stripping on windows and doors.

C. Clean all light fixtures to maximize light output.

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

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

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

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

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

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Clifton Public Schools – Woodrow Wilson Middle School

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	$1,090	$2,450	$0	$3,540	$2,180	$0	$2,180	15	$32,700	$0	823.7%	1.6	61.54%	$22,484.70
ECM #2	Lighting Upgrade - Gym/MPR/Aud	$19,800	$11,200	$5,200	$25,800	$4,118	$0	$4,118	15	$61,770	$0	139.4%	6.3	13.61%	$23,360.42
ECM #3	Lighting Upgrade - Exterior	$4,255	$2,000	$0	$6,255	$3,099	$0	$3,099	15	$46,485	$0	643.2%	2.0	49.42%	$30,740.66
ECM #4	Lighting Controls Upgrade	$19,000	$10,200	$3,325	$25,875	$9,090	$0	$9,090	15	$136,350	$0	427.0%	2.8	34.73%	$82,640.83
ECM #5	DDC Controls Upgrade	$649,600	$0	$0	$649,600	$6,585	$0	$6,585	15	$98,775	$0	-84.8%	98.6	-17.65%	($570,988.70)
ECM #6	Condensate Receiver Replacement	$25,000	$11,250	$0	$36,250	$1,714	$0	$1,714	15	$25,710	$0	-29.1%	21.1	-4.02%	($15,788.38)
ECM #7	Vending Miser Controls	$700	$0	$0	$700	$1,108	$0	$1,108	15	$16,620	$0	2274.3%	0.6	158.29%	$12,527.23
ECM #8	Window AC Unit Replacement	$2,050	$0	$0	$2,050	$258	$0	$258	15	$3,870	$0	88.8%	7.9	9.24%	$1,029.99
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	238.06 KW PV System	$1,421,766	$0	$0	$1,421,766	$46,490	$52,565	$99,056	15	$1,485,835	$788,482	4.5%	14.4	0.56%	($239,246.16)

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
15-Clifton BOE - Woodrow Wilson Middle School

Building ID: 3477601
For 12-month Period Ending: February 28, 2013[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: April 11, 2013

Facility
15-Clifton BOE - Woodrow Wilson Middle School
1400 Van Houten Avenue
Clifton, NJ 07011

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

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

Year Built: 1955
Gross Floor Area (ft²): 143,409

Energy Performance Rating[2] (1-100) 68

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,254,030
Natural Gas (kBtu)[4]	4,958,169
Total Energy (kBtu)	7,212,199

Energy Intensity[4]	
Site (kBtu/ft²/yr)	50
Source (kBtu/ft²/yr)	89

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	583

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison	
National Median Site EUI	60
National Median Source EUI	106
% Difference from National Median Source EUI	-16%
Building Type	K-12 School

Stamp of Certifying Professional

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

Meets Industry Standards[5] for Indoor Environmental Conditions:

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	15-Clifton BOE - Woodrow Wilson Middle School	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	K-12 School	Is this an accurate description of the space in question?		☐
Location	1400 Van Houten Avenue, Clifton, NJ 07011	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
Woodrow Wilson (K-12 School)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	143,409 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Open Weekends?	No	Is this building normally open at all on the weekends? This includes activities beyond the work conducted by maintenance, cleaning, and security personnel. Weekend activity could include any time when the space is used for classes, performances or other school or community activities. If the building is open on the weekend as part of the standard schedule during one or more seasons, the building should select ?yes? for open weekends. The ?yes? response should apply whether the building is open for one or both of the weekend days.		☐
Number of PCs	447	Is this the number of personal computers in the K12 School?		☐
Number of walk-in refrigeration/freezer units	0	Is this the total number of commercial walk-in type freezers and coolers? These units are typically found in storage and receiving areas.		☐
Presence of cooking facilities	Yes	Does this school have a dedicated space in which food is prepared and served to students? If the school has space in which food for students is only kept warm and/or served to students, or has only a galley that is used by teachers and staff then the answer is "no".		☐
Percent Cooled	10 %	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	100 %	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Months	10(Optional)	Is this school in operation for at least 8 months of the year?		☐

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

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/08/2013	02/07/2013	73,166.00
12/08/2012	01/07/2013	66,726.00
11/08/2012	12/07/2012	65,686.00
10/08/2012	11/07/2012	49,726.00
09/08/2012	10/07/2012	57,040.00
08/08/2012	09/07/2012	34,880.00
07/08/2012	08/07/2012	27,920.00
06/08/2012	07/07/2012	53,080.00
05/08/2012	06/07/2012	59,886.00
04/08/2012	05/07/2012	41,640.00
03/08/2012	04/07/2012	68,480.00
electric Consumption (kWh (thousand Watt-hours))		**598,230.00**
electric Consumption (kBtu (thousand Btu))		**2,041,160.76**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,041,160.76**
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)
01/13/2013	02/12/2013	14,380.27
12/13/2012	01/12/2013	11,743.12
11/13/2012	12/12/2012	7,026.99
10/13/2012	11/12/2012	1,410.86
09/13/2012	10/12/2012	1,552.69
08/13/2012	09/12/2012	401.91
07/13/2012	08/12/2012	310.46
06/13/2012	07/12/2012	361.18
05/13/2012	06/12/2012	490.56
04/13/2012	05/12/2012	1,157.03
03/13/2012	04/12/2012	2,651.61

gas Consumption (therms)	**41,486.68**
gas Consumption (kBtu (thousand Btu))	**4,148,668.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**4,148,668.00**
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
15-Clifton BOE - Woodrow Wilson Middle School
1400 Van Houten Avenue
Clifton, NJ 07011

Facility Owner
Clifton BOE
745 Clifton Avenue
Clifton, NJ 07013

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

General Information

15-Clifton BOE - Woodrow Wilson Middle School	
Gross Floor Area Excluding Parking: (ft^2)	143,409
Year Built	1955
For 12-month Evaluation Period Ending Date:	February 28, 2013

Facility Space Use Summary

Woodrow Wilson	
Space Type	K-12 School
Gross Floor Area (ft^2)	143,409
Open Weekends?	No
Number of PCs	447
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	Yes
Percent Cooled	10
Percent Heated	100
Months °	10
High School?	No
School District °	clifton

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 02/28/2013)	**Baseline** (Ending Date 02/28/2013)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	68	68	75	N/A	50
Energy Intensity					
Site ($kBtu/ft^2$)	50	50	47	N/A	60
Source ($kBtu/ft^2$)	89	89	83	N/A	106
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	583	583	543	N/A	695
$kgCO_2e/ft^2$/year	4	4	4	N/A	5

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.

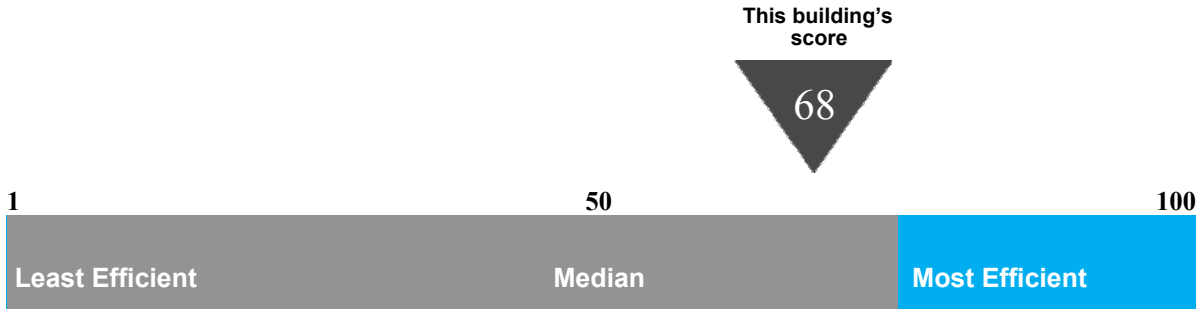
Statement of Energy Performance

2013

15-Clifton BOE - Woodrow Wilson Middle School
1400 Van Houten Avenue
Clifton, NJ 07011

Portfolio Manager Building ID: 3477601

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 89 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

Woodrow Wilson Middle School

AHUs

Tag	UV	RTU#5	RTU#1
Unit Type	Unit Ventilator	Rooftop	Gas Fired H&V
Qty	80	1	1
Location	Classrooms	Roof	Roof
Area Served	Classrooms	-	-
Manufacturer	AAF	Trane	Reznor
Model #	Various	-	-
Serial #	-	-	-
Cooling Type	N/A	DX	N/A
Cooling Capacity (Tons)	N/A	-	N/A
Heating Type	Steam or Hot Water	Gas Fired HX	Gas Fired HX
Heating Input (MBH)	-	-	-
Supply Fan (HP)	-	-	-
Return Fan (HP)	-	-	-
Electrical (V/H/P)	-	-	-
Approx Age	-	-	-
ASHRAE Service Life	25	25	25
Remaining Life	-	-	-
Comments	New wing UV's have Hot Water Coils. Original Building UV's have Steam Coils	Electrical Disconnect mounted over the unit tag	No Tag

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

AHUs

Tag	RTU#2	RTU#6	RTU#4
Unit Type	Gas Fired H&V	Rooftop	Rooftop
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	-	-	-
Manufacturer	Modine	Trane	Trane
Model #	-	YCD102C3LAAB	Voyager
Serial #	-	M05101054D	-
Cooling Type	N/A	DX R-22	-
Cooling Capacity (Tons)	N/A	10	-
Heating Type	Gas Fired HX	Gas Fired HX	-
Heating Input (MBH)	-	135	-
Supply Fan (HP)	-	2.0	-
Return Fan (HP)	-	-	-
Electrical (V/H/P)	-	208-230/60/3	-
Approx Age	-	16	-
ASHRAE Service Life	25	25	25
Remaining Life	-	9	-
Comments	No Tag		Tag not readable

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

AHUs

Tag	HV-1, 2	HV-3, 4
Unit Type	Heating & Ventilating	Heating & Ventilating
Qty	2	2
Location	Fan Room D	Fan Room C
Area Served	Gymnasium	Auditorium
Manufacturer	Trane	Trane
Model #	-	-
Serial #	-	-
Cooling Type	N/A	N/A
Cooling Capacity (Tons)	N/A	N/A
Heating Type	Steam	Steam
Heating Input (MBH)	-	-
Supply Fan (HP)	-	-
Return Fan (HP)	-	-
Electrical (V/H/P)	-	-
Approx Age	-	-
ASHRAE Service Life	25	25
Remaining Life	-	-
Comments	Both Units are Currently inoperable.	One unit is operating.

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

#N/A

Boilers

Tag	B-1 & B-2	Boilers A thru D	
Unit Type	Packaged Firetube Steam Boiler	Modular Hot Water Boilers	
Qty	2	4	
Location	Boiler Room	Boiler Room	
Area Served	Original Building	Addition	
Manufacturer	Cleaver Brooks	Slant Fin	
Model #	CBI-700-200-015	GGT-1200E	
Serial #	CL105337 & CL105338	-	
Input Capacity (Btu/Hr)	8,165,000	1,200,000 (total)	
Rated Output Capacity (Btu/Hr)	6,695,000	960,000 (total)	
Approx. Efficiency %	82.0%	80.0%	
Fuel	Natural Gas	Natural Gas	
Approx Age	7	16	
ASHRAE Service Life	25	25	
Remaining Life	18	9	
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

#N/A

Domestic Water Heaters

Tag	**DHW-1**		
Unit Type	Tank-Style Domestic HWH		
Qty	1		
Location	Boiler Room		
Area Served	Building Domrstic		
Manufacturer	Ruud		
Model #	GX90-715A		
Serial #	URNG0309P00025		
Size (Gallons)	90		
Input Capacity (MBH/KW)	715 MBH		
Recovery (Gal/Hr)	693.3		
Efficiency %	81%		
Fuel	Nat Gas		
Approx Age	4		
ASHRAE Service Life	10		
Remaining Life	6		
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

#N/A

Pumps

Tag	**HWP-1 & HWP-2**		
Unit Type	Hot Water Pump		
Qty	2		
Location	Boiler Room		
Area Served	Addition Heating		
Manufacturer	Bell and Gossett		
Model #	1-1/2BC 8 BI		
Serial #	-		
Horse Power	3		
Flow	85 GPM 65' HD		
Motor Info	US Electrical Motor		
Electrical Power	230/460 V 3 Ph		
RPM	1765		
Motor Efficiency %	90.2%		
Approx Age	-		
ASHRAE Service Life	15		
Remaining Life	-		
Comments			

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

APPENDIX E

CEG Project #: 9C12066
Facility Name: Woodrow Wilson MS
Address: 1400 Van Houten 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, $
221.11	Main Office	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	$65
221.11	Main Office Hall	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
221.11	VP 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
221.11	Principals 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
221.11	Kittenette	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
612	Vault	2600	Industrial, 100w A19 Lamp	1	100	1	0.10	260	Relamp	26w CFL Lamp	1	26	1	0.03	68	0.07	192	$33	0	No New Controls	0	0.0%	0	$0
221.11	Classroom 201	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	$65
221.11	Classroom 202	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 203	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	$65
221.11	Classroom 204	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 205	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
221.11	Classroom 206	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
221.11	Classroom 207	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
221.11	Classroom 208	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
613	205/07 Prep	2600	Industrial Fixture, 300w A19 Lamp	1	300	2	0.60	1,560	Remove and Return	1x4, 2 Lamp, 28w T8, Elect. Ballast, Surface Mnt., No Lens	2	50	2	0.10	260	0.50	1,300	$220	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	52	$9
221.11	Admin Intern 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
221.11	Classroom 209	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	$65
221.11	Classroom 210	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 211	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	$65
221.11	Classroom 212	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76

			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	Classroom 213	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
221.11	Classroom 214	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 215	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	$65
221.11	Classroom 216	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 218	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 220	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Classroom 222	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Fan Room D	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
221.11	Fan Room C	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
613	Custodial Closet	2600	Industrial Fixture, 300w A19 Lamp	1	300	1	0.30	780	Remove and Return	1x4, 2 Lamp, 28w T8, Elect. Ballast, Surface Mnt., No Lens	2	50	1	0.05	130	0.25	650	$110	0	No New Controls	0	0.0%	0	$0
221.11	Boy's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing to Remain	Existing to Remain	2	62	0	0.12	372	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	74	$13
221.11	Girl's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing to Remain	Existing to Remain	2	62	0	0.12	372	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	74	$13
220	2nd Floor Corridor	3000	(2) 6"x4 Tandom, 2 Lamp, 32w T8 Elec Ballast, Surface Mount, Fin Diffuser	2	62	31	1.92	5,766	Existing to Remain	Existing to Remain	2	62	0	1.92	5,766	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21	2nd Floor Corridor	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	16	1.38	4,128	Existing to Remain	Existing to Remain	3	86	0	1.38	4,128	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21	Classroom 257	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	6	0.52	1,342	Existing to Remain	Existing to Remain	3	86	0	0.52	1,342	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	268	$45
232.21	Classroom 258	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	9	0.77	2,012	Existing to Remain	Existing to Remain	3	86	0	0.77	2,012	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	402	$68
232.21	Classroom 259	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	6	0.52	1,342	Existing to Remain	Existing to Remain	3	86	0	0.52	1,342	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	268	$45
232.21	Classroom 249	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	671	$113
232.21	Classroom 273	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	9	0.77	2,012	Existing to Remain	Existing to Remain	3	86	0	0.77	2,012	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	402	$68
232.21	Boy's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
232.21	Girl's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
232.21	Classroom 250	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91

			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, $
232.21	Classroom 251	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 252	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 253	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 254	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 255	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 256	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	4	0.34	894	Existing to Remain	Existing to Remain	3	86	0	0.34	894	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$30
232.21	Classroom 262	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	16	1.38	3,578	Existing to Remain	Existing to Remain	3	86	0	1.38	3,578	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	716	$121
242.21	262 Prep Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	4	107	3	0.32	835	Existing to Remain	Existing to Remain	4	107	0	0.32	835	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	167	$28
232.21	Girl's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
232.21	Boy's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
232.21	Classroom 150	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 151	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 152	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 153	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 154	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 155	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 156	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Classroom 157	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	12	1.03	2,683	Existing to Remain	Existing to Remain	3	86	0	1.03	2,683	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	537	$91
232.21	Girl's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
232.21	Boy's Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	516	Existing to Remain	Existing to Remain	3	86	0	0.17	516	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	103	$17
770	MPR/Gym	3000	400w MH, Lo-Bay	1	465	20	9.30	27,900	Remove and Return	6 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	230	20	4.60	13,800	4.70	14,100	$2,383	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	2,760	$466
232.21	MPR/Gym	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	1	0.09	258	Existing to Remain	Existing to Remain	3	86	0	0.09	258	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, $
242.11	Exercise Room	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	4	107	4	0.43	1,113	Existing to Remain	Existing to Remain	4	107	0	0.43	1,113	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	223	$38
231.31	Boy's Locker Room	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Surface Lens	3	86	14	1.20	3,130	Existing to Remain	Existing to Remain	3	86	0	1.20	3,130	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	626	$106
232.21	LR Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	1	0.09	258	Existing to Remain	Existing to Remain	3	86	0	0.09	258	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Boy's Locker Room	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	7	0.43	1,128	Existing to Remain	Existing to Remain	2	62	0	0.43	1,128	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	226	$38
232.21	LR Restroom	3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	1	0.09	258	Existing to Remain	Existing to Remain	3	86	0	0.09	258	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21	PE Office - Boy's	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	447	Existing to Remain	Existing to Remain	3	86	0	0.17	447	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
769	Gym	3000	400w MH, Hi-Bay	1	465	24	11.16	33,480	Remove and Return	1x4, 6 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	360	24	8.64	25,920	2.52	7,560	$1,278	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	5,184	$876
221.11	Girl's Locker Room	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	7	0.43	1,302	Existing to Remain	Existing to Remain	2	62	0	0.43	1,302	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	260	$44
221.11	LR Restroom	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
232.21	PE Office - Girl's	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	2	0.17	447	Existing to Remain	Existing to Remain	3	86	0	0.17	447	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	89	$15
221.11	LR Restroom	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
231.31	Girl's Locker Room	3000	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Surface Lens	3	86	13	1.12	3,354	Existing to Remain	Existing to Remain	3	86	0	1.12	3,354	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	671	$113
221.11	Classroom 120	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	$65
221.11	Nurse	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	193	$33
221.11	Copy/Breakroom	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	CST	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
221.11	Classroom 116	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	$65
221.11	Classroom 114	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	$65
221.11	Classroom 112	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	$65
221.11	Classroom 110	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	$65
221.11	Classroom 107	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	$65
221.11	Classroom 108	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	$65

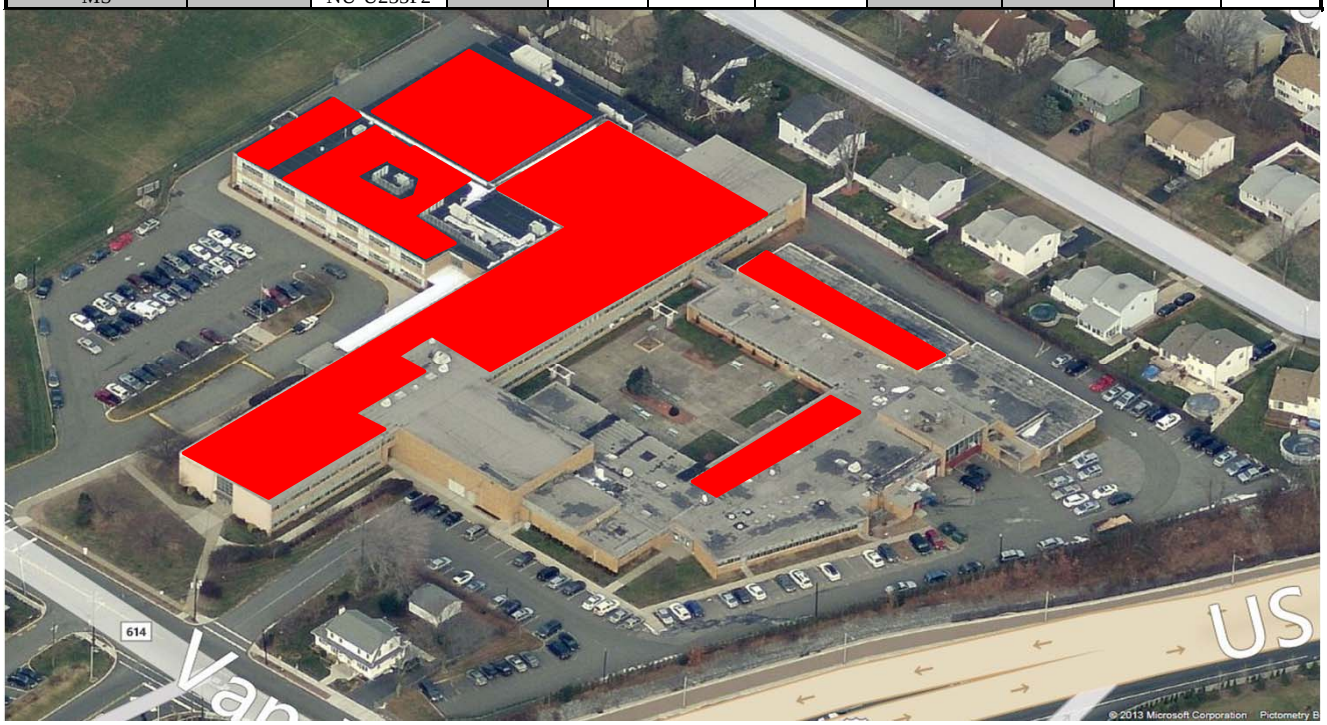
			EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT							RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	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	Classroom 105	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	$65
221.11	Boy's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	4	0.25	744	Existing to Remain	Existing to Remain	2	62	0	0.25	744	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	149	$25
221.11	Girl's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	3	0.19	558	Existing to Remain	Existing to Remain	2	62	0	0.19	558	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	112	$19
613	Custodial Closet	1200	Industrial Fixture, 300w A19 Lamp	1	300	1	0.30	360	Remove and Return	1x4, 2 Lamp, 28w T8, Elect. Ballast, Surface Mnt., No Lens	2	50	1	0.05	60	0.25	300	$51	0	No New Controls	0	0.0%	0	$0
221.11	Classroom 101	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	$65
221.11	Classroom 102	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	$65
221.11	Classroom 103	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	$65
221.11	Classroom 104	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	$65
142.15	Guidance (5)	2600	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Lens	4	156	1	0.16	406	Reballast & Relamp, Add Reflector, Delamp 1	Specular Reflector, Sylvania Lamp FO28/841/SS/ECO; retrofit	3	72	1	0.07	187	0.08	218	$37	0	No New Controls	0	0.0%	0	$0
222.15		2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., White Lens	2	62	10	0.62	1,612	Existing to Remain	Existing to Remain	2	62	0	0.62	1,612	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	322	$54
745	Auditorium	2600	250w MH, Prismatic Lens	1	295	16	4.72	12,272	Remove and Return	1x4, 4 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	230	16	3.68	9,568	1.04	2,704	$457	0	No New Controls	0	0.0%	0	$0
128.14	Stage	2600	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Surface Mnt., No Lens	2	142	9	1.28	3,323	Reballast & Relamp	(2) 8' Lamps to (4) 4' Lamps - 28w T8, Elect Ballast; retrofit	4	98	9	0.88	2,293	0.40	1,030	$174	0	No New Controls	0	0.0%	0	$0
128.14	Insturmental	2600	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Surface Mnt., No Lens	2	142	6	0.85	2,215	Reballast & Relamp	(2) 8' Lamps to (4) 4' Lamps - 28w T8, Elect Ballast; retrofit	4	98	6	0.59	1,529	0.26	686	$116	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	306	$52
221.11	Choral	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.31	Music Storage	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	2	62	6	0.37	446	Existing to Remain	Existing to Remain	2	62	0	0.37	446	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Men's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	186	Existing to Remain	Existing to Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.15		3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., White Lens	2	62	1	0.06	186	Existing to Remain	Existing to Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
221.11	Women's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	186	Existing to Remain	Existing to Remain	2	62	0	0.06	186	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
222.15		3000	2x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., White 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
222.15	Media Center	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., White Lens	2	62	68	4.22	10,962	Existing to Remain	Existing to Remain	2	62	0	4.22	10,962	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	4	20.0%	2,192	$371
221.31	CST 158	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant 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
221.11	Cafeteria	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	51	3.16	8,221	Existing to Remain	Existing to Remain	2	62	0	3.16	8,221	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	3	20.0%	1,644	$278

			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, $
221.21	Kitchen	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, recessed Mnt., Prismatic Lens	2	62	42	2.60	7,812	Existing to Remain	Existing to Remain	2	62	0	2.60	7,812	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	1,562	$264
617	Kitchen Hood	2600	Hood Light w/Globe & Cage, 100w A Lamp	1	100	6	0.60	1,560	Relamp	26w CFL Lamp	1	26	6	0.16	406	0.44	1,154	$195	0	No New Controls	0	0.0%	0	$0
221.11	Boy's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	4	0.25	744	Existing to Remain	Existing to Remain	2	62	0	0.25	744	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	149	$25
221.11	Girl's Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	4	0.25	744	Existing to Remain	Existing to Remain	2	62	0	0.25	744	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	149	$25
612	Cust Closet	2600	Industrial, 100w A19 Lamp	1	100	1	0.10	260	Relamp	26w CFL Lamp	1	26	1	0.03	68	0.07	192	$33	0	No New Controls	0	0.0%	0	$0
221.11	Faculty Lounge	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	$65
221.11	Faculty Lounge Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing to Remain	Existing to Remain	2	62	0	0.12	372	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	74	$13
221.11	Faculty Lounge Restroom	3000	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	2	0.12	372	Existing to Remain	Existing to Remain	2	62	0	0.12	372	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	74	$13
221.11	Classroom 132	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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
221.11	Custodial Closet	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing to Remain	Existing to Remain	2	62	0	0.06	74	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.11	Classroom 126 B	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	4	107	3	0.32	835	Existing to Remain	Existing to Remain	4	107	0	0.32	835	0.00	0	$0	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	167	$28
222.11	Classroom 121	2600	2x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	21	1.30	3,385	Existing to Remain	Existing to Remain	2	62	0	1.30	3,385	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	677	$114
222.11	Classroom 122	2600	2x4, 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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	516	$87
242.35	Classroom 123	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., White Lens	4	107	21	2.25	5,842	Existing to Remain	Existing to Remain	4	107	0	2.25	5,842	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	1,168	$197
222.11	Classroom 124	2600	2x4, 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	$65
242.35	Classroom 125	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., White Lens	4	107	16	1.71	4,451	Existing to Remain	Existing to Remain	4	107	0	1.71	4,451	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	890	$150
222.11	Classroom 126	2600	2x4, 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	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	451	$76
242.35	Classroom 127	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., White Lens	4	107	20	2.14	5,564	Existing to Remain	Existing to Remain	4	107	0	2.14	5,564	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	1,113	$188
242.35	Classroom 129	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., White Lens	4	107	40	4.28	11,128	Existing to Remain	Existing to Remain	4	107	0	4.28	11,128	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	2,226	$376
242.35	Classroom 131	2600	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., White Lens	4	107	40	4.28	11,128	Existing to Remain	Existing to Remain	4	107	0	4.28	11,128	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	2,226	$376
612	129/31 Storage	1200	Industrial, 100w A19 Lamp	1	100	2	0.20	240	Relamp	26w CFL Lamp	1	26	2	0.05	62	0.15	178	$30	0	No New Controls	0	0.0%	0	$0
221.31	131 Prep	2600	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant 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

			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, $
613	Boiler Room	4000	Industrial Fixture, 300w A19 Lamp	1	300	6	1.80	7,200	Remove and Return	1x4, 2 Lamp, 28w T8, Elect. Ballast, Surface Mnt., No Lens	2	50	6	0.30	1,200	1.50	6,000	$1,014	0	No New Controls	0	0.0%	0	$0
613	Boiler Room Entrance	4000	Industrial Fixture, 300w A19 Lamp	1	300	1	0.30	1,200	Remove and Return	1x4, 2 Lamp, 28w T8, Elect. Ballast, Surface Mnt., No Lens	2	50	1	0.05	200	0.25	1,000	$169	0	No New Controls	0	0.0%	0	$0
221.11	Receiving	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	9	0.56	670	Existing to Remain	Existing to Remain	2	62	0	0.56	670	0.00	0	$0	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	134	$23
220	1st Floor Corridor	3000	(2) 6"x4 Tandom, 2 Lamp, 32w T8 Elec Ballast, Surface Mount, Fin Diffuser	2	62	68	4.22	12,648	Existing to Remain	Existing to Remain	2	62	0	4.22	12,648	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21		3000	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	15	1.29	3,870	Existing to Remain	Existing to Remain	3	86	0	1.29	3,870	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.11		3000	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	4	107	10	1.07	3,210	Existing to Remain	Existing to Remain	4	107	0	1.07	3,210	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
242.11	Vestibule	3000	2x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	4	107	4	0.43	1,284	Existing to Remain	Existing to Remain	4	107	0	0.43	1,284	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
227.21	Stairwell 1	8760	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	73	2	0.15	1,279	Existing to Remain	Existing to Remain	2	73	0	0.15	1,279	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21	Stairwell 2	8760	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	3	0.26	2,260	Existing to Remain	Existing to Remain	3	86	0	0.26	2,260	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
231.11		8760	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Surface Lens	3	86	2	0.17	1,507	Existing to Remain	Existing to Remain	3	86	0	0.17	1,507	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
232.21	Stairwell 3	8760	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	3	0.26	2,260	Existing to Remain	Existing to Remain	3	86	0	0.26	2,260	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
231.11		8760	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Surface Lens	3	86	2	0.17	1,507	Existing to Remain	Existing to Remain	3	86	0	0.17	1,507	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
227.21	Stairwell 4	8760	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	2	73	2	0.15	1,279	Existing to Remain	Existing to Remain	2	73	0	0.15	1,279	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
231.11		8760	1x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Surface Lens	3	86	1	0.09	753	Existing to Remain	Existing to Remain	3	86	0	0.09	753	0.00	0	$0	0	No New Controls	0	0.0%	0	$0
725	Exterior	4000	150w HPS Wallpack	1	188	8	1.50	6,016	Remove and Return	40w LED Wallpack	1	40	8	0.32	1,280	1.18	4,736	$800	0	No New Controls	0	0.0%	0	$0
726		4000	175w MH Wallpack	1	195	1	0.20	780	Remove and Return	40w LED Wallpack	1	40	1	0.04	160	0.16	620	$105	0	No New Controls	0	0.0%	0	$0
713		4000	100w HPS Wallpack	1	125	5	0.63	2,500	Remove and Return	28w LED Wallpack	1	28	5	0.14	560	0.49	1,940	$328	0	No New Controls	0	0.0%	0	$0
740		4000	500w Incandescent Flood	1	500	6	3.00	12,000	Remove and Return	60w LED Wallpack	1	40	6	0.24	960	2.76	11,040	$1,866	0	No New Controls	0	0.0%	0	$0
	TOTAL					**1,489**	**137**	**387,715**					**117**	**120**	**332,114**	**17**	**55,601**	**$9,397**			**116**	**21**	**53,932**	**$9,114**

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
Woodrow Wilson MS	24800	SHARP NU-U235F2	1013	17.5	17,769	238.06	275,090	192.8	42,445	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 - Woodrow Wilson MS**
Location: **Clifton, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$1,421,766
Annual kWh Production	275,090
Annual Energy Cost Reduction	$46,490
Average Annual SREC Revenue	$52,565

Simple Payback: **14.35** Years

Life Cycle Cost Analysis

Analysis Period (years): 15
Discount Rate: 3%
Average Energy Cost ($/kWh) **$0.169**
Financing Rate: 6.00%
Financing %: 100%
Maintenance Escalation Rate: 3.0%
Energy Cost Escalation Rate: 3.0%
Average SREC Value ($/kWh) $0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	275,090	$46,490	$0	$68,773	$83,665	$60,307	($28,709)	($28,709)
2	$0	273,715	$47,885	$0	$68,429	$79,946	$64,026	($27,659)	($56,368)
3	$0	272,346	$49,321	$0	$68,086	$75,997	$67,975	($26,564)	($82,932)
4	$0	270,984	$50,801	$0	$67,746	$71,804	$72,168	($25,425)	($108,357)
5	$0	269,629	$52,325	$2,777	$67,407	$67,353	$76,619	($27,017)	($135,374)
6	$0	268,281	$53,895	$2,763	$53,656	$62,627	$81,345	($39,184)	($174,558)
7	$0	266,940	$55,512	$2,749	$53,388	$57,610	$86,362	($37,822)	($212,380)
8	$0	265,605	$57,177	$2,736	$53,121	$52,284	$91,688	($36,410)	($248,789)
9	$0	264,277	$58,892	$2,722	$52,855	$46,629	$97,343	($34,946)	($283,736)
10	$0	262,956	$60,659	$2,708	$39,443	$40,625	$103,347	($46,578)	($330,314)
11	$0	261,641	$62,479	$2,695	$39,246	$34,250	$109,722	($44,942)	($375,255)
12	$0	260,333	$64,353	$2,681	$39,050	$27,483	$116,489	($43,250)	($418,506)
13	$0	259,031	$66,284	$2,668	$38,855	$20,298	$123,674	($41,502)	($460,007)
14	$0	257,736	$68,272	$2,655	$25,774	$12,670	$131,302	($52,581)	($512,588)
15	$0	256,447	$70,321	$2,641	$25,645	$4,572	$139,400	($50,648)	($563,236)
	Totals:	3,985,010	$864,667	$29,797	$761,474	$737,815	$1,421,766	($563,236)	($3,991,108)

Net Present Value (NPV) **($411,178)**

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. $0.170	COND LOSS QT/MIN	ANNUAL HTG $ SAV	**TOTAL $ ENERGY SAV (E&G)**	EQUIP.& INST. COST	TOTAL COST NOTE 2
CP-x	COND. PUMP		5	84.0%	3	4,322	89.5%	4,056	266	$45	1.00	$1,668	$1,714	$25,000	$36,250
TOTALS=										**$45**		**$1,668**	**$ 1,714**		**$36,250**

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 $.87/THERM AND 70% EFFICIENT BOILER PLANT