

EAST ORANGE SCHOOL DISTRICT

GORDON PARKS ACADEMY

**99 GREENWOOD AVENUE
EAST ORANGE, NEW JERSEY 07017**

FACILITY ENERGY REPORT

TABLE OF CONTENTS

I.	HISTORIC ENERGY CONSUMPTION/COST.....	2
II.	FACILITY ENERGY USE INDEX (EUI).....	9
III.	FACILITY DESCRIPTION	11
IV.	MAJOR EQUIPMENT LIST	13
V.	ENERGY CONSERVATION MEASURES	14
VI.	ADDITIONAL RECOMMENDATIONS	39

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

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	Direct Energy

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	General Service Gas - Heating
Third Party Supplier:	South Jersey Energy Co.

Fuel Oil Utility Provider:	National Terminal, Inc.
Utility Rate Structure:	Time of Delivery Price

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.

The oil usage profile shows the actual oil consumption for the facility. The oil provider measures consumption in gallons. One Gallon of #2 oil is equivalent to 140,000 BTUs of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY			
Utility Provider: PSEG Rate: GLP Meter No: 1375305 Account No: 65 195 517 08 Third Party Utility Provider: Direct Energy TPS Meter / Acct No: -			
MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Apr-14	20,880	87.3	\$3,189
May-14	18,690	80.1	\$3,609
Jun-14	17,490	75.6	\$3,369
Jul-14	10,080	31.5	\$1,802
Aug-14	13,470	72.9	\$2,788
Sep-14	19,230	82.2	\$2,917
Oct-14	18,810	84.0	\$2,934
Nov-14	21,450	84.0	\$2,194
Dec-14	19,290	86.7	\$2,939
Jan-15	21,240	85.5	\$3,193
Feb-15	21,060	86.7	\$3,174
Mar-15	18,000	76.0	\$2,933
Totals	219,690	87.3 Max	\$35,040
AVERAGE DEMAND 77.7 KW average AVERAGE RATE \$0.159 \$/kWh			

Figure 1
Electricity Usage Profile

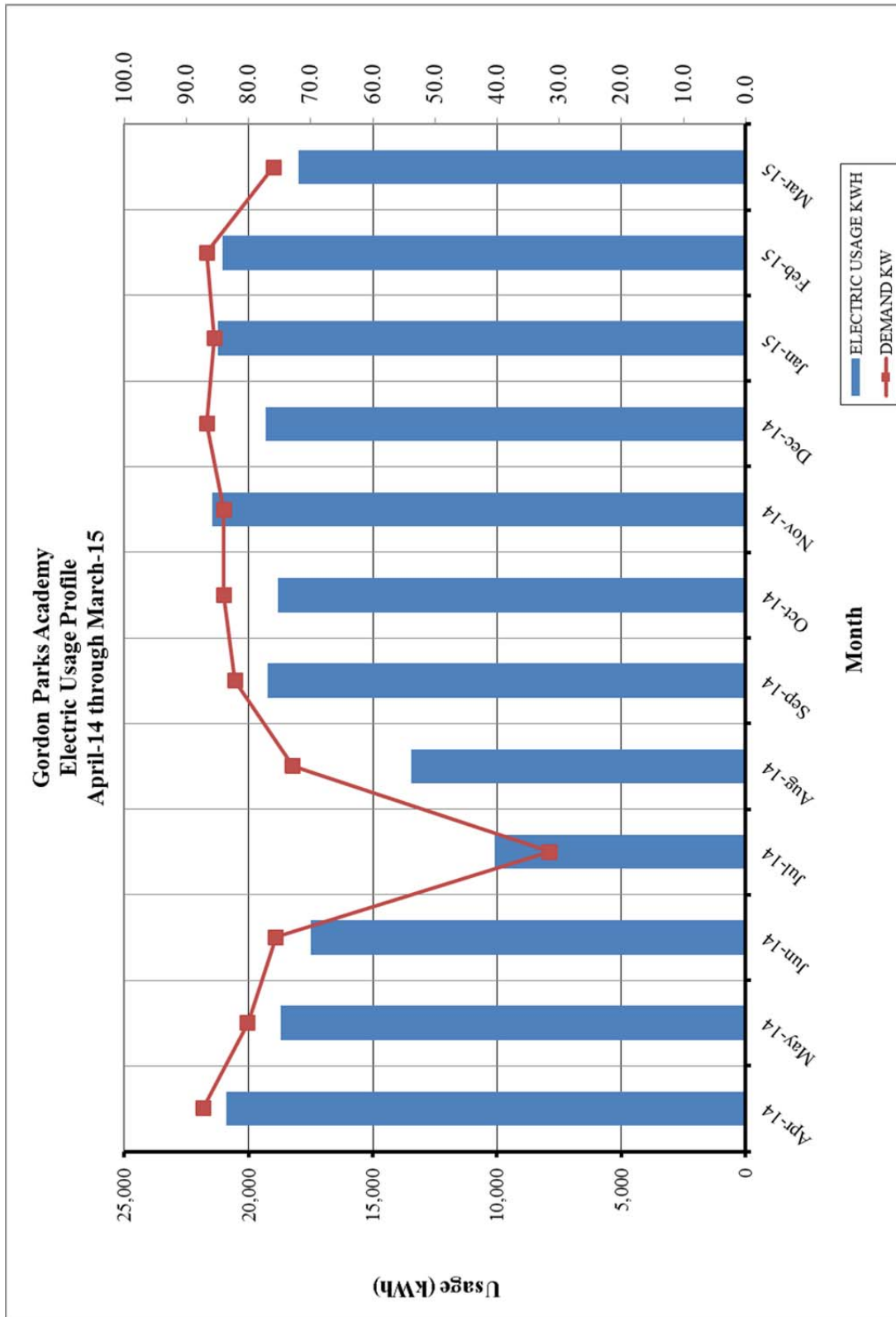


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSEG Rate: GSG (HTG) Meter No: 1647974 Account No: 65 195 517 08 Third Party Utility Provider: South Jersey Energy TPS Meter No: -		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
May-14	32.66	\$21.11
Jun-14	19.92	\$27.63
Jul-14	6.29	\$16.01
Aug-14	17.86	\$25.20
Sep-14	122.21	\$106.83
Oct-14	109.58	\$105.36
Nov-14	109.58	\$105.36
Dec-14	124.55	\$135.28
Jan-15	239.83	\$231.02
Feb-15	248.00	\$230.92
Mar-15	43.40	\$24.38
Apr-15	457.30	\$395.37
TOTALS	1,531.17	\$1,424.46
AVERAGE RATE:	\$0.93	\$/THERM

Figure 2
Natural Gas Usage Profile

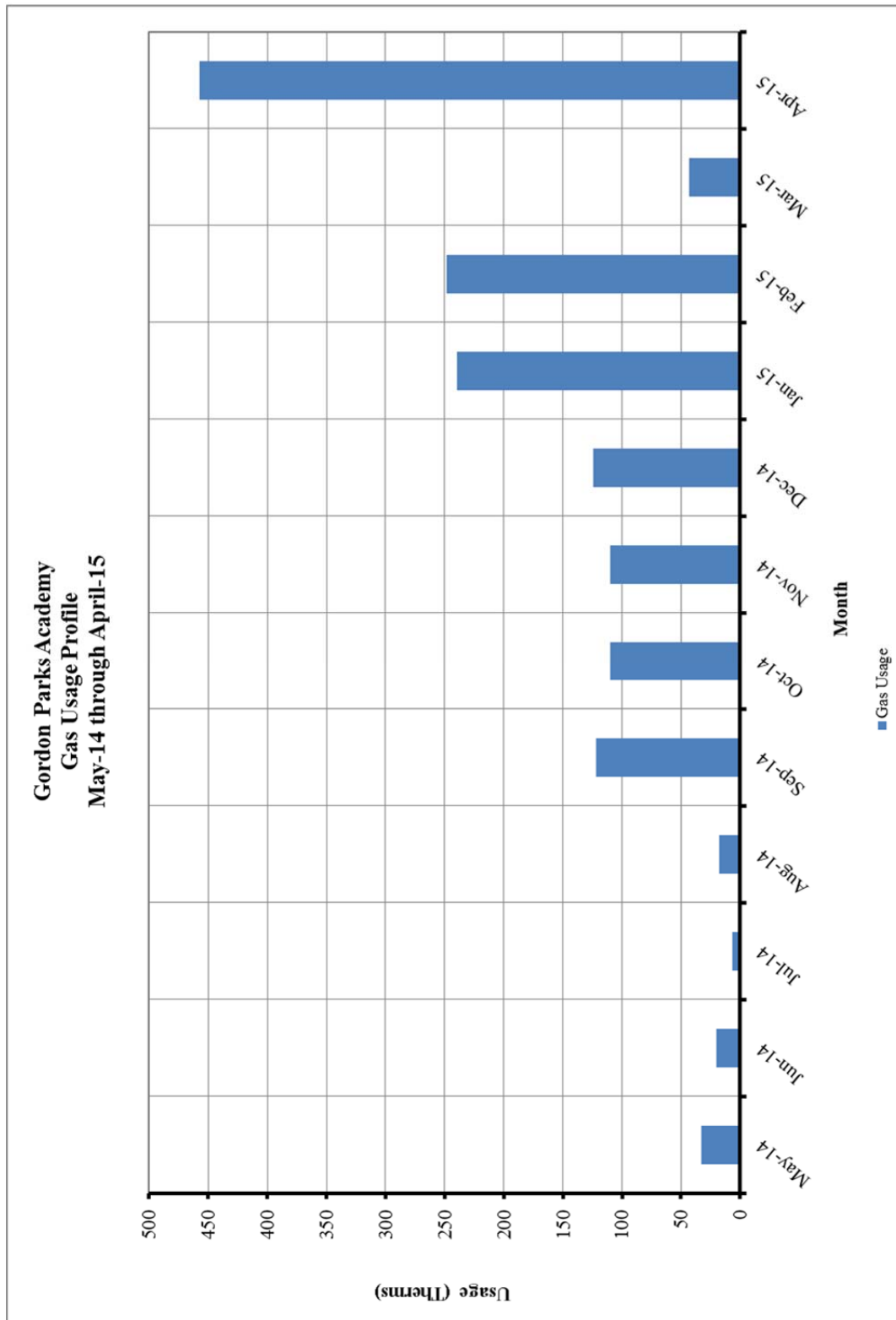
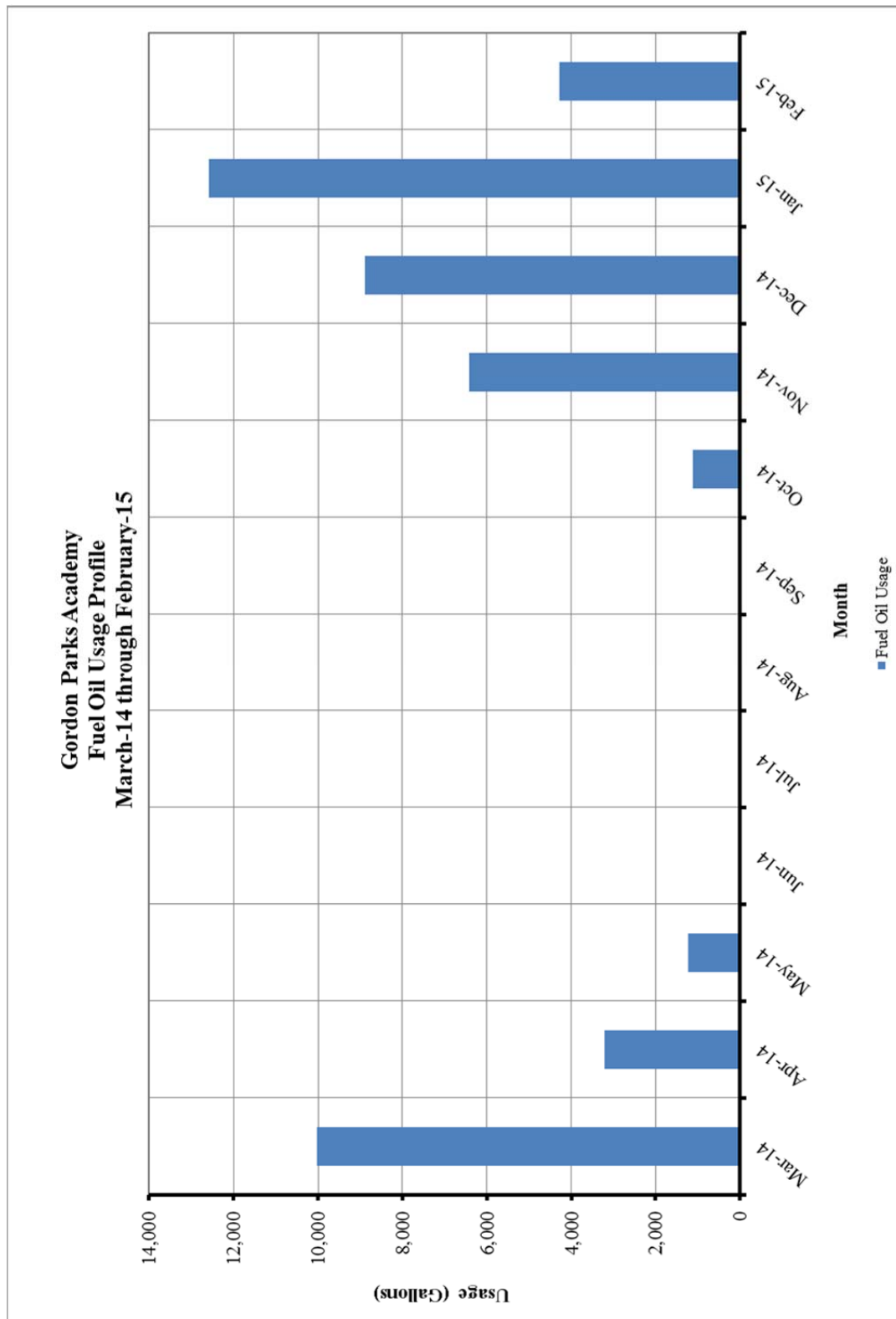


Table 3
Fuel Oil Billing Data

FUEL OIL USAGE SUMMARY		
Utility Provider: National Terminal, Inc. Point of Delivery ID: 100011 Rate: Based on Time of Delivery Price		
MONTH OF USE	CONSUMPTION (GALLONS)	TOTAL BILL
Mar-14	10,026.00	\$33,449.91
Apr-14	3,206.60	\$9,920.37
May-14	1,224.60	\$11,596.32
Jun-14	0.00	\$0.00
Jul-14	0.00	\$0.00
Aug-14	0.00	\$0.00
Sep-14	0.00	\$0.00
Oct-14	1,110.90	\$2,927.96
Nov-14	6,408.00	\$17,042.80
Dec-14	8,879.50	\$18,781.89
Jan-15	12,580.00	\$26,383.77
Feb-15	4,280.00	\$9,562.34
TOTALS	47,715.60	\$129,665.37
AVERAGE RATE: \$2.72 \$/Gallon		

Figure 3
Fuel Oil Usage Profile



II. FACILITY ENERGY USE INDEX (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. Building Benchmarking data is collected and analyzed within the Commercial Building Energy Consumption Survey (CBECS), performed by the Energy and Information Administration (EIA). Building data is grouped by function types and tabulated, from which a median site and source energy intensity is determined. The national median or PEER Group Comparable in this instance is the middle value of the national population meaning half the buildings use more energy, and half use less. The PEER Group EUI allows us to compare the relative efficiency of the audited building to that of an average building with the same or similar primary function (i.e. group type).

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that **source energy** is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$\text{Building Site EUI} = \frac{(\text{Electric Usage in kBtu} + \text{Fuel Usage in kBtu})}{\text{Building Square Footage}}$$

$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Fuel Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

Table 3
Energy Use Index Summary

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	219,690.0			750,022	3.140	2,355,068
NATURAL GAS		1,531.2		153,117	1.050	160,772
FUEL OIL			47,715.6	6,632,468	1.010	6,698,793
TOTAL				7,535,607		9,214,634
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document.						
AUDITED BUILDING				PEER COMPARISON		
BUILDING TYPE	K-12 School			K-12 School		
BUILDING AREA	50,000	SQUARE FEET				
BUILDING SITE EUI	150.71	kBtu/SF/YR			58.2	kBtu/SF/YR
BUILDING SOURCE EUI	184.29	kBtu/SF/YR			141.4	kBtu/SF/YR
		30%		Less Efficient than PEER Comparison		

III. FACILITY DESCRIPTION

The Gordon Parks Academy is located at 99 Greenwood Avenue in East Orange, New Jersey. This 50,000 SF facility was originally built in 1960. The building is three stories with a basement and consists of classrooms, offices, an auditorium, a stage, a cafeteria, an art room, restrooms, and small kitchen.

Occupancy Profile

The school is in use 8:00 am till 3:00 pm, 5 days a week, with staff staying after hours for cleaning and some student activities. There are approximately 57 employees and 305 students that occupy the facility.

Building Envelope

Exterior walls for the building are masonry brick faced with a concrete block construction. The windows throughout the facility are in average condition. Typical windows are single-pane with aluminum frames. The roof on the original building portion of the building is a A-Frame style truss system roof with tar shingles overtop sheathing. The roof on the addition is a flat built up roof.

HVAC Systems

The Gordon Parks Academy is centrally heated, but does not have a central air conditioning system. Air conditioning is supplied in select areas of the building through window air conditioning units and split systems.

The main boiler plant consists of two (2) cast iron sectional steam boilers manufactured by HB Smith. One of the boilers was recently installed and is currently the primary boiler, with the older boiler as a backup. In addition there are two (2) steam boilers demolished in place that no longer operate. The boilers are dual fuel capable, and both appear to have a natural gas connection; however each is operated on fuel oil. The newest boiler is rated at 3,844 MBH input and output of 3,031 MBH. The older HB Smith boiler is rated at 4,625 MBH input with a net steam output of 2,872 MBH. There is one condensate return station in the boiler room with two $\frac{3}{4}$ HP motors, and a boiler feed water tank with three $\frac{1}{2}$ HP motors.

The Auditorium and Stage are conditioned by a single heating and ventilating unit located on the stage. The unit is manufactured by Carrier with a 3 horsepower supply fan motor.

The classrooms and cafeteria are conditioned by heating only unit ventilators with steam heating coils and supplemental heat from steam radiators.

The Media Center has steam radiators and unit ventilators for heating, and a wall mounted split system for cooling. The split system is a Sanyo wall unit with 3 tons of cooling capacity.

The gymnasium is heating only by two steam unit heaters wall hung approximately 10 foot from the floor.

Exhaust System

The school facility has some general exhaust fans located on the roof with fractional horsepower motors.

HVAC System Controls

The building is controlled by a pneumatic system attached to an old Johnson Control panel operating off a time clock. Rooms have pneumatic thermostats with limited occupant controllability. The compressor for the control system is located in the boiler room and has a single 1 horsepower motor.

Window air conditioners and split systems are controlled through on board controls, or separate thermostats.

Domestic Hot Water

Domestic hot water for the building is supplied by a single natural gas fired Rheem water heater. The unit is rated at 75 MBH with a 75 gallon storage tank. The unit has an estimated efficiency of 80% based on input and recovery ratings.

Plumbing System

The Gordon Parks Academy utilizes sinks rated at 2.2 gallons per minute. Additionally, water closets and urinals located in the restroom areas have a rating of 1.6 and 1.0 gallons per flush, respectively.

Kitchen Equipment

The kitchen has a single Vulcan electric oven rated at 25 kilowatts. There are three reach-in refrigerators for food storage and a chest refrigerator for dairy.

Miscellaneous Equipment

Typical classrooms each had three to four computers, if not more, along with a standard television, and smart board system.

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.

IV. 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.

V. 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	Interior Lighting Upgrade	\$62,512	\$9,705	6.4	132.9%
ECM #2	Exterior Lighting Upgrade	\$516	\$114	4.5	231.4%
ECM #3	Lighting Controls	\$970	\$78	12.4	20.6%
ECM #4	Oil to Natural Gas Conversion	\$10,000	\$67,661	0.1	10049.2%
ECM #5	DDC Controls	\$150,000	\$21,564	7.0	115.6%
ECM #6	Steam Trap Replacement	\$22,000	\$14,528	1.5	890.5%
ECM #7	Window Replacement	\$283,000	\$4,107	68.9	-63.7%
ECM #8	Appliance Replacement	\$1,300	\$99	13.1	14.2%
ECM #9	Water Conservation	\$750	\$642	1.2	1184.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	28 kW Solar Array	\$131,962	\$10,483	12.6	19.2%

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)	FUEL OIL (GALLONS)
ECM #1	Interior Lighting Upgrade	36.8	61,036	0	0
ECM #2	Exterior Lighting Upgrade	0.2	720	0	0
ECM #3	Lighting Controls	0.0	488	0	0
ECM #4	Oil to Natural Gas Conversion	0.0	0	-66,802	47,716
ECM #5	DDC Controls	0.0	13,181	0	7,157
ECM #6	Steam Trap Replacement	0.0	0	0	5,341
ECM #7	Window Replacement	0.0	0	0	1,510
ECM #8	Appliance Replacement	0.0	621	0	0
ECM #9	Water Conservation	0.0	0	279	0
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION			
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)	FUEL OIL (GALLONS)
REM #1	28 kW Solar Array	25.5	33,760	0	0

Table 3
ECM Emissions Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	GREENHOUSE GAS EMISSIONS REDUCTION		
		CO ₂ EMISSIONS (LBS)	NO _x EMISSIONS (LBS)	SO ₂ EMISSIONS (LBS)
ECM #1	Interior Lighting Upgrade	92,775	171	397
ECM #2	Exterior Lighting Upgrade	1,094	2	5
ECM #3	Lighting Controls	742	1	3
ECM #4	Oil to Natural Gas Conversion	287,255	(615)	0
ECM #5	DDC Controls	180,352	37	86
ECM #6	Steam Trap Replacement	119,638	0	0
ECM #7	Window Replacement	33,824	0	0
ECM #8	Appliance Replacement	944	2	4
ECM #9	Water Conservation	3,264	3	0
Notes: A. Emissions Reduction based on NJCEP published factors for electric & gas.				

Table 4
Facility Project Summary

FACILITY PROJECT SUMMARY TABLE					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Interior Lighting Upgrade	\$9,705	\$72,007	\$9,495	\$62,512	6.4
Exterior Lighting Upgrade	\$114	\$816	\$300	\$516	4.5
Lighting Controls	\$78	\$1,050	\$80	\$970	12.4
Oil to Natural Gas Conversion	\$67,661	\$10,000	\$0	\$10,000	0.1
DDC Controls	\$21,564	\$150,000	\$0	\$150,000	7.0
Steam Trap Replacement	\$14,528	\$22,000	\$0	\$22,000	1.5
Window Replacement	\$4,107	\$283,000	\$0	\$283,000	68.9
Appliance Replacement	\$99	\$1,300	\$0	\$1,300	13.1
Water Conservation	\$642	\$750	\$0	\$750	1.2
Total Project	\$118,498	\$540,923	\$9,875	\$531,048	4.5

Note the measure totals in this table do not take into account interactive effects of measures; see Method of Analysis Section III in Executive Report for further explanation.

This project does not qualify for additional incentives through the Pay for Performance Program; please see the Installation Funding Options section for additional program options.

ECM #1: Interior Lighting Upgrades

Description:

The majority of the interior lighting throughout the Gordon Parks Academy is provided by 1x4 and 2x4 fluorescent fixtures with newer generation 700 Series 32W T8 lamps and T12 lamps in addition to various CFL and incandescent A-lamp bulbs. It is recommended that all fixtures within the building be replaced with LED equivalent tube lamps and screw-in bulbs due to their efficiency and low power usage.

This ECM includes replacing and retrofitting all of the interior lighting throughout the school with new LED type lamps and fixtures. It is recommended that the School District consult with a lighting engineer prior to retrofitting or replacing interior fixtures to ensure code required minimum light levels will be met.

Energy Savings Calculations:

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

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	36.8
Electric Usage Savings (kWh)	61,036
Electric Cost Savings (\$)	\$9,705

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based off RS Means Unit Cost Data and Vendor quotes.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$72,007
NJ Smart Start Equipment Incentive (\$):	\$9,495
Net Installation Cost (\$):	\$62,512
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$9,705
Total Yearly Savings (\$/Yr):	\$9,705
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.4
Simple Lifetime ROI	132.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$145,575
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	\$53,346.16

ECM #2: Exterior Lighting Upgrade

Description:

The exterior lighting at the school includes only exterior building lighting. The exterior of the building is currently lit by pin CFL lamps and metal halide wall packs.

Concord Engineering recommends upgrading only the metal halide wall packs to energy efficient LED wall packs.

This ECM would replace the existing exterior wall packs with equivalent LED lamps and fixtures.

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.

LIGHTING UPGRADE SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	0.2
Electric Usage Savings (kWh)	720
Electric Cost Savings (\$)	\$114

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based off RS Means Unit Cost Data and Vendor quotes.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$816
NJ Smart Start Equipment Incentive (\$):	\$300
Net Installation Cost (\$):	\$516
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$114
Total Yearly Savings (\$/Yr):	\$114
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.5
Simple Lifetime ROI	231.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,710
Internal Rate of Return (IRR)	21%
Net Present Value (NPV)	\$844.92

ECM #3: Interior Lighting Controls Upgrade

Description:

Sometimes lights in a school are left on unnecessarily. In many cases the lights may be left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. In some instances lights might be 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. In addition, daylight control systems can be implemented using daylighting control systems that dim the electric lighting in response to interior daylight levels. The light output of the fluorescent lamps (T8) is varied by using electronic dimming ballasts. Photosensors, typically mounted in the ceiling, are used to measure the quantity of daylight in the space then determine the amount of dimming required to maintain adequate lighting levels in the total space.

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 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.

This ECM includes installation of ceiling or switch-mount sensors for the offices, and restrooms. 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 which can be implemented in this ECM and outlines the proposed lighting/daylighting controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

LIGHTING CONTROLS SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	0.0
Electric Usage Savings (kWh)	488
Electric Cost Savings (\$)	\$78

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based off RS Means Unit Cost Data and Vendor quotes.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,050
NJ Smart Start Equipment Incentive (\$):	\$80
Net Installation Cost (\$):	\$970
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$78
Total Yearly Savings (\$/Yr):	\$78
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.4
Simple Lifetime ROI	20.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,170
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	(\$38.84)

ECM #4 – Fuel Conversion to Natural Gas

Description:

Gordon Parks Academy currently uses fuel oil to fire both boilers at the facility. Concord Engineering recommends converting to natural gas. While the conversion of existing equipment over to natural gas may not save energy, it will reduce energy costs.

This ECM would replace the fuel oil used to fire the boilers with natural gas at Gordon Parks Academy. The existing steam boilers are already fitted with a dual fuel burner and could easily be switch to natural gas by extending piping from the service meter to the boiler. The district will need to contact the utility company to ensure there is adequate gas pressure to accommodate the additional load.

Energy Savings Calculations:

Fuel conversion does not take into account any change in boiler efficiency.

$$\text{Fuel Usage (kBtu)} = \text{Fuel Usage (Units)} \times \text{Fuel Conversion Factor} \left(\frac{\text{Btu}}{\text{Unit}} \right)$$

$$\text{Natural Gas Usage (therm)} = \text{Fuel Usage (kBtu)} \times \frac{1 \text{ therm}}{100 \text{ kBtu}}$$

FUEL CONVERSION ANALYSIS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Description	Fuel Oil	Natural Gas Conversion	
Existing Fuel Oil Usage (Gallons)	47,716	0	
Fuel Oil Conversion (Btu/Gal)	140,000	140,000	
Natural Gas (Btu/therm)	100,000	100,000	
Fuel Usage (kBtu)	6,680,184	6,680,184	
Fuel Oil #2 (\$/Gallon)	\$2.720	\$2.720	
Natural Gas (\$/therm)	\$0.930	\$0.930	
ENERGY SAVINGS CALCULATIONS			
Fuel Oil #2 Usage (Gallons)	47,716	0	47,716
Natural Gas Usage (Therm)	0	66,802	(66,802)
Energy Cost (\$)	\$129,786	\$62,126	\$67,661
COMMENTS:			

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$10,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$10,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$67,661
Total Yearly Savings (\$/Yr):	\$67,661
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.1
Simple Lifetime ROI	10049.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,014,915
Internal Rate of Return (IRR)	677%
Net Present Value (NPV)	\$797,732.63

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

Description:

The building is controlled by a pneumatic system attached to an old Johnson Control panel operating off a time clock. Rooms have pneumatic thermostats with limited occupant controllability. The compressor for the control system is located in the boiler room and has a single 1 horsepower motor. The installation of a DDC system to control the unit ventilators and boilers could yield significant savings through nighttime setback, temperature reset capability, and improvement maintenance response time to outages and breakdowns.

This ECM includes installation of DDC controls on the HVAC equipment in the facility. The system will include new thermostats, and unit ventilator control valves, exhaust fan on/off controllers, a front end computer and main controller. With the communication between the control devices and the new 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. 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 Central DDC system installation 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, outside temperature reset, 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 public school 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 15% of the electricity and 15% for the fuel oil utility used to heat and cool the facility.

The basis for the DDC system expansion is the Andover 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 via implementation of a Digital Energy Management System:

DDC ENERGY MANAGEMENT SYSEYEM CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Pneumatic	Full DDC Controls	
Existing Fuel Oil Usage (Gallons)	47,716	-	
Existing Electricity Usage for HVAC (kWh)	87,876	-	
Energy Savings, Fuel Oil	-	15%	
Energy Savings, Electricity	-	15%	
Fuel Oil Cost (\$/Gallon)	\$2.72	\$2.72	
Electricity Cost (\$/kWh)	\$0.159	\$0.159	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Fuel Oil Usage (Gallons)	47,716	40,558	7,157
Electricity Usage (kWh)	87,876	74,695	13,181
Fuel Oil Cost (\$)	\$129,786	\$110,318	\$19,468
Electricity Cost (\$)	\$13,972	\$11,876	\$2,096
Energy Cost (\$)	\$143,759	\$122,195	\$21,564
COMMENTS:			

Maintenance Savings and Project Costs:

No maintenance cost savings were estimated for this measure.

Project Costs are based off RS Means Unit Cost data and vendor quote information.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$150,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$150,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$21,564
Total Yearly Savings (\$/Yr):	\$21,564
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.0
Simple Lifetime ROI	115.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$323,460
Internal Rate of Return (IRR)	12%
Net Present Value (NPV)	\$107,429.63

ECM #6: STEAM TRAP REPLACEMENT PROGRAM**Description:**

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

This ECM would replace approximately eighty-three (83) balanced pressure thermostatic steam traps. Where repairing is not feasible, the thermostatic traps will be replaced. Schedule 80 piping and extra heavy fittings will be used, and all piping and fittings between the unions will be replaced along with the steam traps. In addition, a complete steam trap survey will be performed along with tagging and implementing a 3-year, revolving, steam trap maintenance program.

Energy Savings Calculations:

STEAM TRAP LOSS CALCULATION							
Steam Trap Sizes	Trap Orifice Diameter (in)	Steam Loss lb/hr (15 PSI)	Quantity of Traps	Estimated Quantity Failed	Annual Steam Loss lbs	Annual Steam Loss Gallons	Cost Savings
3/4" Trap	3/16"	30.70	83	17	583,005	5,341	\$14,528
TOTAL			83	17	583,005	5,341	\$14,528

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$22,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$22,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$14,528
Total Yearly Savings (\$/Yr):	\$14,528
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.5
Simple Lifetime ROI	890.5%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$217,920
Internal Rate of Return (IRR)	66%
Net Present Value (NPV)	\$151,434.32

ECM #7: Window Replacement

Description:

Primarily, Gordon Parks Academy consists of single pane windows with metal frames. The total area of single pane windows for the entire facility is estimated at 3,625 SF. This area was used as the basis for calculating energy savings and formulating a cost estimate.

Older inefficient windows can account for significant energy use through leakage heat loss and conductive heat loss. The age and condition of the windows contribute to the leakage rate of the building. The single pane construction allows higher thermal (conductive) energy loss. These factors lead to increased energy use in the heating season. The heating loss due to single pane glass is combined with heat loss due to poor seals at each operable window. New double pane windows with low E glazing offer a substantial improvement in thermal performance throughout the year.

This ECM includes the replacement of all single pane glass in the facility with double pane windows with low emissivity glass. The proposed windows include reduced outside air leakage. In addition the double pane structure will significantly increase the insulation value compared to the existing single pane window structure.

The basis for this ECM is an ASHRAE 90.1-2007 equivalent window. The windows will be replaced throughout the school classrooms.

Energy Savings Calculations:

Thermal Loss values were calculated for each month based on the average monthly temperature obtained for 2014. The heating period used was October to April.

Thermal Loss Savings (kBtu)

$$= (U_E - U_P) \times \text{Window Area} \times (T_{\text{Indoor}} - T_{\text{Avg Outdoor}}) \times \frac{\text{Hours}}{\text{Month}} \times \frac{1 \text{ kBtu}}{1,000 \text{ Btu}}$$

$$\text{Heating Savings (Therm)} = \text{Thermal Loss Savings (Heating)} \times \frac{1}{\text{Efficiency}} \times \frac{1 \text{ Therm}}{100 \text{ kBtu}}$$

WINDOW REPLACEMENT CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Description:	Existing Single Pane Windows	Double Pane Low-E Windows	
Window (SF)	3,625	3,625	
U-Value (BTU/HR/SF*°F)	1.0	0.45	0.55
Infiltration Rate (CFM/SF)	0.6	0.4	0.20
Indoor Temperature Heating (°F)	70	70	
Average Thermal Loss Rate Heating (BTU/HR)	82,972	37,338	45,635
Heating Degree Days (65°F)	5252	5252	
Thermal Losses Heating (kBtu)	301,455	135,655	165,800
Heating System Efficiency (%)	79.0%	79.0%	
Fuel Oil Cost (\$/Gallon)	\$2.72	\$2.72	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Fuel Oil Usage (Gallons)	2,745	1,235	1,510
Energy Cost Savings (\$)	\$7,467	\$3,360	\$4,107
Comments:	1. Proposed window U-value Based on ASHRAE 90.1 - 2007 2. Savings Based on Avg. Monthly Temperature for 2014		

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$283,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$283,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$4,107
Total Yearly Savings (\$/Yr):	\$4,107
Estimated ECM Lifetime (Yr):	25
Simple Payback	68.9
Simple Lifetime ROI	-63.7%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$102,675
Internal Rate of Return (IRR)	-7%
Net Present Value (NPV)	(\$211,484.20)

ECM #8: Refrigerator Replacement

Description:

There is a residential style refrigerator located in the teacher's lounge and nurse's office. These units are older models that are not nearly as energy efficient as one manufactured today.

The proposed replacement is a one-for-one with a unit of similar size and dimensions that has the most up-to-date Energy Star Rating. The models selected are manufactured by Frigidaire.

Energy Savings Calculations:

ENERGY STAR REFRIGERATOR CALCULATION			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Quantity	2	2	
Manufacturer	Electrolux, RCA	Frigidaire	
Type	Top Freezer	Top Freezer	
Model	FFHT1814Q, FFHT1514Q	FFHT1814QW	
Size (Cu-Ft)	18, 14	18, 14	
Electric Rate (\$/kWh)	\$0.159	\$0.159	
ENERGY SAVINGS CALCULATIONS			
Electric Usage (kWh)	1,320	699	621
Energy Cost (\$)	\$210	\$111	\$99
COMMENTS:	Calculations based Energy Star Website http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator		

Maintenance Savings & Project Costs:

No maintenance cost savings were estimated for this measure

The cost estimate is based on vendor quote information.

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,300
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$1,300
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$99
Total Yearly Savings (\$/Yr):	\$99
Estimated ECM Lifetime (Yr):	15
Simple Payback	13.1
Simple Lifetime ROI	14.2%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,485
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	(\$118.14)

ECM #9: Water Conservation

Description:

The Gordon Parks Academy utilizes standard plumbing fixtures. The typical water faucet consumption only meets the minimum federal required standard for water efficiency. New fixtures are available that use less water than today's requirements and can add up to significant water reduction over a long period.

This ECM includes the retrofitting of the existing faucets within the facility with new low flow aerators. The estimated usage of the plumbing fixtures is based on the estimated usage per day for each device and the facility operating days per year. The number of plumbing fixtures to be replaced is based on observations of the facility.

The proposed retrofit includes installation of low flow aerators. When water consumption information was not available, the GPF values were estimated for the existing fixtures.

Energy Savings Calculations:

Faucets:

$$\text{Water Usage} = \text{Quantity} \times \text{Operation} \left(\frac{\text{Days}}{\text{yr}} \right) \times \text{Usage} \left(\frac{\text{Min}}{\text{Day}} \right) \times \text{Fixture} \left(\frac{\text{Gal}}{\text{Min}} \right)$$

Electric Usage (*kWh*)

$$\begin{aligned} &= \text{Faucet Water Usage (Gal)} \times 8.33 \frac{\text{lbs}}{\text{Gal}} \times \text{Specific Heat (1)} \times \Delta T (70^\circ\text{F}) \\ &\times \frac{\text{kWh}}{3,413 \text{ Btu}} \times \frac{1}{\text{HWH Efficiency}} \times \frac{\text{Cold}}{\text{Hot}} \text{Mix (50\%)} \end{aligned}$$

Natural Gas Usage (*Therms*)

$$\begin{aligned} &= \text{Faucet Water Usage (Gal)} \times 8.33 \frac{\text{lbs}}{\text{Gal}} \times \text{Specific Heat (1)} \times \Delta T (70^\circ\text{F}) \\ &\times \frac{\text{Therms}}{100,000 \text{ Btu}} \times \frac{1}{\text{HWH Efficiency}} \times \frac{\text{Cold}}{\text{Hot}} \text{Mix (50\%)} \end{aligned}$$

LOW FLOW WATER SAVING DEVICES			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
Quantity of Sinks	25	25	
Flow Rate (GPM)	2.2	0.5	1.7
Device Usage (min per day)	10	10	
Facility Operation (days / year)	180	180	
Heat Content of Water (Btu/gal/°F)	8.33	8.33	
Temperature Rise (°F)	70.0	70.0	
Efficiency of Heating System (%)	80%	80%	
Natural Gas Rate (\$/therm)	\$0.930	\$0.930	
Water Rate (\$/1000gal)	\$5.000	\$5.000	
ENERGY SAVINGS CALCULATIONS			
Natural Gas Usage (Therm)	361	82	279
Water Usage (gallons)	99,000	22,500	76,500
Energy Cost (\$)	\$831	\$189	\$642
COMMENTS:	Heating Savings based on 50% Hot Cold Mix		

Maintenance Savings & Project Costs:

No maintenance cost savings were estimated for this measure

The cost for installation and materials is based on 25 faucet aerators. There are no Smart Start rebates for installation of low flow plumbing fixtures.

Energy Savings Summary:

ECM #9 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$750
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$750
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$642
Total Yearly Savings (\$/Yr):	\$642
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.2
Simple Lifetime ROI	1184.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$9,630
Internal Rate of Return (IRR)	86%
Net Present Value (NPV)	\$6,914.15

REM #1: 28 kW Solar System

Description:

The Gordon Parks Academy has available roof space that could accommodate solar arrays. Based on the available area a 28 kilowatt solar array could be installed. The array will produce approximately 33,760 kilowatt-hours annually that will reduce the overall electric usage of the facility by 15%. The owner should consult a structural engineer prior to installing any solar array to insure the roof can accommodate the additional weight.

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	
Installation Cost (\$):	\$131,962
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$131,962
SREC Revenue (\$/Yr):	\$5,115
Energy Savings (\$/Yr):	\$5,368
Total Yearly Savings (\$/Yr):	\$10,483
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.6
Simple Lifetime ROI	19.2%
Simple Lifetime Maintenance Savings	\$76,721
Simple Lifetime Savings	\$157,238
Internal Rate of Return (IRR)	2.3%
Net Present Value (NPV)	(\$6,822.08)

VI. 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 but save energy none the less.

- 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 any old CRT Monitors with LED/LCD Type Monitors, which can draw as much as a quarter the power of an equivalent CRT monitor.
- G. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

East Orange School District - Gordon Parks Academy

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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/yr)	(\$/yr)	(\$/yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Interior Lighting Upgrade	\$48,439	\$23,568	\$9,495	\$62,512	\$9,705	\$0	\$9,705	15	\$145,575	\$0	132.9%	6.4	13.06%	\$53,346.16
ECM #2	Exterior Lighting Upgrade	\$546	\$270	\$300	\$516	\$114	\$0	\$114	15	\$1,710	\$0	231.4%	4.5	20.79%	\$844.92
ECM #3	Lighting Controls	\$600	\$450	\$80	\$970	\$78	\$0	\$78	15	\$1,170	\$0	20.6%	12.4	2.44%	(\$38.84)
ECM #4	Oil to Natural Gas Conversion	\$5,000	\$5,000	\$0	\$10,000	\$67,661	\$0	\$67,661	15	\$1,014,915	\$0	10049.2%	0.1	676.61%	\$797,732.63
ECM #5	DDC Controls	\$85,000	\$65,000	\$0	\$150,000	\$21,564	\$0	\$21,564	15	\$323,460	\$0	115.6%	7.0	11.61%	\$107,429.63
ECM #6	Steam Trap Replacement	\$14,000	\$8,000	\$0	\$22,000	\$14,528	\$0	\$14,528	15	\$217,920	\$0	890.5%	1.5	66.00%	\$151,434.32
ECM #7	Window Replacement	\$188,667	\$94,333	\$0	\$283,000	\$4,107	\$0	\$4,107	25	\$102,675	\$0	-63.7%	68.9	-6.64%	(\$211,484.20)
ECM #8	Appliance Replacement	\$1,300	\$0	\$0	\$1,300	\$99	\$0	\$99	15	\$1,485	\$0	14.2%	13.1	1.71%	(\$118.14)
ECM #9	Water Conservation	\$500	\$250	\$0	\$750	\$642	\$0	\$642	15	\$9,630	\$0	1184.0%	1.2	85.59%	\$6,914.15
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	28 kW Solar Array	\$79,177	\$52,785	\$0	\$131,962	\$5,368	\$5,115	\$10,483	15	\$157,238	\$76,721	19.2%	12.6	2.28%	(\$6,822.08)

Notes: 1) The variable C_n 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 C_n 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 from July 1, 2015 to June 30, 2016, further details including how to apply, forms, and calculated incentive values can be found the Clean Energy Website. (www.njcleanenergy.com)

Electric Chillers

Water-Cooled Chillers	Constant Speed: Base: \$8 - \$30 per ton Performance Add: \$2 - \$2.25 per ton Variable Speed: Base: \$12 - \$44 per ton Performance Add: \$2 - \$4.00 per ton
Air-Cooled Chillers	Constant Speed: Base: \$20 per ton Performance Add: \$3.50 per ton Variable Speed: Base: \$90 - \$92 per ton Performance Add: \$4.00 per ton

Energy Efficiency must comply with ASHRAE 90.1-2013

Gas Cooling

Gas Absorption Chillers (Indirect & Direct-Fired)	\$185 - \$450 per ton
--	-----------------------

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

Hot Water Gas Fired Boilers < 300 MBH	Non-Condensing: \$0.95 per MBH, Minimum \$400 per unit Condensing: \$2.00 per MBH, Minimum \$1000 per unit
Hot Water Gas Fired Boilers ≥ 300 - 1500 MBH	Non-Condensing: \$1.75 per MBH Condensing: \$2.20 per MBH Minimum \$1000 per unit
Hot Water Gas Fired Boilers >1500 - ≤ 2500 MBH	Non-Condensing: \$1.50 per MBH Condensing: \$2.20 per MBH
Hot Water Gas Fired Boilers >2500 - ≤ 4000 MBH	Non-Condensing: \$1.30 per MBH Condensing: \$2.00 per MBH
Steam, Except Natural Draft, Gas fired Boilers < 300 MBH	\$1.40 per MBH, Minimum \$400 per unit
Steam, Except Natural Draft, Gas fired Boilers ≥ 300 – 1500 MBH	\$1.20 per MBH
Steam, Except Natural Draft, Gas fired Boilers > 1500 – 2500 MBH	\$1.20 per MBH
Steam, Except Natural Draft, Gas fired Boilers > 2500 – 4000 MBH	\$1.00 per MBH
Steam, Natural Draft < 300 MBH	\$1.40 per MBH, Minimum \$300 per unit
Steam, Natural Draft ≥ 300 - 1500 MBH	\$1.00 per MBH
Steam, Natural Draft >1500 - ≤ 2500 MBH	\$0.90 per MBH
Steam, Natural Draft >2500 - ≤ 4000 MBH	\$0.70 per MBH
All Types 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

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

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps $\geq$ 20 hp	\$60 per VFD rated hp
Rotary Screw Air Compressors $\geq$ 25 hp	\$5,250 to \$12,500 per drive
Centrifugal Fan Applications on Constant Volume HVAC Systems	\$80 per VFD rated hp, maximum \$6,000 per drive
Cooling Towers $\geq$ 10 hp	\$60 per VFD rated hp
Boiler Fans $\geq$ 5 HP	\$65 to \$155 per hp
Boiler Feed Water Pumps $\geq$ 5 HP	\$60 to \$155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit \$55 – \$300 per hp
	New Hood \$55 - \$250 per hp

Prescriptive Lighting

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)	\$5 per fixture
T-5 and T-8 High Bay Fixtures	\$25 - \$150 per fixture
HID $\geq$ 100w Replace with new induction fixture. (must be 30% less watts/fixture than HID system)	\$70 per fixture
HID $\geq$ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture

Prescriptive Lighting - LED

LED Architectural Floor and Spot Luminaires	\$50 per fixture
LED Bollard Fixtures	\$50 per fixture
LED Display Case Lighting	\$30 per display case
LED Fuel Pump Canopy	\$100 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 Linear Ambient Luminaires (Indirect, Indirect/Direct, Direct/Indirect, Direct)	2' Fixtures - \$20/fixture 3' Fixtures - \$30/fixture 4' Fixtures - \$45/fixture 6' Fixtures - \$60/fixture 8' Fixtures - \$75/fixture
LED Linear Replacement Lamps (2' & 4' only)	\$5 per lamp
Luminaires for Ambient Lighting of Interior Commercial Spaces (1x4, 2x2, 2x4 New Fixtures and Retrofit Kits)	1x4 LED - \$15 per fixture 2x2 LED - \$15 per fixture 2x4 LED - \$25 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	\$100 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	\$50 per fixture
LED Outdoor Wall-Mounted Area Luminaries	\$100 per fixture
LED Parking Garage Luminaries	\$100 per fixture
LED Retrofit Kits for Large Outdoor Pole / Arm-Mounted Area and Roadway Luminaires	\$150 per fixture
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 Shelf-Mtd. Display & Task Lights	\$15 per linear foot

LED Stairwell and Passageway Luminaires	\$40 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	\$30 per fixture
LED Wall-Wash Lights	\$30 per fixture
EnergyStar Commercial Lighting Fixtures	\$5 to \$10 per fixture
EnergyStar Screw and Pine-Based Bulbs	\$5 to \$10 per lamp

Lighting Controls – Occupancy Sensors

Wall Mounted (Existing Facilities Only)	\$20 per control
Remote Mounted (Existing Facilities Only)	\$35 per control
Daylight Dimming Controls	\$45 per fixture controlled
Occupancy Based hi-low Dimming Control	\$35 per fixture controlled
Occupancy Sensor Remote Mounted High-Bay (Existing Facilities Only)	\$35 per control

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

Refrigerator / Freezer Case Premium Efficiency Motors

Fraction ECM Motor < 1 HP	\$40 per ECM for replacement of existing shaded-pole motor
---------------------------	---

Food Service Equipment

Combination Oven/Steamer (Electric)	\$1,000/oven
Combination Oven/Steamer (Natural Gas)	\$750/oven
Convection Oven (Electric)	\$350/oven
Convection Oven (Natural Gas)	\$500/oven
Rack Oven (Natural Gas)	\$1,000/single oven, \$2,000/double oven
Conveyor Oven (Natural Gas)	\$500/small deck \$750/large deck
Fryer (Electric)	\$200/vat
Fryer (Natural Gas)	\$749/vat
Large Vat Fryer (Electric)	\$200/vat
Large Vat Fryer (Natural Gas)	\$500/vat
Griddle (Electric)	\$300/griddle
Griddle (Natural Gas)	\$125/griddle
Steam Cooker (Electric)	\$1,250/steamer
Steam Cooker (Natural Gas)	\$2,000/steamer
Insulated Holding Cabinets	\$200 to \$300/unit
Glass Door Refrigerators	\$75 to \$150/unit
Solid Door Refrigerators	\$50 to \$200/unit
Glass Door Freezers	\$200 to \$1,000/unit
Solid Door Freezers	\$100 to \$600/unit
Ice Machines	\$50 to \$500/unit
Dishwashers	\$400 to \$1,500/unit

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



ENERGY STAR® Data Verification Checklist

39

ENERGY STAR®
Score¹

Gordon Parks Academy

Registry Name: Gordon Parks Academy
Primary Function: K-12 School
Gross Floor Area (ft²): 50,000
Built: 1905

For Year Ending: 04/30/2015
Date Generated: 08/13/2015

1. The ENERGY STAR score is a 1-to-100 assessment of a building's energy efficiency as compared with similar building nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address

Gordon Parks Academy
99 Greenwood Avenue
East Orange, New Jersey 07017

Property ID: 4440605

Property Owner

East Orange School District
199 4th Avenue, 5th Floor
East Orange, NJ 07017
() -

Primary Contact

Racquel Ferguson
199 4th Avenue, 5th Floor
East Orange, NJ 07017
(973) 266-5742
racquel.ferguson@eastorange.k12.nj.us

1. Review of Whole Property Characteristics

Basic Property Information

1) Property Name: Gordon Parks Academy

Is this the official name of the property?

☐ Yes ☐ No

If "No", please specify: _____

2) Primary Function: K-12 School

Is this an accurate description of the primary use of this property?

☐ Yes ☐ No

3) Location:

99 Greenwood Avenue
East Orange, New Jersey 07017

Is this correct and complete?

☐ Yes ☐ No

4) Gross Floor Area: 50,000 ft²

☐ Yes ☐ No

Does this represent the entire property? (i.e., no part of the building/property was excluded/subtracted from the total) If "no" please specify what space has been excluded.

5) Average Occupancy: 90

Is this occupancy accurate for the entire 12 month period being assessed?

☐ Yes ☐ No

6) Number of Buildings: 1

Does this number accurately represent all structures?

☐ Yes ☐ No

Notes:

Indoor Environmental Standards

1) Ventilation for Acceptable Indoor Air Quality

Does this property meet the ASHRAE Standard 62 for ventilation for acceptable indoor air quality?

☐ Yes ☐ No

2) Acceptable Thermal Environmental Conditions

Does this property meet the ASHRAE Standard 55 for thermal comfort?

☐ Yes ☐ No

3) Adequate Illumination

Does this property adhere to the IESNA Lighting Handbook for lighting quality?

☐ Yes ☐ No

Notes:

2. Review of Property Use Details

K-12 School: Building Use

1) Gross Floor Area: 50,000 ft²

Is this the total size, as measured between the principal exterior surfaces of the enclosing fixed walls of the building(s)? This includes all areas inside the building(s) such as: occupied tenant areas, common areas, meeting areas, break rooms, restrooms, elevator shafts, mechanical equipment areas, and storage rooms. Gross

☐ Yes ☐ No

Floor Area should not include interstitial plenum space between floors, which may house pipes and ventilation. Gross Floor Area is not the same as rentable, but rather includes all area inside the building(s). Leasable space would be a sub-set of Gross Floor Area. In the case where there is an atrium, you should count the Gross Floor Area at the base level only. Do not increase the size to accommodate open atrium space at higher levels. The Gross Floor Area should not include any exterior spaces such as balconies or exterior loading docks and driveways.

2) Gymnasium Floor Area: 0 ft²

Does the gymnasium floor area include all areas devoted to a gymnasium, including gymnasium/athletic areas, spectator areas, locker rooms, and other associated spaces?

☐ Yes ☐ No

3) High School: No

Is the property a high school (teaching grades 10, 11, and/or 12)? If the property 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'.

☐ Yes ☐ No

4) Number of Workers on Main Shift: 57

Is this the number of workers present during the main shift? Note that this is not a total count of workers, but rather a count of workers who are present at the same time. For example, if there are two daily eight hour shifts of 100 workers each, the Number of Workers on Main Shift value is 100. Number of Workers on Main Shift may include employees of the property, sub-contractors who are onsite regularly, and volunteers who perform regular onsite tasks. Number of Workers should not include visitors to the buildings such as clients, customers, or patients.

☐ Yes ☐ No

5) Student Seating Capacity: 321

Is this the maximum number of students for which the school was designed? This should include the seating capacity of the entire school. If portable classrooms have been added to the school, include the capacity of these classrooms, as they expand the overall capacity of the school.

☐ Yes ☐ No

6) Months in Use: 10

Is this the total number of months that the property is open for standard activities?

☐ Yes ☐ No

7) Weekend Operation: No

Does the property include regular activities on the weekend beyond the scope of maintenance, cleaning, and security personnel? Weekend activity could include any time when the property is used for classes, performances, or other school or community activities. The Yes selection is appropriate for any property that is open on one or both days of the weekend during one or more seasons of the year.

☐ Yes ☐ No

8) Number of Computers: 203

Is this the total number of desktop computers, laptops, and data servers at the property? This number should not include tablet computers, such as iPads, or any other types of office equipment. The count should only reflect computers that are owned by the school. It should not include any computers that are brought onsite by students or staff.

☐ Yes ☐ No

9) Cooking Facilities: 100% Yes

Does the property have a commercial cooking area designed to provide and serve food to occupants and/or visitors? This may include restaurants and cafeterias. If the property contains only employee break room kitchens, this field should be marked No.

☐ Yes ☐ No

10) Number of Walk-in Refrigeration/Freezer Units: 0

Is this the total count of walk-in units at the property? Walk-in Refrigeration/Freezers are typically very large units located in storage areas or commercial kitchens that would not be accessible to all building occupants. This count should only include large storage units that a person actually walks into in order to store or retrieve perishable goods.

☐ Yes ☐ No

11) Percent That Can Be Heated: 100

Is this the total percentage of the property that can be heated by mechanical equipment?

☐ Yes ☐ No

12) Percent That Can Be Cooled: 10

Is this the total percentage of the property that can be cooled by mechanical equipment? This includes all types of cooling from central air to individual window units.

☐ Yes ☐ No

13) School District: East Orange

Is this the administrative school district in which the property is located?

☐ Yes ☐ No

Notes:

3. Review of Energy Consumption

Data Overview

Site Energy Use Summary

Electric - Grid (kBtu)	745,217.1 (14%)
Natural Gas (kBtu)	139,527.4 (3%)
Fuel Oil (No. 2) (kBtu)	4,514,826.4 (84%)
Total Energy (kBtu)	5,399,571

Energy Intensity

Site (kBtu/ft ²)	108
Source (kBtu/ft ²)	140.9

National Median Comparison

National Median Site EUI (kBtu/ft ²)	98.2
National Median Source EUI (kBtu/ft ²)	128.1
% Diff from National Median Source EUI	10%

Emissions (based on site energy use)

Greenhouse Gas Emissions (Metric Tons CO ₂ e)	442.2
--	-------

Power Generation Plant or Distribution Utility:

Public Service Electric & Gas Co

Note: All values are annualized to a 12-month period. Source Energy includes energy used in generation and transmission to enable an equitable assessment.

Summary of All Associated Meters

The following meters are associated with the property, meaning that they are added together to get the total energy use for the property. Please see additional tables in this checklist for the exact meter consumption values.

Meter Name	Fuel Type	Start Date	End Date	Associated With
Electric Grid Meter	Electric	12/09/2013	In Use	Gordon Parks Academy

Meter Name	Fuel Type	Start Date	End Date	Associated With
Fuel Oil (No. 2)	Fuel Oil No 2	11/03/2014	In Use	Gordon Parks Academy
Natural Gas #1	Natural Gas	12/09/2013	In Use	Gordon Parks Academy

Total Energy Use ☐ Yes ☐ No

Do the meters shown above account for the total energy use of this property during the reporting period of this application?

Additional Fuels ☐ Yes ☐ No

Do the meters above include all fuel *types* at the property? That is, no additional fuels such as district steam, generator fuel oil have been excluded.

On-Site Solar and Wind Energy ☐ Yes ☐ No

Are all on-site solar and wind installations reported in this list (if present)? All on-site systems must be reported.

Notes:

Electric Meter: Electric Grid Meter (kWh (thousand Watt-hours))				
Associated With: Gordon Parks Academy				
Start Date	End Date	Usage	Green Power?	
04/09/2014	05/12/2014	20,880	No	
05/12/2014	06/10/2014	18,690	No	
06/10/2014	07/10/2014	17,490	No	
07/10/2014	08/08/2014	10,080	No	
08/08/2014	09/09/2014	13,470	No	
09/09/2014	10/08/2014	19,230	No	
10/08/2014	11/06/2014	18,810	No	
11/06/2014	12/09/2014	21,450	No	
12/09/2014	01/09/2015	19,290	No	
01/09/2015	02/09/2015	21,240	No	

Start Date	End Date	Usage	Green Power?
02/09/2015	03/11/2015	21,060	No
03/11/2015	04/10/2015	18,000	No
04/10/2015	05/11/2015	18,660	No
Total Consumption (kWh (thousand Watt-hours)):			238,350
Total Consumption (kBtu (thousand Btu)):			813,250.2

Total Energy Consumption for this Meter

☐ Yes ☐ No

Do the fuel consumption totals shown above include consumption of all energy tracked through this meter that affect energy calculations for the reporting period of this application (i.e., do the entries match the utility bills received by the property)?

Notes:

Fuel Oil No 2 Meter: Fuel Oil (No. 2) (Gallons (US))

Associated With: Gordon Parks Academy

Delivery Date	Quantity
11/03/2014	1,350
11/11/2014	1,223
11/17/2014	1,332
11/21/2014	1,353
11/28/2014	1,400
12/02/2014	1,525
12/08/2014	1,600
12/12/2014	1,319
12/16/2014	1,401
12/19/2014	944
12/23/2014	1,168
12/30/2014	1,685
01/03/2015	1,580
01/07/2015	1,458
01/10/2015	1,410
01/14/2015	1,548
01/17/2015	1,198

Delivery Date	Quantity
01/21/2015	1,572
01/24/2015	1,079
01/27/2015	1,189
01/31/2015	1,546
02/03/2015	1,291
02/07/2015	1,690
02/10/2015	1,299
Total Consumption (Gallons (US)): 33,160	
Total Consumption (kBtu (thousand Btu)): 4,576,080	

Total Energy Consumption for this Meter ☐ Yes ☐ No

Do the fuel consumption totals shown above include consumption of all energy tracked through this meter that affect energy calculations for the reporting period of this application (i.e., do the entries match the utility bills received by the property)?

Notes:

Natural Gas Meter: Natural Gas #1 (therms)

Associated With: Gordon Parks Academy

Start Date	End Date	Usage
04/09/2014	05/12/2014	34.83
05/12/2014	06/10/2014	32.66
06/10/2014	07/10/2014	19.92
07/10/2014	08/08/2014	6.29
08/08/2014	09/09/2014	17.86
09/09/2014	10/08/2014	122.21
10/08/2014	12/09/2014	219.16
12/09/2014	01/09/2015	124.55
01/09/2015	02/09/2015	239.83
02/09/2015	03/11/2015	248
03/11/2015	04/10/2015	43.4 ← estimate
04/10/2015	05/11/2015	457.3
Total Consumption (therms):		1,566.01

Total Consumption (kBtu (thousand Btu)):		156,601
Total Energy Consumption for this Meter		
		☐ Yes ☐ No
Do the fuel consumption totals shown above include consumption of all energy tracked through this meter that affect energy calculations for the reporting period of this application (i.e., do the entries match the utility bills received by the property)?		
Notes:		

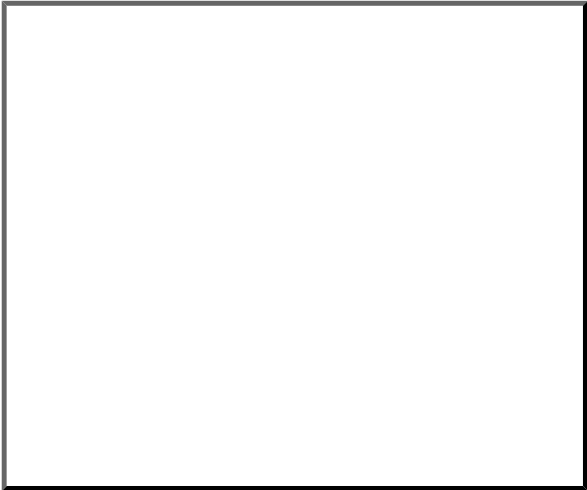
4. Signature & Stamp of Verifying Licensed Professional

_____ (Name) visited this site on _____ (Date). Based on the conditions observed at the time of the visit to this property, I verify that the information contained within this application is accurate and in accordance with the Licensed Professional Guide.

Signature: _____ Date: _____

Licensed Professional

,
(____)____-____



NOTE: When applying for the ENERGY STAR, the signature of the Verifying Professional must match the stamp.

Professional Engineer Stamp
(if applicable)



ENERGY STAR[®] Statement of Energy Performance

39

ENERGY STAR[®]
Score¹

Gordon Parks Academy

Primary Property Function: K-12 School
Gross Floor Area (ft²): 50,000
Built: 1905

For Year Ending: April 30, 2015
Date Generated: August 13, 2015

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address

Gordon Parks Academy
99 Greenwood Avenue
East Orange, New Jersey 07017

Property Owner

East Orange School District
199 4th Avenue, 5th Floor
East Orange, NJ 07017
() -

Primary Contact

Racquel Ferguson
199 4th Avenue, 5th Floor
East Orange, NJ 07017
(973) 266-5742
racquel.ferguson@eastorange.k12.nj.us

Property ID: 4440605

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

108 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	745,217 (14%)
Natural Gas (kBtu)	139,527 (3%)
Fuel Oil (No. 2) (kBtu)	4,514,826 (84%)

National Median Comparison

National Median Site EUI (kBtu/ft ²)	98.2
National Median Source EUI (kBtu/ft ²)	128.1
% Diff from National Median Source EUI	10%

Source EUI

140.9 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	442
---	-----

Signature & Stamp of Verifying Professional

I _____ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: _____ Date: _____

Licensed Professional

,
() -



**Professional Engineer Stamp
(if applicable)**

APPENDIX D

MAJOR EQUIPMENT LIST

Air Handlers

Concord Engineering

Air Handler Units

Tag	H&V-Aud
Unit Type	Indoor Air Handler
Qty	1
Location	Auditorium Stage
Area Served	Auditorium / Stage
Manufacturer	Carrier Corp
Model No.	46P9B144
Serial No.	01002
Cooling Type	No Cooling
Cooling Capacity (Tons)	N/A
Heating Type	Steam
Heating Input (MBH)	-
Supply Fan (HP)	3
Supply Fan VFD	☐ Yes ☒ No ☐ N/A
Return Fan (HP)	N/A
Return Fan VFD	☐ Yes ☐ No ☒ N/A
Approx Age	
ASHRAE Service Life	20
Remaining Life	20
Comments	

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Terminal Units

Concord Engineering

Terminal Units

Tag	WAC1	MS-1	WAC2
Unit Type	Window Unit	Console Unit	Window Unit
Qty	1	1	1
Location	Teacher's Room	Media Center	Nurse's Office
Area Served	Teacher's Room	Media Center	Nurse's Office
Manufacturer	Electrolux	Sanyo	Friedrich
Model No.	FAA086P7A	KHS3632	SP05A10
Serial No.	IK70156776	0003391	LCCS01255
Cooling Type	Packaged DX	Split System DX	Packaged DX
Cooling Capacity (Tons)	0.67	3	0.45
Cooling Efficiency	10.8	-	10.8
Heating Type	No Heating	No Heating	No Heating
Heating Input (MBH)	N/A	N/A	N/A
Heating Efficiency	N/A	N/A	N/A
Approx Age	8		8
ASHRAE Service Life	10	15	10
Remaining Life	2	15	2
Comments			

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Terminal Units

Concord Engineering

Terminal Units

Tag	WAC 3	UH	UV
Unit Type	Window Unit	Unit Heater	Unit Ventilator
Qty	1	2	35
Location	Kitchen	Gym	Classrooms, Media, Cafeteria
Area Served	Kitchen	Gym	Classrooms, Media, Cafeteria
Manufacturer	-	-	-
Model No.	-	-	-
Serial No.	-	-	-
Cooling Type	Packaged DX	No Cooling	No Cooling
Cooling Capacity (Tons)	-	N/A	N/A
Cooling Efficiency	-	N/A	N/A
Heating Type	No Heating	Steam	Steam
Heating Input (MBH)	N/A	-	-
Heating Efficiency	N/A	N/A	N/A
Approx Age	8	20	20
ASHRAE Service Life	10	20	20
Remaining Life	2	0	0
Comments	Window Unit covered		

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Boilers

Boilers

Tag	B1	B2
Unit Type	Cast-Iron Sectional (Steam)	Cast-Iron Sectional (Steam)
Qty	1	1
Location	Boiler Room	Boiler Room
Manufacturer	HB Smith	HB Smith
Model No.	28A-12	M450L Mills - 15
Serial No.	28A-12-115211	-
Input Capacity (Btu/h)	3,844,000	4,625,000
Output Capacity (Btu/h)	3,031,000	2,872,700
Approx. Efficiency %	78.9%	62.1%
Fuel Type	Dual Fuel Gas/Oil	Dual Fuel Gas/Oil
Approx Age	2	30
ASHRAE Service Life	30	30
Remaining Life	28	0
Comments		Power Flam Burner 1.5 HP, Burner Fan Flue Gas Fan, 1.0 HP

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Dom HWH

Domestic Water Heaters

Tag	HWH-1
Unit Type	Commerical Gas Water Heater
Qty	1
Location	Boiler Room
Area Served	-
Manufacturer	Rheem/Ruud
Model #	G75-75N-2
Serial #	RRLN0208105349
Storage Size (Gal)	75
Input Capacity (MBH/KW)	75.1
Recovery (Gal/Hr)	72.8
Efficiency %	80%
Fuel	Natural Gas
Approx Age	11
ASHRAE Service Life	15
Remaining Life	4
Comments	Bell & Gossett Circulator Pump Motor: 1/12 HP ; 1725 RPM 1 PH; 60 Hz ; 115 V

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Pumps

Pumps

Tag	CP1	CP2
Unit Type	Condensate	Condensate
Qty	1	1
Location	Boiler Room	Boiler Room
System Served	Condensate Return (Boiler)	Condensate Return (Boiler)
Manufacturer	-	-
Model #	-	-
Serial #	-	-
Horse Power	0.5	0.8
Flow Rate (GPM)	-	-
Head Pressure (FTHD)	-	-
Motor Manufacturer	Century	Marathon
Motor Frame	K56J	56J
Electrical Power (V/P/HZ)	208-230/460/3/60	115/208-230/1/60
Motor RPM	3450/2850	3450
Motor Efficiency %	-	-
Pump VFD	☐ Yes ☒ No ☐ N/A	☐ Yes ☒ No ☐ N/A
Approx Age		
ASHRAE Service Life	18	18
Remaining Life	18	18
Comments	3 Century Motors for Condensate Pump	2 Marathon Motors for Condensate Pump

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Kitchen-Misc

Kitchen / Misc.

Tag	FF1	MF1	FF2
Unit Type	Residential Refrigerator	Residential Refrigerator	Residential Refrigerator
Qty	1	1	1
Location	Teacher's Room	Nurse's Office	Nurse's Office
Manufacturer	Electrolux	Felix Storch, Inc.	RCA Appliance Corp.
Model No.	FRT18B5JM2	HS 1661L	MTX14CYXKRWH
Serial No.	BA93422760	2005 05 000127	GR849726
Fuel			
Comments			

Note:

"N/A" = Not Applicable.

"FF" = Full Fridge

"-" = Info Not Available

"MF" = Mini Fridge

MAJOR EQUIPMENT LIST

Concord Engineering

Kitchen-Misc

Kitchen / Misc.

Tag	CO1	RIF1	RIF2
Unit Type	Oven	Reach-in Refrigerator	Reach-in Refrigerator
Qty	1	1	1
Location	Kitchen	Kitchen	Kitchen
Manufacturer	Vulcan-Hart	Traulsen	Traulsen
Model No.	RET10	RLT 2-32WUT	G20010
Serial No.	72103803	M074490H93	T511760G92
Fuel			
Comments	24.5 KW 3-Phase 208 Volts	1-Phase 115 Volts	1-Phase 115 Volts

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering

Kitchen-Misc

Kitchen / Misc.

Tag	RIF3	
Unit Type	Reach-in Refrigerator	Pneumatic Air Compressor
Qty	1	1
Location	Kitchen	Boiler Room
Manufacturer	Powers Equipment Co.	-
Model No.	780	-
Serial No.	D074885	-
Fuel		-
Comments	Dairy Fridge 115 Volts 1-Phase	Leland Faraday Motor 1 HP

Note:

"N/A" = Not Applicable.

"- " = Info Not Available

APPENDIX E

CEG Project #:	1C15143
Facility Name:	Gordon Parks Academy
Address:	99 Greenwood Ave.
City, State, Zip	East Orange, NJ 07017

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	
136	3 - Gym	2000	Metal Halide 250W 2x2 Surface Mounted Prismatic	1	295	12	3.54	7,080	Replace	Cree High Bay LED 160W	1	160	12	1.92	3,840	1.62	3,240	\$515	0	No New Controls	0	0.0%	0	\$0	\$5,400.00	\$1,080.00	\$6,480.00	\$1,800.00	9.08	\$0.00	\$0.00	\$0.00	YES	-
6	3 - Entry 1	2200	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	2	0.12	273	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	2	0.06	132	0.06	141	\$22	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$90.00	\$210.00	\$20.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
6	3 - Entry 2	2200	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	1	0.06	136	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	66	0.03	70	\$11	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
137	3 - Attic Storage	400	42W CFL	1	42	2	0.08	34	Replace	28W LED Lamp	1	28	2	0.06	22	0.03	11	\$2	0	No New Controls	0	0.0%	0	\$0	\$140.00	\$55.00	\$195.00	\$20.00	98.27	\$0.00	\$0.00	\$0.00	FALSE	-
138	3 - Attic Storage	400	150W Incandescent	1	150	1	0.15	60	Replace	23W LED Lamp	1	23	1	0.02	9	0.13	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$57.00	\$27.50	\$84.50	\$10.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
10	3 - Stair 31	2200	4-Lamp T8 Electronic 2x4 Recessed Direct	4	114	3	0.34	752	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	297	0.21	455	\$72	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$135.00	\$405.00	\$45.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 33	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 33 Closet	400	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	46	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	18	0.07	28	\$4	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	27.34	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 32	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	8	0.91	1,459	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	8	0.36	576	0.55	883	\$140	0	No New Controls	0	0.0%	0	\$0	\$720.00	\$360.00	\$1,080.00	\$120.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
6	2 - Girl's Toilet	500	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	1	0.06	31	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	15	0.03	16	\$3	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	37.34	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Classroom 25	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
137	2 - Janitor's Closet	400	42W CFL	1	42	1	0.04	17	Replace	28W LED Lamp	1	28	1	0.03	11	0.01	6	\$1	0	No New Controls	0	0.0%	0	\$0	\$70.00	\$27.50	\$97.50	\$10.00	98.27	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Teacher's Room	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	3	0.34	547	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	3	0.14	216	0.21	331	\$53	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	43	\$7	\$270.00	\$135.00	\$405.00	\$45.00	6.84	\$50.00	\$50.00	\$100.00	FALSE	14.56

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
139	2 - Faculty Women's Bathroom	500	1-Lamp Rapid Start T8 .5x2 Surface Mounted Prismatic	1	22	3	0.07	33	Re-Lamp	Seesmart LED 2' Tube 9W 4K bypass ballast and provide new tombstones	1	9	3	0.03	14	0.04	20	\$3	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$135.00	\$195.00	\$15.00	58.06	\$0.00	\$0.00	\$0.00	FALSE	-
138	2 - Roof Access Room	400	150W Incandescent	1	150	2	0.30	120	Replace	23W LED Lamp	1	23	2	0.05	18	0.25	102	\$16	0	No New Controls	0	0.0%	0	\$0	\$114.00	\$55.00	\$169.00	\$20.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
138	1 - Auditorium Lobby	400	150W Incandescent	1	150	1	0.15	60	Replace	23W LED Lamp	1	23	1	0.02	9	0.13	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$57.00	\$27.50	\$84.50	\$10.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
140	1 - Auditorium Display Case Wall	2600	2-Lamp Fluorescent Preheat T12 Magnetic 2 Foot Surface Mounted Direct	2	50	2	0.10	260	Re-Lamp	Seesmart LED 2' Tube 9W 4K bypass ballast and provide new tombstones	2	18	2	0.04	94	0.06	166	\$26	0	No New Controls	0	0.0%	0	\$0	\$80.00	\$90.00	\$170.00	\$20.00	5.67	\$0.00	\$0.00	\$0.00	FALSE	-
140	1 - Display Door	400	2-Lamp Fluorescent Preheat T12 Magnetic 2 Foot Surface Mounted Direct	2	50	2	0.10	40	Re-Lamp	Seesmart LED 2' Tube 9W 4K bypass ballast and provide new tombstones	2	18	2	0.04	14	0.06	26	\$4	0	No New Controls	0	0.0%	0	\$0	\$80.00	\$90.00	\$170.00	\$20.00	36.85	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Classroom 2	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	17	1.94	3,101	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	17	0.77	1,224	1.17	1,877	\$298	0	No New Controls	0	0.0%	0	\$0	\$1,530.00	\$765.00	\$2,295.00	\$255.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
6	1 - Classroom 2	1600	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	3	0.19	298	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	3	0.09	144	0.10	154	\$24	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$135.00	\$315.00	\$30.00	11.67	\$0.00	\$0.00	\$0.00	FALSE	-
141	1 - Classroom 2 Toilet 1	500	27W CFL	1	27	1	0.03	14	Replace	20W LED Lamp	1	20	1	0.02	10	0.01	4	\$1	0	No New Controls	0	0.0%	0	\$0	\$20.00	\$27.50	\$47.50	\$10.00	67.39	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Classroom 2 Toilet 2	500	13W CFL	1	13	1	0.01	7	Replace	Philips LED A19 6W	1	6	1	0.01	3	0.01	4	\$1	0	No New Controls	0	0.0%	0	\$0	\$15.00	\$27.50	\$42.50	\$10.00	58.40	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Classroom 2 Toilet 2 Sink	500	13W CFL	1	26	1	0.03	13	Replace	Philips LED A19 6W	1	6	1	0.01	3	0.02	10	\$2	0	No New Controls	0	0.0%	0	\$0	\$15.00	\$27.50	\$42.50	\$10.00	20.44	\$0.00	\$0.00	\$0.00	FALSE	-
103	1 - Auditorium	1600	4-Lamp T8 Electronic 2x8 Surface Mount Prismatic	4	220	8	1.76	2,816	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	6	90	8	0.72	1,152	1.04	1,664	\$265	0	No New Controls	0	0.0%	0	\$0	\$1,440.00	\$540.00	\$1,980.00	\$240.00	6.58	\$0.00	\$0.00	\$0.00	FALSE	-
105	1 - House Lights	1600	200W Incandescent	1	200	14	2.80	4,480	Replace	42W CFL	1	42	14	0.59	941	2.21	3,539	\$563	0	No New Controls	0	0.0%	0	\$0	\$350.00	\$385.00	\$735.00	\$140.00	1.06	\$0.00	\$0.00	\$0.00	FALSE	-
137	1 - Auditorium Rear Hall	2200	42W CFL	1	42	3	0.13	277	Replace	28W LED Lamp	1	28	3	0.08	185	0.04	92	\$15	0	No New Controls	0	0.0%	0	\$0	\$210.00	\$82.50	\$292.50	\$30.00	17.87	\$0.00	\$0.00	\$0.00	FALSE	-
12	1 - Auditorium Men's Restroom	500	2-Lamp T8 Electronic 1x4 Pendant Prismatic Lens	2	62	1	0.06	31	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	15	0.03	16	\$3	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	37.34	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All		Smart Start Incentive
12	1 - Auditorium Women's Restroom	500	2-Lamp T8 Electronic 1x4 Pendant Prismatic Lens	2	62	1	0.06	31	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	15	0.03	16	\$3	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	37.34	\$0.00	\$0.00	\$0.00	FALSE	-
141	1 - Auditorium Entry	2200	27W CFL	1	27	6	0.16	356	Replace	20W LED Lamp	1	20	6	0.12	264	0.04	92	\$15	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$165.00	\$285.00	\$60.00	15.31	\$0.00	\$0.00	\$0.00	FALSE	-
121	1 - Auditorium Entry	2200	100W Incandescent	1	100	2	0.20	440	Replace	Philips 18W LED A-Lamp	1	18	2	0.04	79	0.16	361	\$57	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	1.13	\$0.00	\$0.00	\$0.00	FALSE	-
121	1 - Stage	1600	100W Incandescent	1	100	3	0.30	480	Replace	Philips 18W LED A-Lamp	1	18	3	0.05	86	0.25	394	\$63	0	No New Controls	0	0.0%	0	\$0	\$45.00	\$82.50	\$127.50	\$30.00	1.56	\$0.00	\$0.00	\$0.00	FALSE	-
131	1 - Back Stage Hall	2200	4-Lamp T8 Electronic 1x4 Pendant Prismatic Lens	4	114	1	0.11	251	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	1	0.05	99	0.07	152	\$24	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
138	1 - Book Room	400	150W Incandescent	1	150	1	0.15	60	Replace	23W LED Lamp	1	23	1	0.02	9	0.13	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$57.00	\$27.50	\$84.50	\$10.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
12	1 - Storage Closet	1600	2-Lamp T8 Electronic 1x4 Pendant Prismatic Lens	2	62	1	0.06	99	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	48	0.03	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	11.67	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Classroom 3A	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	4	0.46	730	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	4	0.18	288	0.28	442	\$70	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$180.00	\$540.00	\$60.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
138	1 - Janitor's Closet	400	150W Incandescent	1	150	1	0.15	60	Replace	23W LED Lamp	1	23	1	0.02	9	0.13	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$57.00	\$27.50	\$84.50	\$10.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
138	1 - Storage Crawl Space	400	150W Incandescent	1	150	1	0.15	60	Replace	23W LED Lamp	1	23	1	0.02	9	0.13	51	\$8	0	No New Controls	0	0.0%	0	\$0	\$57.00	\$27.50	\$84.50	\$10.00	9.22	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Nurse Waiting Area	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	251	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	99	0.07	152	\$24	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Nurse's Office	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	456	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	180	0.14	276	\$44	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$90.00	\$270.00	\$30.00	5.47	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Nurse's Sink	500	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	57	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	23	0.07	35	\$5	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	21.88	\$0.00	\$0.00	\$0.00	FALSE	-
141	1 - Nurse's Restroom	500	27W CFL	1	27	1	0.03	14	Replace	20W LED Lamp	1	20	1	0.02	10	0.01	4	\$1	0	No New Controls	0	0.0%	0	\$0	\$20.00	\$27.50	\$47.50	\$10.00	67.39	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
3	1 - Speech Office	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	228	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	90	0.07	138	\$22	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	18	\$3	\$90.00	\$45.00	\$135.00	\$15.00	5.47	\$50.00	\$50.00	\$100.00	FALSE	34.94
3	1 - Classroom 10 Coat Closet	400	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	46	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	18	0.07	28	\$4	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	27.34	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Main Entry	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	251	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	99	0.07	152	\$24	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	1-B Stair 32	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	752	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	297	0.21	455	\$72	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$135.00	\$405.00	\$45.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Kitchen	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	4	0.46	912	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	4	0.18	360	0.28	552	\$88	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$180.00	\$540.00	\$60.00	5.47	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Front Kitchen Office	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	4	0.46	912	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	4	0.18	360	0.28	552	\$88	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	72	\$11	\$360.00	\$180.00	\$540.00	\$60.00	5.47	\$50.00	\$50.00	\$100.00	FALSE	8.74
95	B - Closet	400	2-Lamp 1-Pin CFL (13W)	2	26	1	0.03	10	Existing to Remain	Existing to Remain	2	26	0	0.03	10	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$0.00	\$0.00	\$0.00	FALSE	-
74	B - Boiler Room	400	Metal Halide 400W Pendant Mounted	1	461	2	0.92	369	Replace	Cree High Bay LED 240W	1	240	2	0.48	192	0.44	177	\$28	0	No New Controls	0	0.0%	0	\$0	\$900.00	\$180.00	\$1,080.00	\$300.00	27.75	\$0.00	\$0.00	\$0.00	FALSE	-
87	B - Boiler Room	400	4-Lamp T12 Magnetic 1x8 Pendant Utility	2	262	2	0.52	210	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	6	90	2	0.18	72	0.34	138	\$22	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$135.00	\$495.00	\$60.00	19.88	\$0.00	\$0.00	\$0.00	FALSE	-
6	3 - Closet	400	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	6	0.37	149	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	6	0.18	72	0.19	77	\$12	0	No New Controls	0	0.0%	0	\$0	\$360.00	\$270.00	\$630.00	\$60.00	46.68	\$0.00	\$0.00	\$0.00	FALSE	-
3	3 - Stairway 31	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	752	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	297	0.21	455	\$72	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$135.00	\$405.00	\$45.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 29	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 28	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Boys Toilet	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	7	0.80	1,756	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	7	0.32	693	0.48	1,063	\$169	5	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	139	\$22	\$630.00	\$315.00	\$945.00	\$105.00	4.97	\$200.00	\$50.00	\$250.00	FALSE	11.34

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
3	2 - Office	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	456	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	180	0.14	276	\$44	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	36	\$6	\$180.00	\$90.00	\$270.00	\$30.00	5.47	\$50.00	\$50.00	\$100.00	\$20.00	13.98
3	2 - Classroom 30	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 27	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 31	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	8	0.91	1,459	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	8	0.36	576	0.55	883	\$140	0	No New Controls	0	0.0%	0	\$0	\$720.00	\$360.00	\$1,080.00	\$120.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Classroom 26	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	2 - Office 31A	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	684	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	270	0.21	414	\$66	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	54	\$9	\$270.00	\$135.00	\$405.00	\$45.00	5.47	\$50.00	\$50.00	\$100.00	\$20.00	9.32
3	2 - Office 20A	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	456	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	180	0.14	276	\$44	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	36	\$6	\$180.00	\$90.00	\$270.00	\$30.00	5.47	\$50.00	\$50.00	\$100.00	FALSE	17.47
3	2 - Hallway 1	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	5	0.57	1,254	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	5	0.23	495	0.35	759	\$121	0	No New Controls	0	0.0%	0	\$0	\$450.00	\$225.00	\$675.00	\$75.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Hallway 2	2200	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	12	1.37	3,010	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	12	0.54	1,188	0.83	1,822	\$290	0	No New Controls	0	0.0%	0	\$0	\$1,080.00	\$540.00	\$1,620.00	\$180.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
6	2 - Stair 3	2200	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	2	0.12	273	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	2	0.06	132	0.06	141	\$22	0	No New Controls	0	0.0%	0	\$0	\$120.00	\$90.00	\$210.00	\$20.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Classroom 24	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	19	2.17	3,466	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	19	0.86	1,368	1.31	2,098	\$334	0	No New Controls	0	0.0%	0	\$0	\$1,710.00	\$855.00	\$2,565.00	\$285.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	2 - Classroom 24	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Classroom 23	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	19	2.17	3,466	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	19	0.86	1,368	1.31	2,098	\$334	0	No New Controls	0	0.0%	0	\$0	\$1,710.00	\$855.00	\$2,565.00	\$285.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	2 - Classroom 23	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
82	2 - Classroom 22	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	25	2.85	4,560	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	25	1.13	1,800	1.73	2,760	\$439	0	No New Controls	0	0.0%	0	\$0	\$2,250.00	\$1,125.00	\$3,375.00	\$375.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	2 - Classroom 22	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
82	2 - Media Center	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	17	1.94	3,101	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	17	0.77	1,224	1.17	1,877	\$298	0	No New Controls	0	0.0%	0	\$0	\$1,530.00	\$765.00	\$2,295.00	\$255.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	2 - Media Center	1600	13W CFL	1	13	3	0.04	62	Replace	Philips LED A19 6W	1	6	3	0.02	29	0.02	34	\$5	0	No New Controls	0	0.0%	0	\$0	\$45.00	\$82.50	\$127.50	\$30.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
6	3 - Stair 4	2200	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	4	0.25	546	Re-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	4	0.12	264	0.13	282	\$45	0	No New Controls	0	0.0%	0	\$0	\$240.00	\$180.00	\$420.00	\$40.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Classroom 2	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	27	3.08	4,925	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	27	1.22	1,944	1.86	2,981	\$474	0	No New Controls	0	0.0%	0	\$0	\$2,430.00	\$1,215.00	\$3,645.00	\$405.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Classroom 2	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Classroom 3	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	19	2.17	3,466	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	19	0.86	1,368	1.31	2,098	\$334	0	No New Controls	0	0.0%	0	\$0	\$1,710.00	\$855.00	\$2,565.00	\$285.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Classroom 3	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Classroom 4	1600	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	19	2.17	3,466	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	19	0.86	1,368	1.31	2,098	\$334	0	No New Controls	0	0.0%	0	\$0	\$1,710.00	\$855.00	\$2,565.00	\$285.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Classroom 4	1600	13W CFL	1	13	2	0.03	42	Replace	Philips LED A19 6W	1	6	2	0.01	19	0.01	22	\$4	0	No New Controls	0	0.0%	0	\$0	\$30.00	\$55.00	\$85.00	\$20.00	18.25	\$0.00	\$0.00	\$0.00	FALSE	-
124	1 - Auditorium Lobby	2200	13W CFL	1	13	4	0.05	114	Replace	Philips LED A19 6W	1	6	4	0.02	53	0.03	62	\$10	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$110.00	\$170.00	\$40.00	13.27	\$0.00	\$0.00	\$0.00	FALSE	-
121	1 - Auditorium Lobby	2200	100W Incandescent	1	100	4	0.40	880	Replace	Philips 18W LED A-Lamp	1	18	4	0.07	158	0.33	722	\$115	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$110.00	\$170.00	\$40.00	1.13	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Auditorium Hallway	2200	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	6	0.68	1,505	Re-Lamp / De-Lamp	Seemart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	6	0.27	594	0.41	911	\$145	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
3	1 - Classroom 1	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	7	0.80	1,277	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	7	0.32	504	0.48	773	\$123	0	No New Controls	0	0.0%	0	\$0	\$630.00	\$315.00	\$945.00	\$105.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Classroom 7	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	7	0.80	1,277	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	7	0.32	504	0.48	773	\$123	0	No New Controls	0	0.0%	0	\$0	\$630.00	\$315.00	\$945.00	\$105.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Classroom 10	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Classroom 6	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Classroom/Conf Room 5	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Main Hallway	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	7	0.80	1,756	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	7	0.32	693	0.48	1,063	\$169	0	No New Controls	0	0.0%	0	\$0	\$630.00	\$315.00	\$945.00	\$105.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Classroom 8	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	6	0.68	1,094	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	6	0.27	432	0.41	662	\$105	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Boys Bathroom	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	502	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	198	0.14	304	\$48	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$90.00	\$270.00	\$30.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Custodian's Closet	400	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	1	0.11	46	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	1	0.05	18	0.07	28	\$4	0	No New Controls	0	0.0%	0	\$0	\$90.00	\$45.00	\$135.00	\$15.00	27.34	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Conference Room	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	456	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	180	0.14	276	\$44	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	36	\$6	\$180.00	\$90.00	\$270.00	\$30.00	5.47	\$50.00	\$50.00	\$100.00	\$20.00	13.98
3	1 - Main Office	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	547	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	216	0.21	331	\$53	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$135.00	\$405.00	\$45.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Storage	400	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	91	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	36	0.14	55	\$9	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$90.00	\$270.00	\$30.00	27.34	\$0.00	\$0.00	\$0.00	FALSE	-
3	1 - Stairway 31	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	752	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	297	0.21	455	\$72	0	No New Controls	0	0.0%	0	\$0	\$270.00	\$135.00	\$405.00	\$45.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
82	1 - Hallway 5	2200	4-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	4	114	6	0.68	1,505	Re-Lamp / De-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	3	45	6	0.27	594	0.41	911	\$145	0	No New Controls	0	0.0%	0	\$0	\$540.00	\$270.00	\$810.00	\$90.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						LIGHTING RETROFIT COSTS					LIGHTING CONTROLS COST					
			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, \$	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Total Materials	Total Labor	Total All	Smart Start Incentive	Simple Payback
12	1 - Girls Bathroom	2200	2-Lamp T8 Electronic 1x4 Pendant Prismatic Lens	2	62	1	0.06	136	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	66	0.03	70	\$11	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Special Ed 34	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Custodian's Office	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	3	0.34	684	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	3	0.14	270	0.21	414	\$66	6	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	54	\$9	\$270.00	\$135.00	\$405.00	\$45.00	5.47	\$50.00	\$50.00	\$100.00	\$20.00	9.32
3	B - Hallway 6	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	502	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	198	0.14	304	\$48	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$90.00	\$270.00	\$30.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Stairway 32	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	2	0.23	502	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	2	0.09	198	0.14	304	\$48	0	No New Controls	0	0.0%	0	\$0	\$180.00	\$90.00	\$270.00	\$30.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Cafeteria	2000	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	12	1.37	2,736	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	12	0.54	1,080	0.83	1,656	\$263	0	No New Controls	0	0.0%	0	\$0	\$1,080.00	\$540.00	\$1,620.00	\$180.00	5.47	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Basement Hallway	2200	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	7	0.80	1,756	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	7	0.32	693	0.48	1,063	\$169	0	No New Controls	0	0.0%	0	\$0	\$630.00	\$315.00	\$945.00	\$105.00	4.97	\$0.00	\$0.00	\$0.00	FALSE	-
6	B - Basement Hallway	2200	2-Lamp T8 Electronic 1x4 Surface Mount Prismatic Lens	2	62	1	0.06	136	Re-Lamp	Seesmart LED Tube 15W 4K bypass ballast and provide new tombstones	2	30	1	0.03	66	0.03	70	\$11	0	No New Controls	0	0.0%	0	\$0	\$60.00	\$45.00	\$105.00	\$10.00	8.49	\$0.00	\$0.00	\$0.00	FALSE	-
3	B - Art Room	1600	4-Lamp T8 Electronic 2x4 Recessed Prismatic Lens	4	114	9	1.03	1,642	Re-Lamp / De-Lamp / Reflector	Seesmart LED Tube 15W 4K with semi Specular Reflector Kit bypass ballast and provide new tombstones	3	45	9	0.41	648	0.62	994	\$158	0	No New Controls	0	0.0%	0	\$0	\$810.00	\$405.00	\$1,215.00	\$135.00	6.84	\$0.00	\$0.00	\$0.00	FALSE	-
109	Exterior - Main Entry	3000	Metal Halide 70W Wall Pack	1	92	1	0.09	276	Replace	RAB Exterior 12W LED Wall Pack	1	12	1	0.01	36	0.08	240	\$38	0	No New Controls	0	0.0%	0	\$0	\$182.00	\$90.00	\$272.00	\$100.00	4.51	\$0.00	\$0.00	\$0.00	FALSE	-
70	Exterior - Door H10	3000	1-Lamp 2-Pin CFI (26W)	1	26	1	0.03	78	Existing to Remain	Existing to Remain	1	26	0	0.03	78	0.00	0	\$0	0	No New Controls	0	0.0%	0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	-	\$0.00	\$0.00	\$0.00	FALSE	-
109	Exterior - Auditorium Entry	3000	Metal Halide 70W Wall Pack	1	92	2	0.18	552	Replace	RAB Exterior 12W LED Wall Pack	1	12	2	0.02	72	0.16	480	\$76	0	No New Controls	0	0.0%	0	\$0	\$364.00	\$180.00	\$544.00	\$200.00	4.51	\$0.00	\$0.00	\$0.00	FALSE	-
	TOTAL					535	61.1	102,147					533	24	40,391	37.1	61,756	\$9,819			9	2	488	\$78	\$48,985	\$23,838	\$72,823	\$9,795	6.42	\$600	\$450	\$1,050	\$80.00	12.51

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
Gordon Parks Academy	2870	SHARP ND-240QCJ	117	17.5	2,052	28.08	33,760	25.5	4,902	13.68



= Proposed PV Roof Layout

= Proposed PV Parking Layout

Notes:

1. Estimated kWh based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

Project Name: LGEA Solar PV Project - Gordon Parks Academy

Location: East Orange, NJ

Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	\$131,962
Annual kWh Production	33,760
Annual Energy Cost Reduction	\$5,368
Average Annual SREC Revenue	\$5,115
Simple Payback:	12.59 Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost (\$/kWh)	\$0.159	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value (\$/kWh)	\$0.152

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	\$0	0	0	0	\$0	0	0	0	0
1	\$0	33,760	\$5,368	\$0	\$8,440	\$7,765	\$5,597	\$445	\$445
2	\$0	33,591	\$5,529	\$0	\$8,398	\$7,420	\$5,943	\$564	\$1,009
3	\$0	33,423	\$5,695	\$0	\$8,356	\$7,054	\$6,309	\$688	\$1,696
4	\$0	33,256	\$5,866	\$0	\$6,651	\$6,665	\$6,698	(\$846)	\$850
5	\$0	33,090	\$6,042	\$341	\$6,618	\$6,251	\$7,111	(\$1,044)	(\$194)
6	\$0	32,924	\$6,223	\$339	\$6,585	\$5,813	\$7,550	(\$894)	(\$1,088)
7	\$0	32,760	\$6,409	\$337	\$4,914	\$5,347	\$8,016	(\$2,377)	(\$3,465)
8	\$0	32,596	\$6,602	\$336	\$4,889	\$4,853	\$8,510	(\$2,207)	(\$5,673)
9	\$0	32,433	\$6,800	\$334	\$4,865	\$4,328	\$9,035	(\$2,032)	(\$7,705)
10	\$0	32,271	\$7,004	\$332	\$3,227	\$3,771	\$9,592	(\$3,464)	(\$11,169)
11	\$0	32,109	\$7,214	\$331	\$3,211	\$3,179	\$10,184	(\$3,269)	(\$14,438)
12	\$0	31,949	\$7,430	\$329	\$3,195	\$2,551	\$10,812	(\$3,067)	(\$17,505)
13	\$0	31,789	\$7,653	\$327	\$1,589	\$1,884	\$11,479	(\$4,448)	(\$21,952)
14	\$0	31,630	\$7,883	\$326	\$1,582	\$1,176	\$12,187	(\$4,224)	(\$26,177)
15	\$0	31,472	\$8,119	\$324	\$1,574	\$424	\$12,938	(\$3,994)	(\$30,171)
Totals:		489,052	\$99,835	\$3,657	\$74,093	\$68,481	\$131,962	(\$30,171)	(\$135,538)
Net Present Value (NPV)								(\$20,267)	

PVWatts: Monthly PV Performance Data		Rooftop Array
Requested Location:	98 Greenwood Ave., East Orange, NJ	
Location:	NEWARK, NJ	
Lat (deg N):	40.7	
Long (deg W):	74.17	
Elev (m):	9	
DC System Size (kW):	28.08	
Module Type:	Standard	
Array Type:	Fixed (roof mount)	
Array Tilt (deg):	10	
Array Azimuth (deg):	180	
System Losses:	14	
Invert Efficiency:	96	
DC to AC Size Ratio:	1.1	
Average Cost of Electricity	0.16	
Initial Cost	No initial cost defined	
Cost of Electricity Generated	not determined	

Month	AC System Output(kWh)	Solar Radiation (kWh/m^2/day)	Plane of Array Irradiance (W/m^2)	DC array Output (kWh)	Value (\$)
1	1,793	2.39	74.17	1,886	285.02
2	2,126	3.17	88.64	2,230	337.99
3	2,961	4.07	126.24	3,101	470.78
4	3,284	4.83	144.98	3,440	522.21
5	3,880	5.70	176.64	4,059	616.98
6	3,811	5.94	178.16	3,990	605.91
7	3,782	5.77	178.77	3,959	601.27
8	3,499	5.38	166.77	3,661	556.37
9	3,014	4.65	139.55	3,155	479.19
10	2,495	3.61	112.05	2,616	396.74
11	1,636	2.35	70.54	1,725	260.09
12	1,480	2.01	62.39	1,564	235.27
Total	33,760	49.88	1518.89	35,386	5367.82